

Management Education, Training and
Development of Construction
Managers – Will They Ever Learn?

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*Management Education, Training and
Development of Construction Managers
- Will They Ever Learn?*

Definition and Mapping of Research Questions

Document 1

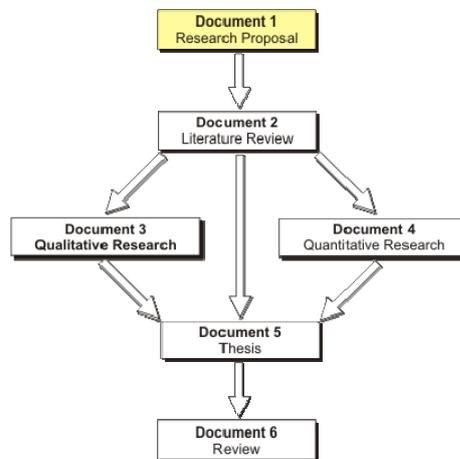
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Title: Management Education, Training and Development of Construction Managers - Will They Ever Learn?

Research Proposal



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1.0.2 List of Abbreviations and Acronyms

| | |
|------------|---|
| ALT | Association for Learning Technology |
| ASCILITE | Australasian Society for Computers in Learning in Tertiary Education |
| BBPN | Building Best Practice Network |
| CBP / CBPP | Construction Best Practice Programme |
| CEML | Council for Excellence in Management and Leadership |
| CIB | Construction Industry Board |
| CIC | Construction Industry Council |
| CIOB | Chartered Institute of Building |
| CITB | Construction Industry Training Board |
| CMI | Chartered Management Institute |
| DfES | Department for Education and Skills |
| DTI | Department of Trade and Industry |
| EC | European Commission |
| ECDGEC | European Commission Directorate-General for Education and Culture |
| ECDGESA | European Commission Directorate-General for Employment and Social Affairs |
| ICT | Information and Communications Technology |
| ILTHE | Institute for Teaching and Learning in Higher Education |
| ISP | Internet Service Provider |
| ITCBP | Information Technology Construction Best Practice |
| MSC | Management Standards Centre |
| NGfL | National Grid for Learning |
| PC | Personal Computer |
| PDA | Personal Digital Assistant |
| PDF | Portable Document Format |
| Ufi | University for Industry |
| UHIMI | University of the Highland and Islands Millennium Institute |
| UKeU | UK eUniversities |
| UKeUW | UK eUniversities Worldwide |

1.1 Introduction

This document sets out the aims and objectives of a research area that is of considerable interest to the author. This area is the impact and opportunities of new learning technologies for management training and development in the construction industry within the perspective of the provision of lifelong learning.

Within the bounds of this research proposal and the proposed research project the term ‘construction industry’ is taken to mean those involved in the physical production of buildings, including new-build, alterations and refurbishment works. It is the intention of the author to focus the research upon the market segment of ‘general contracting’ organisations, i.e. those undertaking commercial and industrial projects, rather than those undertaking house-building or civil engineering projects. It must be recognised that many organisations operate in more than one market segment.

Although an important part of the construction industry the author does not intend to include professionals and consultants such as architects, surveyors, civil and structural engineers in this research project as they do not normally undertake the actual physical building works themselves.

Whilst it is proposed that the research is limited to the ‘general contracting’ market it is intended that this area of research will be of interest and benefit to the following:

- Construction companies;
- Construction industry professionals;
- Construction trainers and developers;
- The academic community;
- Professional bodies and associations; and
- The author as a practising professional.

The research area will consist of a fusion of two main themes:

- Training and development for construction industry professionals to meet the future needs and requirements of the industry in the light of the Latham Report.
- New learning technologies, in particular the internet, for the delivery of management education, training and development by higher education institutions.

These areas will generate a number of research questions which the author believes are capable of sustaining a research programme throughout the next three to four years. These are stated in the sections concerning qualitative analysis, quantitative analysis and the thesis (Documents 3, 4 and 5).

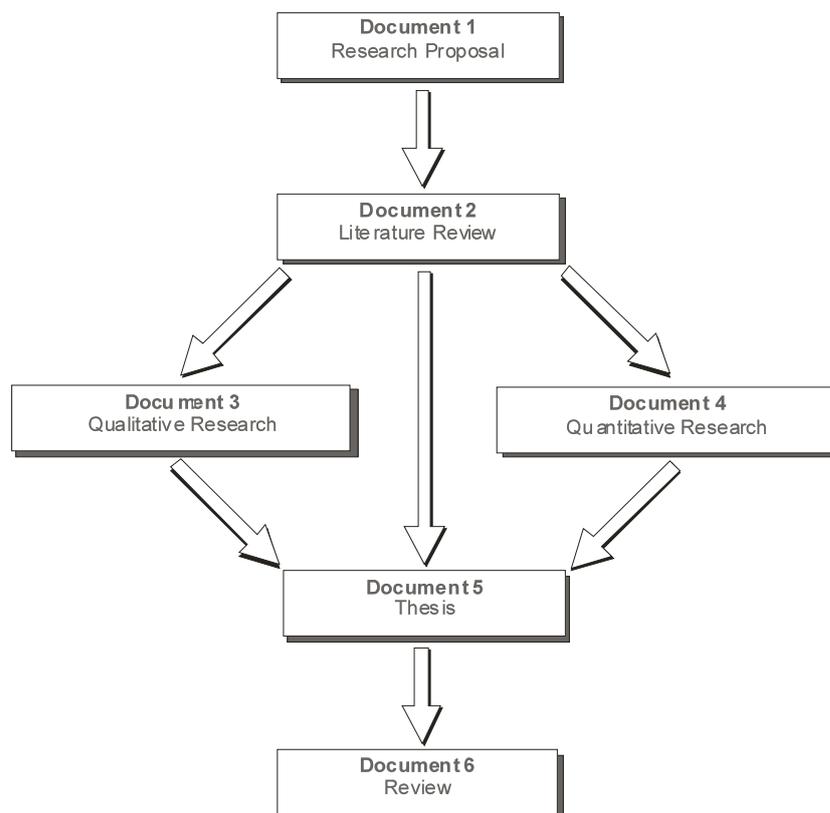


Figure 1.1 The Research Project Structure

Document 2: Literature Review will undertake a comprehensive review of published material in the two principal research areas, management education, development and training; and new information technologies for learning.

Document 3: Qualitative Research will concentrate upon the new learning technologies and their application to the construction industry.

Document 4: Quantitative Research will concentrate upon the management education, training and development skills needed for construction industry professionals.

Document 5: The Thesis will build upon the quantitative and qualitative research work to consider how the higher education sector can make best use of the new learning technologies to meet the needs of management education, training and development for life-long learning in the construction industry.

Document 6: The review does not constitute a part of the research project and is therefore not discussed in this document.

1.2 Construction Management Education and Training

In the 1994 final report by Sir Michael Latham, *Constructing the Team*, one of the issues raised was that of professional education. Although professional education within the construction industry was not the principal focus of this report Latham did however recognise the importance and need for more cohesively and better educated professionals within the industry.

This report gave rise to other reports and initiatives in response the major findings. The most well known and applicable of these are the reports in 1998 by Sir John Egan, *Rethinking Construction* and the 2001 National Audit Office report *Modernising Construction*.

Latham (1994, p74 para. 7.29.1) stated the following:

“Although there is little doubt that professionals need to understand more clearly about the role each other has to play in the building process, it is also important not to lose specialisms that are so important to the industry as it becomes more and more complex. Professional education needs to supplement these specialisms with a thorough grounding in management and financial training for all disciplines. (CIOB Evidence, March 1994.)”

The need for, amongst other things, ‘a thorough grounding in management training’ is clearly identified. From the author’s own experience in the construction industry from 1976 to 1991, it was noticeable that many senior managers at the time possessed little or no formal management education, and consequently saw little or no need for management education and training. This attitude might be considered a classic case of the ‘like me’ syndrome, where perhaps they regarded themselves as good managers, and not having received any formal management training themselves did not see the need for any management training. Unfortunately this is not a view necessarily shared by their clients and customers, or indeed some of their own employees.

Egan (1998, Ch 1, para. 4) also made the following observation in his discussion on the need to modernise:

“... there is a crisis in training. The proportion of trainees in the workforce appears to have declined by a half since the 1970s and there is increasing concern about skill shortages in the industry. Too few people are being trained to replace the aging skilled workforce, and too few are acquiring the technical and managerial skills required to get full value from new techniques and technologies. Construction also lacks a proper career structure to develop supervisory and management grades; ...”

Egan (1998, Ch 2, para17) goes on to state when considering the drivers for change and commitment to people:

“... It means a commitment to training and development of committed and highly capable managers and supervisors. It also means respect for all parties in the process, involving everyone in sustained improvement and learning ...”

Both Latham and Egan place a great pressure on the construction industry to adopt new modern working practices and cultures based on a spirit of partnership, trust and professionalism to produce a greatly improved level of efficiency within the industry, and the discarding of the old culture and ways of adversarialism, distrust and conflict.

Education and training will play a major part in reforming the industry if the findings of the Latham and Egan reports are to be realised. This will require not only the changing of the educational framework for professional education but also the re-education and retraining of those already entrenched within the industry.

A subsequent report by the National Audit Office to the House of Commons in 2001 again highlighted the problems with education and training within the industry (NAO, 2001, p28, para.1.15):

“Our discussions with 11 construction firms and 17 specialist contractors and consultants indicated they were concerned that the construction industry was unlikely to have sufficient appropriate skills covering all disciplines to implement improvements... Between 1994 and 1998 applications for construction related courses run by universities

for professional staff fell by 26 per cent and there is increasing concern that the industry is becoming increasingly reliant on a less skilled workforce.”

If, therefore, we will have to rely on a less skilled workforce entering the industry then clearly there is a case for increased in-service education and training. If the industry is to meet the demand being put upon it for increased performance and a more professional attitude then this will not be met by a less educated and less skilled workforce. What is being demanded is a better educated and more skilled workforce. It is the professionally trained graduate staff who will ultimately provide the majority of the management in the industry. If fewer graduates are being produced then the quality of management in the industry will ultimately deteriorate and do little to improve the productivity of the industry.

Such is the concern over levels of productivity in British industry that the government has commissioned Michael Porter to undertake a study of Britain's productivity gap. The trade and industry secretary, Patricia Hewitt, has blamed this productivity gap on 'poor' management performance (Fagan, 2002). At the time of writing Michael Porter has yet to publish his report, but Fagan predicts that it will not contain any startling new revelations about management performance.

This is further echoed by the draft report 'Rethinking Construction Education' commissioned by the Construction Industry Training Board (CITB) reported by Clark and Nikkhah (Building, 28/02/2003) that highlights the fact that if the number of students entering construction courses in Universities continues to decline at its present rate then there will be no students entering construction management degree courses after 2012.

Yet, from the Author's own experience, it is known that employers are desperate for graduate trainees for managerial positions and are already offering high starting salaries and lucrative packages to secure them. If construction employers are going to be unable to recruit graduates from the higher education sector they will need to satisfy their needs from other sources. These might include recruiting

unskilled/unqualified staff (school leavers) and training them in-house, recruiting graduates from other non-construction related courses and providing technical conversion courses, recruiting and retraining personnel from other industries and backgrounds, etc. The need for highly skilled management will have to be met from somewhere.

It is against this background that this research project will seek to establish what management education, training and development is, or will be, required to meet the future needs of the industry.

1.3 New Learning Technologies

The last few years have seen the development of a new set of opportunities for improving teaching and learning through the development of information technology; in particular that of web-based facilities, and high-speed data connectivity such as broad band, as well as corporate intranet systems.

With these has come the development of new teaching and learning environments, such as Nottingham Trent University's Virtual Learning Portal (VLP), and other patent systems such as Blackboard®. Although this research project does not intend to look at these systems as technology in its own right, it will consider the application and impact of them in the teaching and learning environment. It is predicted that VLPs will make a considerable impact on the way higher education is delivered as higher education institutions start to realise the power of the portal (Leon, 2003).

The importance of these technologies and their potential influence not only in education and training, but in industry and society as a whole, is recognised at the highest levels of the EC to the extent that it has launched and sponsored a number of initiatives and schemes to develop and deploy information technology throughout our society.

The EC Commissioner for Education and Culture, Mrs Viviane Reding (Reding, 2000a) stated that

“...new learning technologies are radically reshaping the society in which we live, and transforming the ways in which knowledge is created, exploited, transformed and shared. Education and training must adapt to these new and far reaching challenges, and join forces in a newly integrated approach to meeting the needs of the knowledge based society.”

The EC has launched its e-learning initiative (EC, 2000b) to accelerate the introduction of e-learning into schools and other places of learning. Whilst its primary intention is the introduction and development of ICT facilities within schools it will ultimately produce school and college leavers who are familiar the

concepts of ICT and e-learning. The intention of the initiative is to mobilise resources at national levels, backing them up with E.C. funding where nations are eligible.

In a subsequent speech Reding (Reding, 2000b) drew attention to the further problem in the education system that the e-learning system intends to address, that of:

“...the decrease in youth interest for scientific or technical subjects ... Students at High School are more interested by social sciences, law, finance, and business at large.”

There is clear evidence of this effect in the UK higher education sector with declining applications in science and technology based subjects, including construction, that have seen a 45% drop in applications from 1994 to 2000 (Clark, 2003). This problem is also highlighted by the Rethinking Construction *Respect for People* report (2002: 23) that quotes a 42% drop in construction degree course applications from 1996 to 2001.

Construction companies are not renowned for being at the forefront in the adoption of information technology. For many years the limit of information technology used tended to be a computer based accounting system. However, within the last ten years, construction firms have begun to wake up to the benefits of information technology. It is becoming more commonplace, even in small and medium sized construction companies and on construction sites, to find PCs linked to the main office by modem using analogue or digital telephone land lines. Even if no land line is available connectivity is still possible and easily available through the digital mobile phone network.

A company no longer even has to have dedicated phone-in connectivity as communication via third party Internet Service Providers (ISPs) using the internet is now readily available. These services can also be accessed through the digital mobile phone network using a PC, laptop or even a PDA (personal digital assistant).

With the recent launch of the 3rd generation mobile phones using a higher band width, ease of accessibility and communication will continue to advance. Already the distinction between a PDA and a mobile phone is beginning to disappear as the two technologies begin to merge. Furthermore with the advent of Bluetooth® technology cable connection between devices is no longer necessary as they communicate using radio frequency transmissions, albeit over short distances. Thus the technology exists for potential recipients in almost any location to access e-learning. There is still however the issue of the availability of e-learning material.

It is interesting, by way of comparison, to consider how the Australian higher education system has adopted and adapted to the use of new learning technologies. For a great many years the Australian education system has had to face the problems of delivering education to remote and isolated locations. Their experience in delivering education to such communities is, perhaps, not too dissimilar to that required in delivering education and training to people working on construction sites. ASCILITE (the Australasian Society for Computers In Learning In Tertiary Education) was established around 20 years ago, whilst by way of comparison the UK's ALT (Association for Learning Technology) was established just 10 years ago.

The Open University is the UK's longest established and most experienced provider of education using distance learning involving various learning technologies. Whilst the O.U. is a provider of essentially generic academic programmes and educational courses rather than vocational courses its immense experience in this field might suggest ways of effectively implementing e-learning for the construction industry.

Another project that will be considered is the University of the Highlands and Islands¹ project, making higher education more accessible to the remote, isolated and scattered communities of the Scottish highlands and islands. Here parallels might be drawn between the remote isolated communities of Scotland and the remote, isolated communities of construction workers. Again, lessons learned from this project might benefit the construction industry.

¹ Now known as the UHI Millennium Institute

In addition to the established academic institutions providing construction education there are many private commercial organisations providing management education and training. Whilst these are mostly not academically or professionally accredited, these providers frequently deliver their education and training direct to the workplace, or into the workplace environment. Many of these use modern learning technologies to deliver their training and many make extensive use computer based systems to deliver training direct to the employee's desk or home.

The author's experience in writing material for a provider of computer based training packages, Future Learning Systems Ltd, for some sections of a software training package called 'Project Curriculum', provided the author with a valuable insight into the pro's and con's of this type of education training. Additionally, the author has been able to adapt and extend the material written to produce a subject based web-site for students as a teaching support for project planning and control subjects (Hurst, 2002).

It is against this background that this research project will seek to establish what new learning technologies are available and how these new learning technologies might best be used to develop management education, training and development in the construction industry.

1.4 Document 2: Literature Review

The literature review will consider the parallel themes of construction management education, training and development, the use and application of learning technology and life-long learning. These themes are not entirely independent as there is a considerable interaction and interdependence between them.

The author has already collected a considerable number of reports, papers, articles, press releases, and web-site materials in these areas. These are being collated and reviewed, and this process will continue not only for the literature review required for Document 2, but throughout the quantitative research in Document 3, the qualitative research in Document 4 and the final thesis in Document 5.

To date the author has been concentrating on collecting reports and papers that have initiated many of the current initiatives in management training, and in learning technology. Many of these originate from the European Commission such as the Lisbon Initiative ‘eEurope – an Information Society for All’ (EC, 2000a); the report ‘Making a European Area of Lifelong Learning a Reality’ (EC, 2001) and many follow up reports and initiatives. Other reports and initiatives have stemmed from the UK government, some in response to EC initiatives and communications whilst others are in response to industry, such as the Latham Report (Latham, 1994) and the Egan Report (Egan, 1998). Other reports that may prove significant, such as Michael Porter’s report, have yet to be published.

Some of these reports have led to the setting up of a number of bodies such as Rethinking Construction, the Construction Industry Board, as well as best practice programmes such as the ‘Construction Best Practice’ all of which produce their findings and outcomes in reports, web sites and other publications. These are of value to the author because they reflect the current state of industry and thinking.

Other sources of authoritative information being collected are academic papers published in conference proceedings, journals, reports and publications from learned

bodies such as the Association for Learning Technology (ALT), and the Institute for Teaching and Learning in Higher Education (ILTHER); and professional bodies such as the Chartered Institute of Building (CIOB) and the Chartered Management Institute (CMI).

1.5 Document 3: Qualitative Research

The qualitative research element of the study will concentrate primarily upon the new learning technologies and their application to the construction industry management, education and training from a higher education perspective. It will seek to answer the question:

How might the new learning technologies be best used to develop management education training and development in the construction industry?

Research will be undertaken using the some or all of the following methods:

- Published work on new learning technologies;
- Interviews with learning technologists;
- Reviews / case studies of the application of new learning technology;
- Interviews with teaching and learning specialists; and
- Interviews with e-learning students.

The use of learning technology in education is continuously advancing. Its importance and development ranges from EC initiatives (EC, 2001) and reports (EC, 2000b) on a pan-European dimension through national scale and industry initiatives (ITCBP) to local initiatives (Hurst; 2002).

Laurillard (1993) considers how learning technology can be utilised by higher education. This often cited work sets down a framework for the use of learning technology in higher education but, since its publication, enormous advances in Information Technology have occurred. These should have made Laurillards's framework widely and easily implemented, yet the scope of adoption in higher education would appear to be much less than could have been predicted.

Only slowly are we beginning to see the emergence of degree courses being delivered or supported by e-learning and the new learning technologies. The author

will seek to establish which technologies are being used and how effective they are in the courses' delivery. In many instances, it would appear that the advent of the new learning technologies may have enabled the higher education institutes to reach a wider church, but initial research by the author would tend to suggest that these new technologies are simply being used as an alternative method of delivering existing academic material. Typically, this includes electronic copies of paper based lecture notes (Word documents or PDF files), PowerPoint slides, or simple html files. These are either delivered through some form of portal or a web-site created by a lecturer. Thus it appears that many of these systems are being used simply as repositories of electronic documents, rather than providing innovative teaching and learning through the e-learning environment.

However the technologies already exist for far greater expansion and development of e-learning. These include:

- Multi-media presentations;
- Streaming video;
- Web-cast lectures;
- Interactive web based tutorials;
- Chat rooms;
- Video conferencing; and
- Discussion groups.

The use of such technologies can have a significant impact on the way teaching and learning can be delivered to the remote and/or dispersed learner. An example of the way some of these technologies can be used is the MSc European construction management course, of which the author is the course leader; live web-casting of lectures is being delivered to students at Nottingham Trent University from Waterford Institute of Technology in Ireland (see Appendix 2).

The qualitative research will therefore examine these technologies and their use and implementation to answer the proposed research question. This research will be used

to provide a background in e-learning technology for the thesis consideration of life-long learning.

1.6 Document 4: Quantitative Research

The quantitative research element of the study will concentrate primarily upon the management education, development and training needs for construction industry professionals, and the future needs of the construction industry. It will seek to answer the question:

What management education, training and development is needed by the construction industry professional to meet the future needs of the industry?

Primary research will be undertaken using some or all of the following methods:

- Interviews with training and development managers and senior managers of construction companies;
- Interviews with training and education officers of professional institutions and organisations within the construction industry; and
- Surveys of senior managers in construction companies.

There have been a considerable number of initiatives over the last few years to increase the amount of education, training and development that takes place amongst workers of all levels to help maintain and develop their skills. Most of these initiatives have been given a broad collective label of 'lifelong learning' to promote the ideas that education and training are not done solely at the onset of one's career through school, college, university, etc., but should be a continuous process throughout that career.

Of the initiatives developed, many have been in response to the EC's reports into lifelong learning. These have been translated into national reports and initiatives, including the setting up of various bodies to develop and promote lifelong learning. Many of these bodies have been set up by the government or have been established through existing government agencies such as the Department of Trade and Industry and the Department for Education and Skills.

Some of these initiatives are not only aimed at improving education and training in industry, but also of improving the quality of products. These often feature 'Best Practice' programmes with the intention of disseminating 'Best Practice' within and throughout that industry.

Within these initiatives can be found bodies such as the 'Council for Excellence in Management and Leadership' (CEML), jointly established by the DTI and DFES. Typically these take a pan-industry and professional perspective, drawing upon and reporting best practices found in the business environment.

Other initiatives have been established in response to government reports. One such programme within the construction industry is the 'Construction Best Practice Programme' (CBP), a body funded by the DTI and steered by the government and industry. The CBP was initiated in response to the Egan Report, but also coincides with other initiatives such as the CEML.

The CBP programme has declared its aims to be:

- Raise Awareness - by encouraging people within the construction industry to rethink their approach to business and understand the benefits of best practice.
- Gain Commitment - helping companies to understand their potential for improvement, helping them to identify relevant opportunities and to get buy-in from the right people.
- Take Action - once convinced of the need for change, companies require assistance in choosing the right steps to take, and help in choosing and using the appropriate tools or techniques.
- Facilitate Sharing - sharing ideas and experiences is essential if best practice is to be adopted widely and quickly within the industry

(Source: CBP website)

Within the CBP programme are a number of other subsidiary, but no less significant, issues. One of these of particular interest to the Author is the Information

Technology Construction Best Practice programme (ITCBP). This is funded by the DTI and steered jointly by the DTI and the Construction Industry Board² (CIB).

In the construction industry not only do we have a well documented skill shortage at all levels, but a reluctance, if not resistance in some cases, to adopt new technology, and in particular information and communications technology. Indeed the managing director of the Author's last employers was actually very proud of the fact that he did not have, and never was going to have, a computer in his office. Such attitudes and intransigence are not uncommon amongst managers in the industry and may well be paralleled by similar attitudes towards education, training and development.

Thus a major initiative is required to get the industry to adopt the use of ICT and with this aim...

“The **IT Construction Best Practice programme** identifies publicises and supports the use of IT to improve business and management practices for the construction industry. The IT Construction Best Practice programme brings together **expertise, experience and guidance** from throughout the industry in a package that is sure to contribute to your business success.

This programme of products, events and guidance, many completely free of charge, will help you to:

- Learn from the success of others as told in IT Construction Best Practice case studies
- Assess how IT can contribute to your business success, and measure your progress with the self-assessment tool
- Adopt new techniques and practices with confidence gained from practical 'how-to' guides

Find out how companies, including your competitors, are developing their use of IT at regional events and company visits.”

(Source: ITCPB website)

² The CIB that was established to implement the findings of the Egan report was formally wound up on 29th June 2001, although its projects are continuing under the umbrellas of the CIC and the CITB

One of the aims of the ITCBP is to promote the benefits of ICT within the industry. Although the ITCBP programme will be more significant in the qualitative research aspects of this project its importance and impact and influence upon management education, training and development in the construction industry cannot be ignored in the quantitative research

The implementation of all of these aims requires education or re-education, training and development if they are to be successfully implemented. The quantitative research will therefore seek to identify those requirements.

1.7 Document 5: Thesis

The thesis will draw together, build upon and develop the work undertaken in the literature review, qualitative and quantitative research in Documents 2, 3 and 4, and will seek to answer the question:

How might the new learning technologies be best used by the higher education sector to help meet the need of management education, training and development for lifelong learning in the construction industry?

In considering this question the author will consider the practical applications and requirements of delivering management education, training and development; and meeting the needs of the construction industry for a lifelong learning environment.

Research will be undertaken using the some or all of the following methods:

- Quantitative research conducted previously and ongoing;
- Qualitative research conducted previously and ongoing;
- Published work on life-long learning technologies;
- Surveys and interviews with exponents, providers and users of life-long learning; and
- Reviews / case studies of the application of life-long learning.

Drawing upon the knowledge gained in the quantitative and qualitative research together with the author's own experience in industry and higher education it is hoped that a framework can be developed as a model for the development of higher education courses for in-service management education training and development in the construction industry.

There has been, and still is, an enormous amount of interest in the field of new learning technologies and higher education. Indeed, Laurillard (1993) highlights the

importance of universities adopting these new technologies to meet the demands of the new higher education market.

In his report to Parliament the Secretary of State for Education and Skills, Charles Clarke (2003: ch.3) stresses the importance of the relationships between businesses and universities in the exchange and development of knowledge and skills. If the needs and ambitions of lifelong learning are to be met then the higher education sector must develop these relationships with industry to enable and facilitate lifelong learning for management education training and development.

The importance of lifelong learning is recognised at European level by the EC with the publication of its initiative that proposes lifelong learning should encompass the whole spectrum of formal, non-formal and informal learning (EC, 2001: 3). The report further states:

“The clear message is that traditional systems must be transformed to become much more open and flexible, so that learners can have individual learning pathways, suitable to their needs and interests...”

(EC, 2001: 4)

These theories are reflected in current UK government initiatives to engender a UK lifelong learning culture through the DfES and to a lesser extent the DTI. The importance attached to the lifelong learning initiative is considerable, to the extent that the DfES has created its own web site dedicated solely to this issue (www.lifelonglearning.co.uk) and the promotion and implementation of lifelong learning.

A key issue in the development of lifelong learning is the development of an ICT network that is accessible to all, including potential lifelong learners. This is to be achieved through the creation of the ‘wired community’ with the provision of internet and e-mail access throughout the country and, in particular, disadvantaged areas, through the provision of cyber cafes, open access facilities in colleges, libraries, village halls, places of general public access, etc. (DfES, 2002a; DfES,

2002b). ICT access should therefore be available to all, particularly where it might not be available through home or work.

Whilst this initiative is primarily targeted at those with little or no formal educational qualifications or training, there are parallels that can be drawn with the construction industry where many managers lack formal academic qualifications and/or formal management education and training.

The provision of lifelong learning at higher education level has not been overlooked or ignored by the government. There are two initiatives that have created two new bodies that are of interest to the author:

- The University for Industry (UfI); and
- UK eUniversities (UKeU).

The UfI is a public-private partnership created to carry forward the government's vision of a 'University for Industry' to put individuals in a better position to get jobs, improve career prospects and improve business competitiveness (UfI, 2002) through its 'Learn Direct'³ programmes. These are intended to enable workers to undertake academic study in the workplace or home through a strategic partnership with partner higher education institutions. Many of these courses are generic in nature and delivered on-line.

The UKeU has been created to provide a portal to enable universities to deliver degree level learning to both the UK and worldwide markets. The UKeU has three principal goals:

- “... [to] provide the means for overseas students to access UK university degrees and engage in degree-level learning whilst continuing to live and work in their own countries.
- ... to help broaden access for UK students to university education with the same on-line courses.

³ The University for Industry publishes its materials, courses, etc., under the brand name 'Learn Direct'

...[to] provide business and industry with degree level content from the best institutions, integrated as customised modules into corporate education and Continuous Professional Development (CPD) programmes.”

(UKeU, 2003: 1)

The latter two goals are of particular interest to the author as they may provide a vehicle for delivery of construction management education, training and development to the construction industry.

It is against this background that the thesis will consider the provision of lifelong learning for management education, training and development for the construction industry.

1.8 Outcomes

On completion of this thesis (Document 5) it is anticipated that the author will have answered the research question and that the following outcomes will have been achieved:

- A thorough knowledge and understanding of the education, training and development needs of construction industry professionals;
- A thorough knowledge and understanding of how the new learning technologies can be best used by the higher education sector to help meet the needs of management education, training and development;
- A thorough knowledge and understanding of the concept and application of life life-long learning and how it can be best applied in the construction industry;
- A thorough knowledge and understand of how the educational, training and development needs of construction industry professionals can be best serviced by the new learning technologies to provide an environment of life-long learning; and
- The creation of a framework or model for the development of higher education courses for in-service management education, training and development in the construction industry.

In addition to the above the following generic outcomes should be achieved form this research project:

- The ability to undertake doctoral level research projects;
- The ability to produce a doctoral thesis and publications at doctoral level; and
- The opportunity to publish papers in the field that will be of interest to the academic, construction professional, professional institutions.

1.9 References

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APPENDIX 1A.1**MSc European Construction Management Web Casts**

The MSc European Construction Management programme is a three-centre programme run jointly by Nottingham Trent University's School of Property and Construction, Fachhochschule Karlsruhe and the School of Engineering at Waterford Institute of Technology, Waterford Ireland. The course has been running for ten years, having been initially developed from an Erasmus funded student mobility programme.

Students on the MScECM programme undertake the first term (September to December) of their studies in Nottingham, the second term (January to March) in Waterford and the third term (April to July) in Karlsruhe. A fourth term (July to September) is spent at one of the institutions of their own choosing where the language spoken is not the student's native language.

In November 2002, after the students had commenced their studies in Nottingham and submitted visa application for Ireland, the Irish Government changed its visa regulations and requirements for students studying in Ireland with effect from January 1st 2003. When the students applied for Visas in October the waiting time for an Irish visa was four to five weeks. This subsequently increased to ten weeks in November and then by December it became six to eighteen months.

This created a severe problem for the students who needed visas (seven non-EC students) and the course providers. Seven out of twenty-two students were unable to get visas to continue on the course in Waterford. This was an entirely unprecedented situation as in the previous nine years the course has run there has never been a single problem in obtain visas for students to study in Ireland. The course has had students from 19 countries as diverse as Chile, Nigeria, Russia, Mexico, Trinidad, Brazil.

Thus late in December 2002 the course team had to find away of supporting those students without visas for Ireland. Staff commitments and financial constraints meant that NTU was unable to deliver an effective alternative lecture programme at such short notice. However it was felt that all institutions were obliged to cater for these students as they were in effect victims of an unprecedented situation totally beyond their control.

The outcome of much discussion between Waterford and NTU was that lectures would be broadcast live from Waterford using a web-based video link. This was quickly and easily established, and has been functioning since the start of the term. Problems have been remarkably few and the system has been far more successful than anyone originally envisaged. The principal problem is that it is a ‘one way’ system, students can see and hear the lectures but cannot interact as there is no video feedback system. However, immediate problems are usually dealt with by students’ text messaging their fellow students in the classroom in Waterford.



The pictures above show the classroom arrangement in Waterford and the web-camera arrangement, together with the receiving arrangement in Nottingham below.



This appendix will be developed and extended to form a case study to be jointly published by the author and his counterpart in Waterford. This case study will feature in the thesis.

**Nottingham Trent University
The Nottingham Business School**

Doctor of Business Administration Programme

***Management Education, Training and
Development of Construction Managers
- Will They Ever Learn***

Literature Review

Document 2

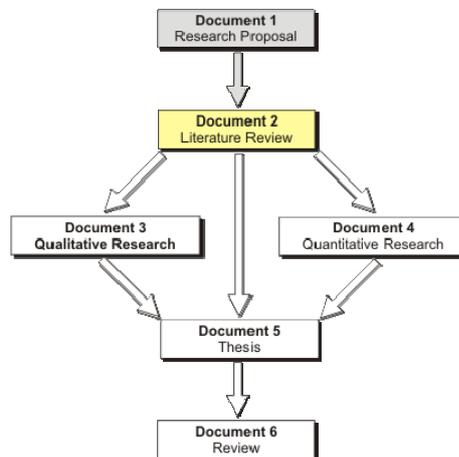
**A.G. Hurst
N0013040
October 2003**

NOTTINGHAM
TRENT UNIVERSITY 

This document is submitted in fulfilment of Document 2, being a partial fulfilment of the Doctor of Business Administration programme.

Title: Management Education, Training and Development of Construction Managers – Will They Ever Learn?

Literature Review



Supervisors: Professor Alistair Mutch
Professor Myra Hodgkinson

October 2003

A.G. Hurst MSc, MBA, MCIQB, MAPM, MCMI

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2.0.1 List of Acronyms and Abbreviations

| | |
|------------------|---|
| APTC | Administrative, Professional, Technical and Clerical |
| BEC | Building Employers Confederation |
| CBPP | Construction Best Practice Programme |
| CEBE | Centre for Education in the Built Environment |
| CEC | Council of the European Commission |
| CEML | Council for Excellence in Management and Leadership |
| CFL | Computer Facilitated learning |
| CIC | Construction Industry Council |
| CIOB | Chartered Institute of Building |
| CIPD | Chartered Institute of Personnel and Development |
| CITB | Construction Industry Training Board |
| CMC | Computer Mediated Conferencing |
| CMI | Chartered Management Institute |
| CPD | Continuing Professional Development |
| CSR | Corporate Social Responsibility |
| DfES | Department for Education and Skills |
| DOE | Department of the Environment |
| DTI | Department of Trade and Industry |
| DTLR | Department of Transport Local Government Regions |
| EFQM | European Foundation for Quality Management |
| EP | European Parliament |
| FEDA | Further Education Development Agency |
| HEI | Higher Education Institute |
| HESA | Higher Education Statistics Agency |
| HMSO | Her Majesty's Stationery Office |
| ITCBPP | Information Technology Construction Best Practice Programme |
| KPI | Key Performance Indicator |
| KPR | Key Performance Result |
| LTSN | Learning and Teaching Support Network |
| M ⁴ I | Movement for Innovation |
| PCAS | Polytechnics Central Admission Service |

UCAS Universities Central Admission Service

UCCA Universities Central Council for Admissions

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2.1 Introduction

This document reviews literature in support of the author's research into management education, training and development in the construction, and how a new paradigm for this might be created through the learning organisation, lifelong learning, the use of the new e-learning environments and ICT technologies. The author is aware of the two variant spellings, 'organization' and 'organisation', and has opted to use the spelling used in the publication being reviewed, which may be either 'organization' or 'organisation', whilst the spelling 'organisation' will be used by the author.

This literature review seeks to identify key issues and themes around which future research will be based. It reviews pertinent literature from a range of sources including EC and national government reports, privately sponsored reports, academic journal articles, books, web articles and conference proceedings. By its very nature this review is not an exhaustive review of every article and publication ever written on the subject. Given the time frame for the review and the currency of many of the key issues there is an ongoing publication of articles, papers, reports, conferences, etc., no review ever could be complete. The author has tried to identify key issues, themes and authors in the chosen areas.

The literature review had been carried out under three main headings which form the principle chapters:

- The Construction Industry and Higher Education
- Learning Organisations and Lifelong Learning
- e-Learning and the New Learning Technologies.

The literature review concludes, as might be expected, with conclusions and recommendations for further review and research.

Chapter 2.2 The Construction Industry and Higher Education

This chapter reviews literature that sets the backdrop for the construction industry and higher education against which future research will be undertaken.

Given the construction industry's alleged poor performance record, the latest government (through the DTI) sponsored reports, Egan (1998) particularly and indirectly Latham (1994) are considered from the perspective of how productivity might be improved through improved management education, development and training. This review also considers the initiatives that have arisen as a consequence of Egan and Latham, namely 'Rethinking Construction' and the 'Council for Excellence in Management and leadership'. A number of papers and journal articles around the issues raised by rethinking Construction and CEML are considered. Other initiatives, such as the Construction Best Practice Programme (CBPP), and the Information Technology Construction Best Practice Programme (ITCBPP) are not reviewed here as they were deemed too operational in objective, but will be considered in subsequent stages of the research.

The changing shape of the construction industry is then reviewed through analysis of government statistics on employment within the construction industry. The changing patterns of employment are considered and particularly that of the APTC component which includes construction management. The effects of the 'boom and bust' cycle, for which the industry is notorious, and its affect on employment are considered together with the effects of the move from direct employment to subcontract employment within the industry. A number of papers and journal articles on these topics are reviewed.

The state of higher education for the construction industry is then reviewed from the perspective of the decline in applications for construction management courses, and two important reports, Lighthill (1986) and Coulter (2003) are reviewed. UCAS statistics are analysed to show how the profile for applications to construction management courses is changing. A comparison is then made the between the government's employment statistics for the construction industry and the UCAS

statistics for applications for construction courses, for any discernable pattern or trend, although no detailed statistical analysis is made at this stage, as it lies outside the remit of this document.

Conclusions are then drawn for this section of the literature review.

Chapter 2.3 Learning Organisations and Lifelong Learning

This chapter reviews literature in the fields of learning organisations, including continuous professional development (CPD), which is identified in the previous chapter as essential to future management education, training and development. The concepts of the ‘learning organisation’ are considered and differentiated from those of ‘organisational learning’. A number of learning organisation models are identified together with their key characteristics, how a learning organisation might be created, and the reasons why a learning organisation might fail. The models of learning organisations identified are reviewed together with papers and academic journal articles discussing the concepts and applications of learning organisations and lifelong learning, which will form a key part of future research.

The concept of lifelong learning is then considered as it too has been identified as a key component of the future development of management and the workforce, both the EC and national government. EC and national government agency reports are reviewed as the agencies provide both the funding, the drivers for change and the implementation of lifelong learning. Lifelong learning is then considered in terms of formal, informal and non-formal learning as all of these can contribute to workplace learning. A model of the informal and informal learning system is provided. Lifelong learning is seen as helping the needs of the present and future construction industry workforce as many of the e-learning and new learning technologies that are considered in the next chapter facilitate the lifelong environment.

Empowerment of workers is then discussed as a key element to the creation of a learning organisation, as workers need to be empowered and motivated if a

commitment to lifelong learning is to be achieved, and a model for empowerment of workers in this environment is provided. A number of papers and journal articles in this field are reviewed before the subject continuing professional development is considered within the context of a lifelong learning activity, as for many this is the first step towards lifelong learning.

Conclusions are then drawn for this chapter of the literature review.

Chapter 2.4 e-Learning and New Learning Technologies.

This chapter reviews literature commencing with differentiating between the terms ‘distance learning’, ‘open learning’ and ‘flexible learning’, as well as between the terms ‘distance education’ and ‘distance learning’. The relationship between ‘flexible learning’ and ‘e-learning’ is provided through the use of a taxonomy of educational forms and a comparison of traditional classroom based education and distance education.

This chapter does not review the pedagogy that surrounds these issues even though a considerable amount of literature was found for this, but seeks to retain a strategic approach to the subject area. A consideration of the pedagogical issues was deemed too operational at this stage within the context of this research project although consideration of some of these issues will have to be made in a future stage.

The implications and impact of e-learning for traditional universities and higher education is reviewed before considering the drivers for change towards e-learning. Reasons for not adopting e-learning (restraints) are also reviewed together with the barriers to e-learning. A model of the driving and restraining forces for e-learning is provided. Strategies for the implementation of e-learning are reviewed.

As with pedagogy, the technical detail of implementing e-learning systems and its associated ICT provision have consciously not been reviewed here as the author considers them far too operational in detail at this stage of the research project, even

though a great detail of literature has been published in this area. Some of the technical and ICT issues will have to be considered at a future stage of this research project.

The new subject area of mobile learning (M-learning) is reviewed here as an emergent technology that is likely to have a considerable future impact on lifelong learning and e-learning, although as yet there is only a very small amount of literature published in this field. The author was fortunate to be able to attend the 2nd M-Learn conference held in London in May 2003, which provided a valuable insight into this emergent subject. However many of the papers presented were of a highly pedagogical or technical nature.

Conclusions are then drawn for this chapter of the literature review.

2.2 The Construction Industry and Higher Education

2.2.1 Introduction

This chapter reviews literature concerning the following aspects:

1. The evolution of the employment structure of the construction industry,
2. The evolution of recruitment to construction management degree courses,
3. Government agencies initiatives and agendas to improve performance within the construction industry.

Reports sponsored by government, such as Latham and Egan, are considered, along with their resultant initiatives and agendas such as Rethinking Construction which has been charged with the objective of improving the productivity of the construction industry, and the CEML, through improvements in management education, training and development.

Government agency (DTI) statistics are reviewed and analysed to determine the patterns and trends in employment in the construction industry. Particular attention is paid to the change from direct employment to self-employment and subcontracting, and the changes in APTC staffing. The effects of the industry's 'boom and bust' cycle is considered. UCAS statistics for recruitment to higher education degree courses in construction management and civil engineering courses are reviewed and analysed to determine the patterns and trends of recruitment, and the ensuing implications for the construction industry.

Finally a comparison is made between the patterns and trends in construction employment and recruitment to construction management degree courses.

2.2.2 Government Concerns

The Government has long been concerned with the UK's poor productivity performance and the belief that weak management and leadership across both the public and private sectors are partly responsible (CEML, 2001, p14). Horne and

Steadman-Jones (2001, p60) report that in more than 75% of organisations leadership development is seen as a low priority and that there was little or no framework for leadership development.

The construction industry employs around two million of the country's workforce and contributes 8% of the county's GDP and a successful construction industry is key for government, according to Stephen Timms MP, Minister of State for e-Commerce and Competitiveness (Timms 2002). Yet the construction industry is one that traditionally has few barriers to entry, poor working conditions, a large transient workforce, high labour turnover with poor job security, subject to regular periods of boom and bust, low profit margins and has a poor image in the public's perception. The industry, to all accounts, seems to be in a state of perpetual turmoil and crisis.

Over the years, the construction industry has been the subject of many enquiries into its working practices and productivity, Emerson (1962), Banwell (1964), Tavistock (1966), etc. More recently two major reports on the industry have been produced, Latham (1994) and Egan (1998).

Egan (1998, para. 17) identified a number of 'Drivers of Change' that he believed were essential for the future of the construction industry. These are:

- Committed leadership
- A focus on the customer
- Integrate the process and the team around the product
- A quality driven agenda
- A commitment to people

Upon the commitment to people in the construction industry Egan (1998, para. 17) states:

This means not only decent site conditions, fair wages and care for health and safety of the workforce. It means a commitment to training and development of committed and highly capable managers and supervisors. It also means respect for all participants in the process, involving everyone in sustained improvement and learning, and a no-blame culture based on mutual interdependence and trust.

In his commentary upon this driver for change he notes that 'much of construction does not yet recognise that its people are its greatest assets and treat them as such.'

Too much talent is simply wasted...'. Egan's report (1998, para. 86) further envisaged the creation of a 'movement for change as a group of people, '... who are committed to improving the delivery of their projects and the performance of their companies by applying the ideas that the Task Force has set out.' Egan recommended that the movement should be open to all who are able to demonstrate commitment to a number of agendas including 'training all their staff fully and providing them with conditions of employment and facilities that enable them to give of their best.'

The movement that Egan recommended was created and operates under the banner of the Rethinking Construction initiative created to implement the findings of Egan, and has become known as the Movement for Innovation (M⁴I). Within M⁴I this led to the establishment of the 'Respect for People Working Group' which in November 2000 published its first report 'A commitment to People "Our Biggest Asset"'. The importance of the 'Respect for People' agenda has now been recognised and in Rethinking Construction's report (2002, p8) career development and lifelong learning are clearly identified as one of its seven key themes.

In late 2001 a national debate entitled 'Rethinking the Construction Client' was held by Rethinking Construction (2001) initiative to consider the developments in the industry in the three years since the Egan report was published. Although primary focus of the debate was those in the public sector, and those who receive public sector funding for construction its output is relevant to all those in the construction industry. The debate concluded with the publication of six key guidelines (Rethinking Construction, 2001, p3), of which Guideline 6 states that 'culture and processes should be changed so that collaborative rather than confrontational working is achieved.' Two of the four major factors identified within this guideline (Rethinking Construction, 2001, p10) are:

- training in the skills for collaborative working,
- creating an environment in which people can expect support rather than blame.

These are in turn supported by four key points of which two are of particular note:

- organisations embracing change will need to invest in communication and training to change habits and behaviours. Staff need to understand why they need to change and how they can (but it is inevitable that some will never change).
- The skill required to work in a new culture and to create the environment for change and innovation need attention.

Rethinking Construction recognise that change will not succeed unless employees have the knowledge and skills required to work in the proposed new environment. This also requires organisations not only to have the right business processes and technologies, but for each individual to have the requisite skills and knowledge. Training and education will be essential to provide new job skills, but also for a new collaborative working environment.

Latham (1994) reported that industry must adopt new working practices and relationships within the industry if it is to break away from its traditional adversarial nature and meet the future needs of and demands of its clients and society, i.e. a new socially responsible non-adversarial culture is required. This will require the education, training and development of construction managers, not only those entering the industry, but also of those already established within the industry (Kumaraswamy (1998, p264). Powell (1998, p514) observes that:

‘traditionally ‘Building management’ has been concerned with the practicalities of construction – the making real of architectural intention ... its people understand well the constructional resources needed to bring building into being.’,

but he does concede that the industry has changed in the last 30 years or so and that

‘today it is a much more focussed on the ‘hard’ issues [planning, organising, coordination, productivity, minimising cost, maximising value, integrity in making and honouring contracts, quality of work, service, safety, delivery on time]. It speaks of its professionalism more in terms of its ethics and services to humanity.’

and that the industry and its managers also need to be educated in the latter.

Putt (1998, p456) draws similar conclusions questioning the nature of professionalism within the industry and the role of education. He argues that the advent of continuing education, CPD and lifelong learning will bring about the

changes necessary as in part a response to meeting the new needs of society, a point emphasised by Timms (2002).

The Government's concern over low productivity and its belief that this was in part due to weak management and leadership led in April 1999 to the creation of the Council for Excellence in Management and Education (CEML), with a remit to:

review both the provision of management and leadership development, and the demand for it by:

- Examining the way management education is organised and delivered, with reference to provision both within and outside business schools
- Reviewing the quality, relevance and support for management and leadership education
- Considering the role of the professions in management and leadership development
- Identifying key stakeholders and challenging them to take action.

(CEML, 2001, p4)

Horne and Jones (2001, p45) in their study for the Institute of Management, sponsored by the DTI and DfES, report that there were considerable concerns over the quality of leadership in UK organisations, with up to half the managers in the organisations surveyed rating the quality of leadership in their organisation as poor. Leaders in the public sector were rated considerably lower than those in the private sector by their subordinates. Horne and Jones (2001, p49) further report that around half of managers thought that their employers gave a low priority to leadership development, and only around a quarter believed that 'there was a clear and articulated framework for development.' They further report (2001, p45) that whilst the largest organisation often had formal staff development programmes and leadership training budgets, the small organisations perceived leadership development to be a higher priority than that found in larger organisations.

Scott et al (1997) found in their study that older and more experienced managers and engineers were more resistant to training and the introduction of new concepts and ideas, and attended for fewer training courses than younger less experienced managers and engineers. They noted with dismay that although they all (managers and engineers) recognised that training was an essential component of providing a competitive edge, the older and more senior the manager or engineer the more

resistant they were to changes, and that it was generally the senior managers and engineers whose views dominated and held sway over their organisations. Given the aging profile of the construction industry this does not appear to bode well for the future of the industry.

Following the publication of its consultation document in 2001 the CEML published its report in 2002 (CEML, 2002a; CEML, 2002b). Amongst its thirty recommendations are a number relating to not only to the provision of higher education but also relating to in-service training and the use of e-learning technology.

Whilst the subject of learning technology was outside the remit of Horne & Jones' study they did examine the types of leadership training and development opportunities available to managers (2001, p52). They report that both formal and informal training and development occurred within organisations. Formal training, such as MBA type programmes, tended to occur in the higher levels of management whilst in the lower levels more informal methods such as mentoring, action learning and feedback systems were prevalent.

Keep, Mayhew and Corney (2002) study confirms that formal and certified education and training is easily quantifiable and easily shown to improve productivity and job satisfaction, but raise the issue that informal learning which makes up the majority of workplace learning is not easily quantifiable.

The Government in its response (DTI, 2002b, p12) commented that 'improvements in management and leadership will only happen if employers, facing day to day realities of running their organisations see a value in making such improvements.' It acknowledges that much needs to be done in raising awareness in the potential for a better skilled and qualified workforce to provide improved productivity and job satisfaction. Horne and Jones (2001) report similar findings.

Rethinking Construction (2000, p9) note the 'those who fail to improve their attitude and performance towards **respecting** people will fail to **recruit** and **retain** the best

talent and business partners. The cost to a business of such a failure can only be guessed.’ They further state that these ideas can be applied to any organisation, whether large or small, and the benefits will be seen quickly, noting that the benefits of ‘improved safety, health, working conditions, investment in training and a more diverse workforce will be appreciated, increasingly leading to financial success’.

In order to increase the awareness of the benefits of education, training and development of the workforce Rethinking Construction (2000, p9) proposed the use of the ‘business case’ model (see figure 2.1) to promote their ‘respect for people’ agenda. Claims made are that by adopting the business case model:

eventually all those working in a firm or project will enjoy a level of professionalism unknown in the past leading to benefits such as:

- A better standard of work
- More cost effective projects
- Fewer delays and expensive mistakes
- Fewer accidents and less ill health
- Reduced staff turnover
- Earlier completion dates
- An advantage over competition
- More repeat business

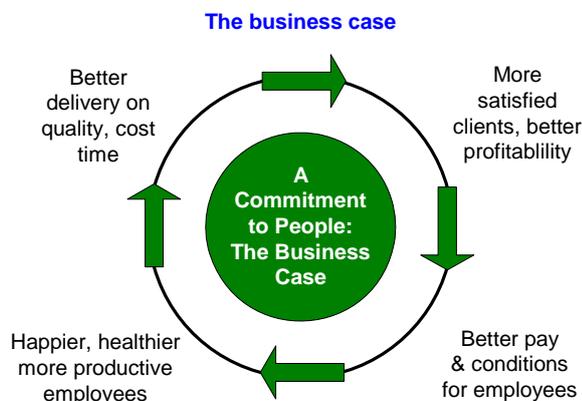


Figure 2.1 The Business case model.
Source: Rethinking Construction (2000)

Rethinking Construction (2000, p14) set the business plan within the European Foundation for Quality management (EFQM) Business Excellence Model (see figure 2.2) and identify six action themes that the construction industry needs to adopt to meet its future needs of excellence.

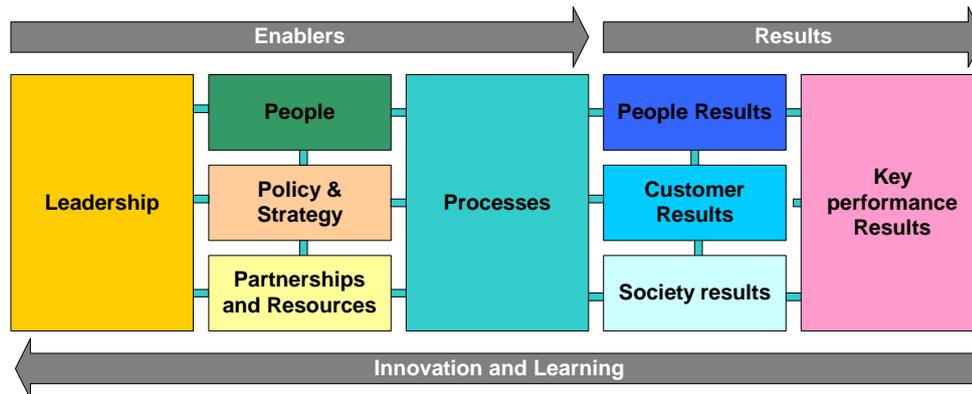


Figure 2.2 The EFQM model
Source: Rethinking Construction (2000)

These six action themes are:

- Diversity in the workplace
- Site facilities and the working environment at site level
- Health
- Safety
- Career development and lifelong learning
- The working environment off-site

(Rethinking Construction 2000, p15)

It is this fifth action theme that is particular interest to the author for future areas of this study. Rethinking Construction (2000, p15) propose the creation of self-assessment 'toolkits' for employers to use to help reach their Key Performance Results (KPRs). Both toolkits and the KPRs have been developed with the objective of employers obtaining the 'Investors in People' quality standards and ISO 9000 – 2000.

In their follow-up report Rethinking Construction (2003, p18) state that 130 organisations had trialled a suite of draft toolkits for the Respect for People agenda. It is perhaps not surprising to note that the main area of focus of those who adopted the toolkits was health and safety, although it is reported that those in the trial also noted:

- Many clients and others now recognised that having a stable workforce, willing to go the extra mile impacts positively on time and cost, predictability, quality and customer satisfaction. The image that employees portray of the organisations that they inhabit has an overall effect on business.
- Employment in the construction industry remains unrepresentative of the general labour force. Employers could be losing out on considerable proportions of the available workforce.

- If pay, conditions, health, safety, career development and other concerns are effectively dealt with the organisation will be a more attractive proposition for talented employees.
- Reduction in occupational health problems will reduce costs to industry and improve performance. Good health and safety management is good commercial management.

Rethinking Construction (2003) report that there is clearly some way still to go if performance improvement in the construction industry is to be achieved and underpinned by an ability to recruit and retain sufficient numbers of appropriately skilled and motivated people. The industry's significant underperformance limits its ability to embrace change, characterised by poor image, low levels of investment in training and development, and poor health and safety performance.

2.2.3 The Changing Shape of the Construction Industry

Indeed the predicament facing the construction industry has not escaped the Government's notice and they have expressed their concern in the steady decline in the numbers of entrants to construction related degree courses, particularly because of the aging workforce in the industry and the increasing level of employment in the industry (DTI, 2003b).

In order to establish how the structure of the industry is changing and how it changed during the periods cover by the reports of Lighthill, Fairclough, Coulter and Wilkie & Giddings the Government's annual statistics for the construction industry, 'The Housing and Construction Statistics' (DOE, 1979 - 1991) and latterly the 'Construction Statistics Annual' (DTI/DLTR, 2002) enable a profile of employment in the industry to be constructed. Whilst comprehensive employment statistics are produced for the many trades and crafts within the industry these reports contain very little information about the managerial structure of the construction industry. Until 1989 the DOE produced a breakdown of the APTC employment figures, but since 1990 the figures produced merely report the overall level of APTC (administrative, professional, technical and clerical) staff employed, and it is in these positions ultimately that construction graduates will ultimately be employed. Thus monitoring the trend of management employees in APTC employment has become impossible. Figures 2.5 and 2.6 shown the breakdown of the APTC employees from 1974 –

1989. The employment data for these figures can be found in table 2.03 in appendix 2.7.3

Figure 2.3 below shows the trends in employment since 1969. The cyclical nature of the industry with period of ‘boom and bust’ are clearly evident with the recession of the early 1990’s during which some 500,000 jobs were lost in the construction industry. The employment data for this graph can be found in table 2.03 in appendix 2.7.2

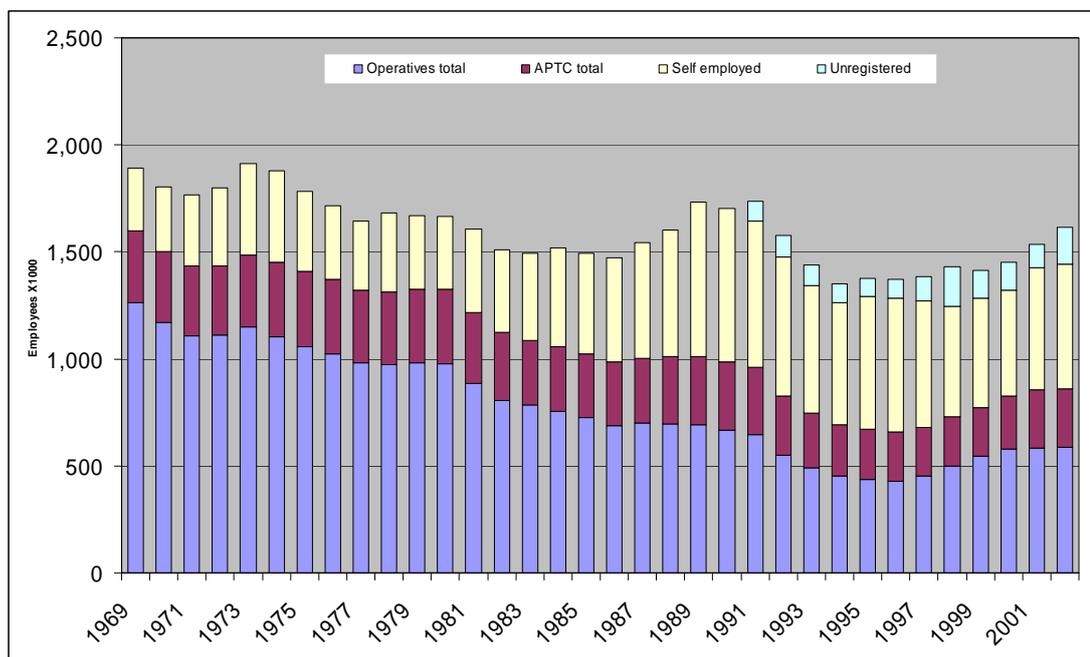


Figure 2.3: Employment within the construction industry
 Source: DOE Housing & Construction Statistics & DTI Construction Statistics Annuals

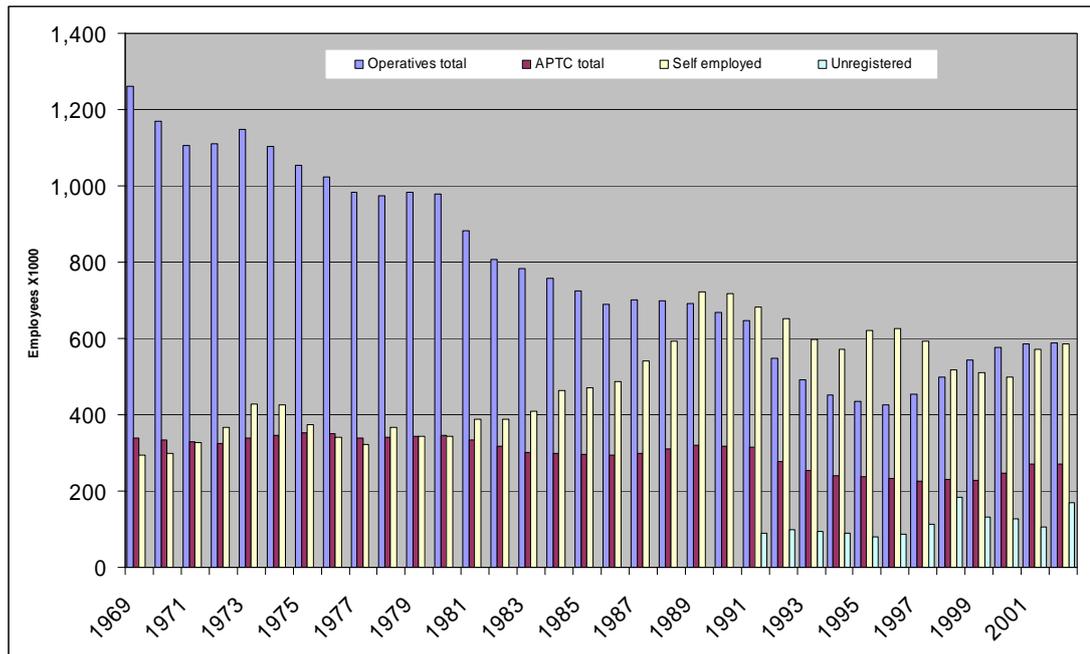


Figure 2.4: Employment within the construction industry

Source: DOE *Housing & Construction Statistics* & DTI *Construction Statistics Annuals*

Figure 2.4 above shows how the industry employment structure has changed since 1969, whilst figures 2.5 and 2.6 below show the changes in the composition of APTCs. Particularly noticeable is the move away from directly employed operatives towards self-employment in the 1980s however recent tax changes have begun to reverse this trend (Briscoe, 1998, p506). However self-employment is not limited to operatives, but also includes some APTCs, although the practice of self-employment amongst APTCs is not widespread (Winch, 1998, p532). Janssen (2000, p716) however expresses concern about the rise in self-employment, not only amongst 'itinerant building workers', but in the use of 'contract work or task work, casual employment and agency labour or, at the professional level, domestic work and freelance employment'. Concern is expressed not only about the effects on productivity but also on education and training in the construction industry.

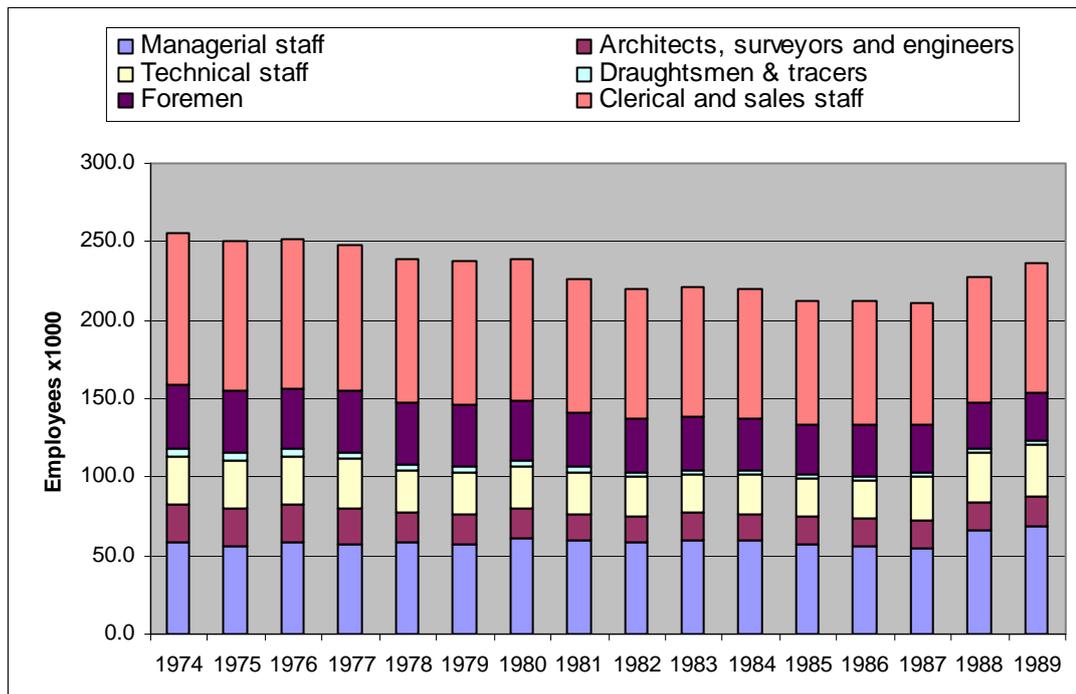


Figure 2.5 APTC employment
Source: DOE Housing and Construction Statistics

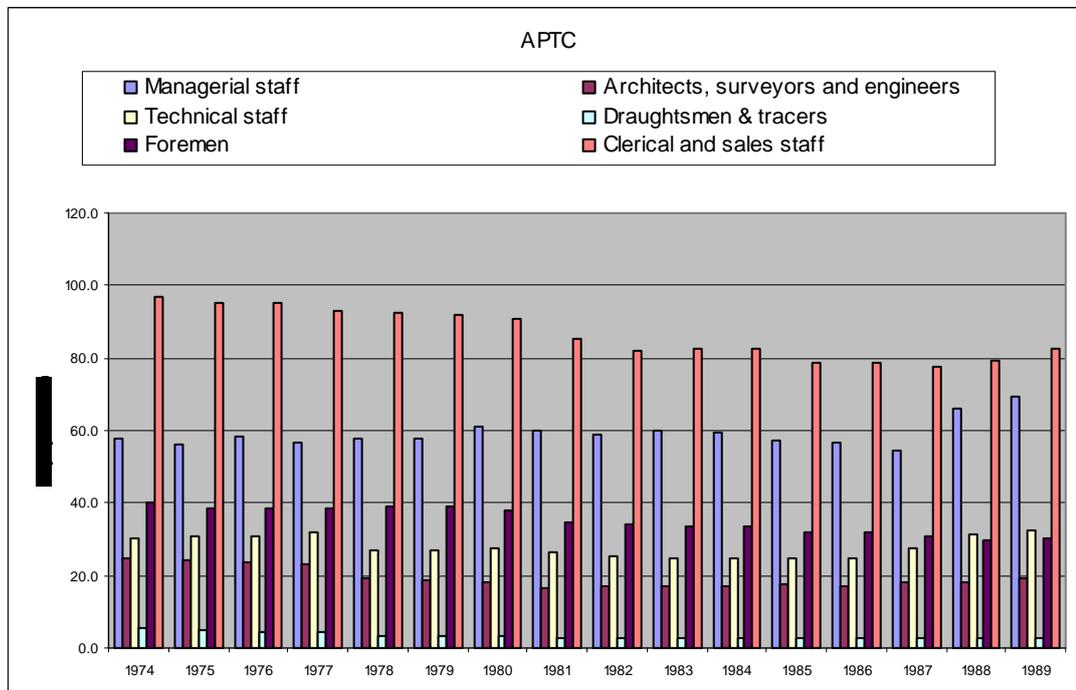


Figure 2.6 APTC employment
Source: DOE Housing and Construction Statistics

Gann and Senker (1998, p570) report that 45% of operatives in the industry are self-employed and have no responsibility for training and around 70% of construction output is produced by very small firms, which work either as subcontractors or jobbing builders where employment of trainees is difficult. Whilst subcontracting and self-employment provide a short term response to fluctuating markets, through flexible organization structures, there is no incentive or commitment to long term investment for future growth or development. Fluctuating demand, small projects and specialisation make planning very difficult. Further more they found that these frequent short term pressures often lead to poaching of labour, especially skilled labour, and acted as a further disincentive to training, thus 'few construction firms develop any human resource plans, and most take insufficient interest in integrating training into their corporate strategies.'

2.2.4 The State of Higher Education for the Construction Industry

In January 2003 shocks waves permeated the UK construction industry with the publication of a report by Coulter examining the state of higher education in the construction industry (Clark, 2003; Clark & Nikkhah, 2003; and Sweet & Smith, 2003). The report, the outcome of a meeting between academia and industry, supported by CEBE, LTSN, CITB, CIC and Rethinking Construction, in November 2002 considered the problems of attracting, recruiting and retaining graduates in the construction industry.

Coulter (2003, p4) reports:

- A 45% decline in building and construction course applications from 1994 to 2000.
- A decline in the standard of applicants for these courses.
- A decline in women students applying for building and construction courses.
- A decline in the number of graduates entering and staying in construction.

Coulter's report echoes the findings of the Fairclough Report and indeed quotes Fairclough (2002, p16):

... there has been a dramatic decline in the numbers on new entrants on construction related degree courses. If the current rates of decline were to continue into the future,

the numbers of students in built environment courses would rapidly collapse. By 2009 the number of applicants to civil engineering courses would have fallen to 0, while the last applicant to building and construction courses would enter university by 2012.

Fairclough was not the first to highlight the impending problems in graduate recruitment in the construction industry. Rethinking construction (2000) reported ‘applications to university courses have gone down dramatically over the last five years [1996 – 2000] by 34% in the case of architecture, rising to 50 – 52% for building/construction and civil engineering.’ However it was not until the publication of Coulter’s report that attention was drawn to Fairclough’s comments and their significance became apparent. Whilst Rethinking Construction (2000), Fairclough (2002) and Coulter (2003) paint a picture of an unhealthy future for construction higher education they all refer to the number of applicants to courses. Reference to the statistics produced by UCAS since 1996¹ for applications and acceptances indeed confirms the decline in interest in construction related degree courses. However an important distinction must be made between the number of applications being made, and the number of acceptances made, as an applicant may not be offered a place, may not achieve the entrance requirements, or may opt for a deferred entry, or an entirely different subject. Thus there is a disparity between the number of applications made and the number of acceptances made.

Figures 2.7 below shows the number of acceptances made for construction industry related degree courses (see table 2.01 in appendix 2.7.1 for the data).

¹ No statistics are available from UCAS for pre-1994 when UCAS was formed through a merger of UCCA and PCAS

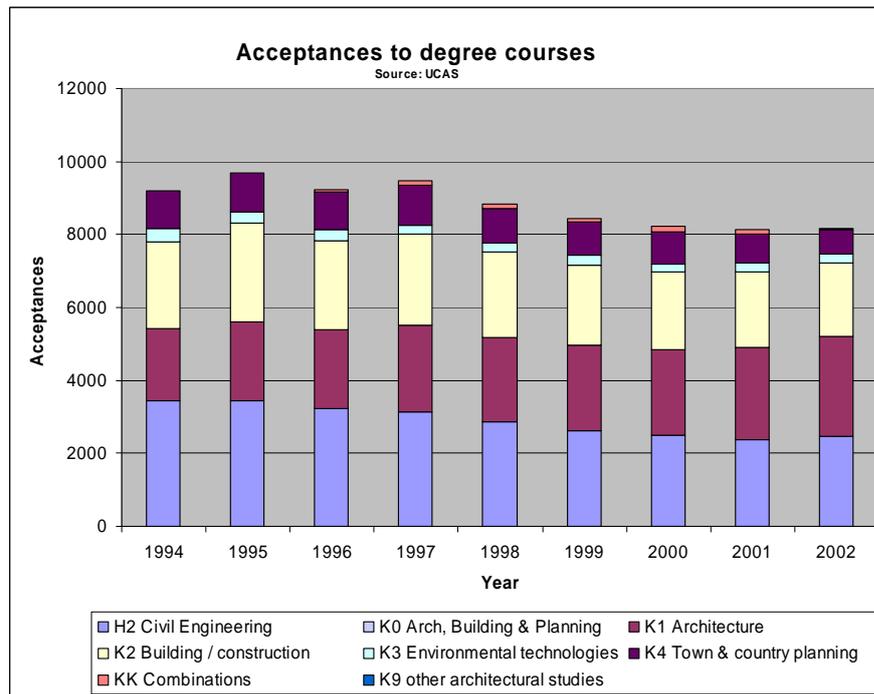


Figure 2.7: Acceptances to construction industry related degree courses:
Source: UCAS

As the focus of this research is upon construction a better picture of the state of higher education in these areas can be obtained by considering only civil engineering and building/construction degree course data as shown in figure 2.8 overleaf: It is useful to consider these two segments of the industry together as the distinction building a building/construction company and a civil engineering company is often blurred with many firms undertaking both types of work.

It should be noted that Lighthill's report (2002) considers data only for the period 1994 to 2000 (where UCAS sourced) and in some cases 1996 to 2000 (where HESA sourced). Since these reports were produced there has been a levelling off of the decline in acceptances for construction industry related courses. Figures 2.9 and 2.10 show the respective graphs for civil engineering degree course acceptances and building/construction degree course acceptances.

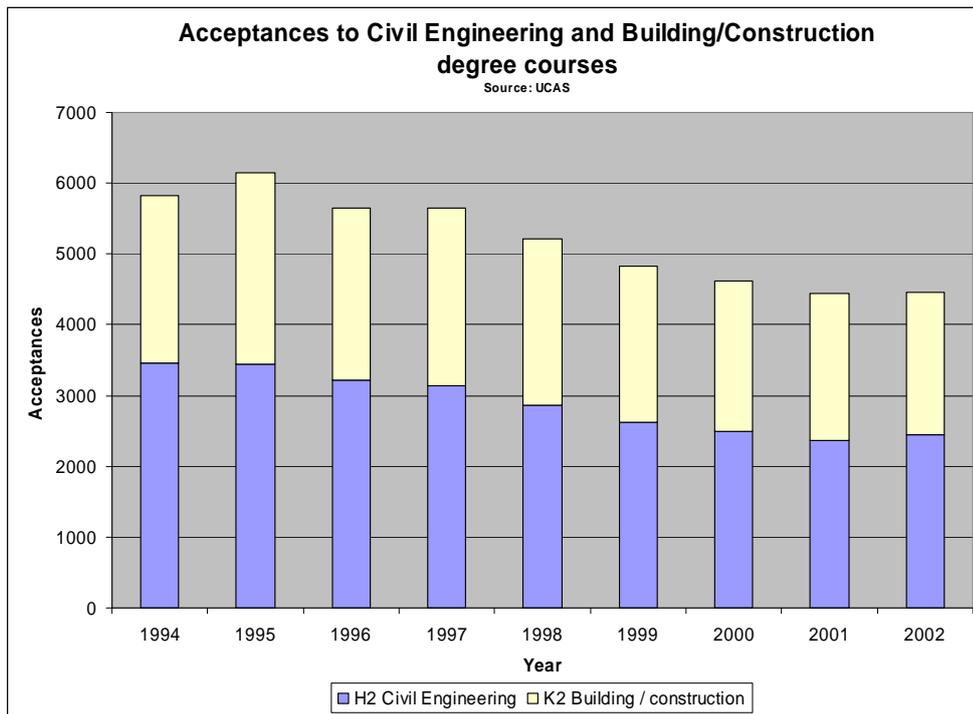


Figure 2.8: Acceptances to civil engineering & building/construction degree courses
Source: UCAS

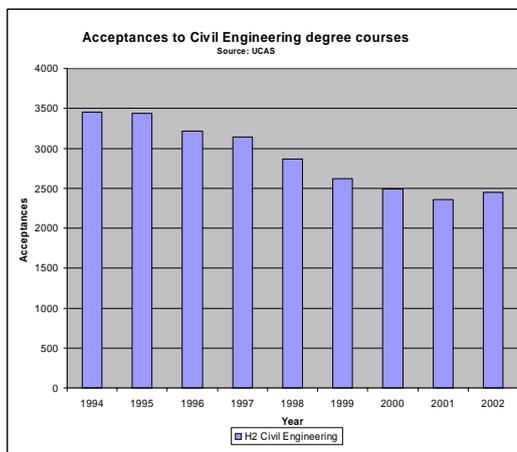


Figure 2.9 Civil engineering degree course acceptances

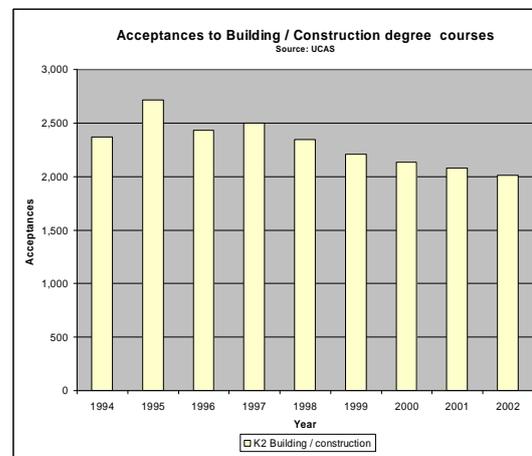


Figure 2.10 Building/construction degree course acceptances

The figures above, whilst confirming the decline in graduates, do not support the claims made by Fairclough (2002), who due to the limited period of data used for his report would appear to have based his projections on a naïve extension of the trend in applications. The addition of more recent data from UCAS is indicating a slowing in the decline in acceptances for building/construction courses and a slight increase for

civil engineering courses. Whether this is the case or whether these figures are ‘blips’ in the trend will not be known until the future figures for 2003 and possibly 2004 become available during the period of this research project.

The problems of graduate recruitment are however not new in the construction industry. The Lighthill Report in 1986 was commissioned jointly by the BEC and CIOB to consider the problems of providing graduates for the construction industry. Lighthill (1986, p3) reported that the number of degree courses had fallen from 22 to 19 in the previous two years in an environment of economic recession and contracting student numbers. Amongst Lighthill’s recommendations (Lighthill, 1986, p4) were that the number of building² degree course places, and degree courses should be expanded to meet the growing demand for graduates, and that structured programmes for trainees in building management be developed.

At the same time as Coulter’s (2003) report was being produced, the CIOB had commissioned its own report from Wilkie and Giddings (2003). Wilkie and Giddings (2003, p4) reported that since the 1986 Lighthill report the number of institutions providing degree courses had increased from 19 to 37, running 58 courses in 2002. It was also noted that since 1986, two of the original nineteen institutions had ceased running building degree courses. Wilkie & Giddings (2003, p11) further report that since 2000 a further eleven courses have closed, and nine have yet to produce any graduates. Yet at the same time they acknowledge that the number of graduates produced has almost doubled (Wilkie & Giddings (2003, p5) since the Lighthill report to the extent that supply exceed demand in the early 1990s (Smith, 2003, p13) when the recession was at its lowest level. Caution must however be exercised when considering the Wilkie and Giddings report as it considers only those courses which are accredited by the report’s sponsors, the CIOB, and ignores other non-accredited courses.

² Since the 1980s many ‘Building’ degrees have been renamed to include the words ‘Construction’ and/or ‘Management’. Therefore the degree titles ‘Building’, ‘Building Management’, ‘Construction Management’, etc., are regarded here as being synonymous.

All three reports have been produced against a background of ‘boom and bust’ for which the construction industry is notorious, from the recession of the late 1970s and early 1990s, and the inflationary boom of the 1980s. Lighthill (1986, p7) reports that at that time industry required 30% more graduates than was being produced in higher education. Whilst no figures for the current shortfall are given by Fairclough (2002, p16) or Wilkie & Giddings (2003, p5) all acknowledge that demand outstrips supply, and that this can have serious consequences for the future of the industry. Likewise Lighthill (1986, p5), Fairclough (2002, p16) and Wilkie & Giddings (2003, p14) also comment that construction education needs to reflect the changing needs and requirements of the construction industry, a fact does not escape the notice of Clark (2003).

By comparing the overall level of employment within the construction industry with the level of acceptance for civil engineering and building/construction degrees, is there any evidence of correlation? Figure 2.11 below shows the relationship between the level of employment in the construction industry and the level of acceptance for civil engineering and building/construction degrees, whilst figure 2.12 below shows a comparison of the level of APTC employment and the level of acceptances.

Although there is not a large enough data set for the acceptances, compared to that of employment, there is a suggestion that the level of acceptance of degree course places lags that of the level of employment by around seven years. If this is so then any upturn in the level of employment in construction will eventually lead to an upturn in the numbers of students studying for civil engineering and building/construction degrees, but producing a growing shortage of graduates for the industry as reported by Fairclough (2002) Coulter (2003) and Wilkie & Giddings (2003).

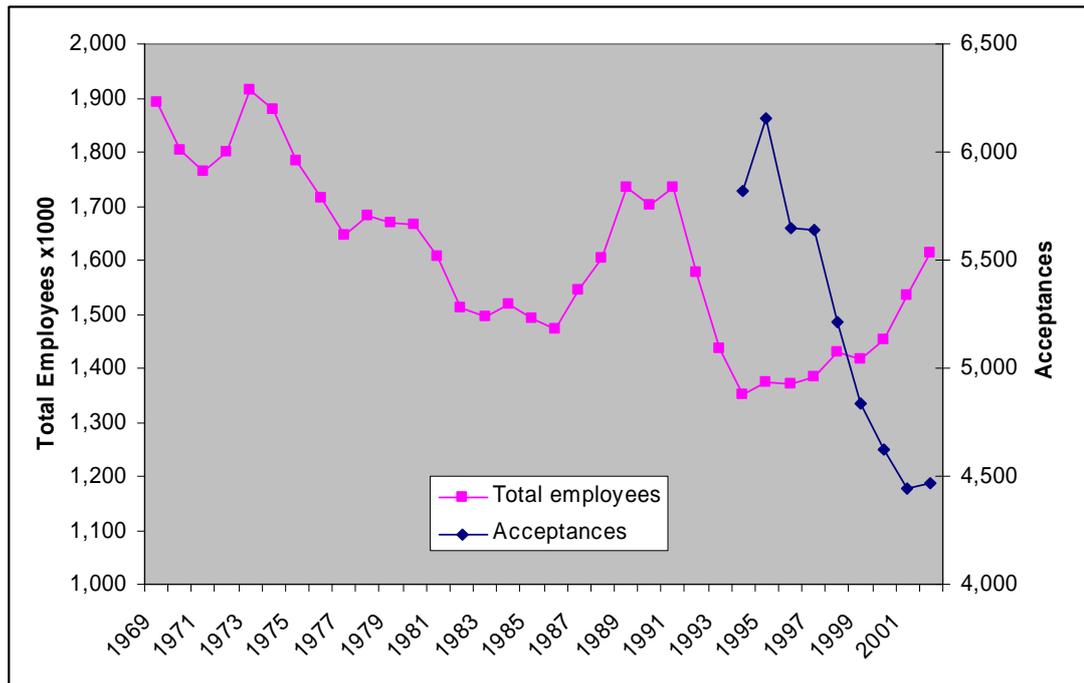


Figure 2.11: Acceptances of degrees and the level of construction employment.
Source: UCAS & DOE/DTI

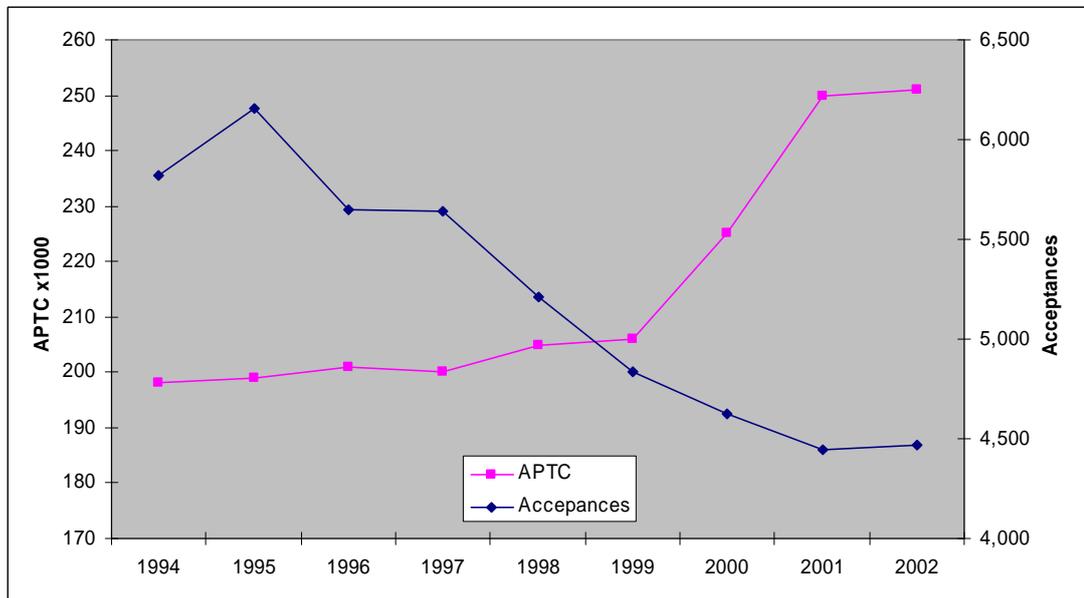


Figure 2.12: Acceptances of degrees and the level of APTC employment.
Source: UCAS & DOE/DTI

2.2.5 Conclusions

If the construction industry employment levels continue to rise and graduate recruitment continues to fall then the industry will face a crisis as it will not be able to sufficient trained staff from its traditional source of construction related degree courses.

Government is clearly concerned about the low productivity of the industry that it believes in part is due to low calibre management which itself is due in part to poor and low levels of qualifications, education and training within the industry. Its 'Rethinking Construction' agenda with its 'Drivers for Change' and the 'Respect for People' initiatives will continue to impact upon the industry, but to what extent, only the future will tell.

The key themes that have been identified here, and which will warrant future research are:

- Patterns and trends in construction industry employment through continued collection and analysis of employment statistics,
- Patterns and trends in higher education recruitment for construction management degree courses through continued collection and analysis of UCAS statistics,
- Statistical correlation of construction industry employment data, and construction management degree course application data,
- Continuing developments in construction management education , training and development,
- Developments and impact of the Rethinking Construction agenda,
- Continuing research, collection and review of literature in these fields.

2.3 The Learning Organisation and Lifelong Learning

2.3.1 Introduction

This chapter reviews the literature concerning the following aspects:

1. The learning organisation
2. Lifelong learning
3. Continuing professional development

The creation of learning organisations and the implementation of lifelong learning is regarded as a key element to improving business efficiency and competitiveness by both the CEC and national government. This chapter seeks to classify and define the terms ‘learning organisation’ and differentiate it from ‘organisational learning’. A number of models and sets of characteristics are reviewed as part of the process of classification and definition of a learning organisation.

Literature that discusses why learning organisations might fail is reviewed in an attempt to establish what difficulties might be encountered by companies attempting to transform and develop themselves into learning organisations is reviewed.

Lifelong learning and continuing professional development (which might be regarded as a sub-set of lifelong learning) are reviewed. The impact of CEC reports and agendas, and national government initiatives are reviewed as both drivers and sponsors for change, and the areas in which there are CEC strategies for lifelong learning are discussed. Learning is then defined in terms of formal, informal and non-formal learning, and a model of the informal and non-formal learning processes is provided. Finally the contribution of CPD to the lifelong learning debate is discussed and a comparison between CPD and lifelong learning is made.

2.3.2 The Learning Organisation

If lifelong learning is to be effectively implemented in any industry then a key to its success will be the creation of a learning organisation (CEC, 2001b; Rethinking Construction, 2000). In order to understand the environment required for effective

lifelong learning to flourish it is necessary to go beyond the CEC reports and determine what a 'learning organisation' is.

As Örtenblad (2002, p213) comments many authors have tried to define and describe the learning organisation, but no-one seems to have succeeded. He argues that even though the terms 'learning organisation' and 'organisational learning' are frequently used synonymously, definition and description is difficult because learning organisations change continually or that each learning organisation is different in order to fit specifically a company. Örtenblad proposes that the term 'learning organisation' is merely a convenience term for a conglomerate of things. Love et al (2000, p324) however see 'organisational learning' as descriptor to explain and quantify learning activities whilst 'learning organisations' refers to organisations designed to enable learning... and organisations in which learning is already occurring.' They further state that the focus of a learning organisation is upon 'managing chaos and indeterminacy, flattening hierarchies, decentralisation, empowerment of people, teamwork and cross-functional teams, network relationships, adoption of new technologies and new forms of leadership'. Watson (2002, p196) defines a learning organisation as

an organisation in which experimentation, reflection and mutual learning provides a key source of satisfaction for individuals as well as enabling the organisation to be productively adaptive.

Thomsen and Hoest (2001) provide a similar argument, but cite the Pedler et al (1997, p3) definition: 'a learning company is an organisation that facilitates the learning for all its members and consciously transform itself and its context.' Thomsen and Hoest (2001, p471) do however provide a set of eleven characteristics based upon the model of Pedler et al and others of what a learning organisation ought to look like. These are:

1. A learning approach to strategy
2. Participative public policy making
3. Informating
4. Formative accounting and control.
5. Internal exchange
6. Reward flexibility
7. Enabling structures
8. Boundary markers as environmental scanners
9. Inter-company learning

- 10. Learning climate
- 11. Self-development opportunities for all.

Although they agree with the eleven characteristics they do not however agree with the configuration of Pedler et al's (1991, 1996) model (see figure 2.13) and proposed their own (see figure 2.14).

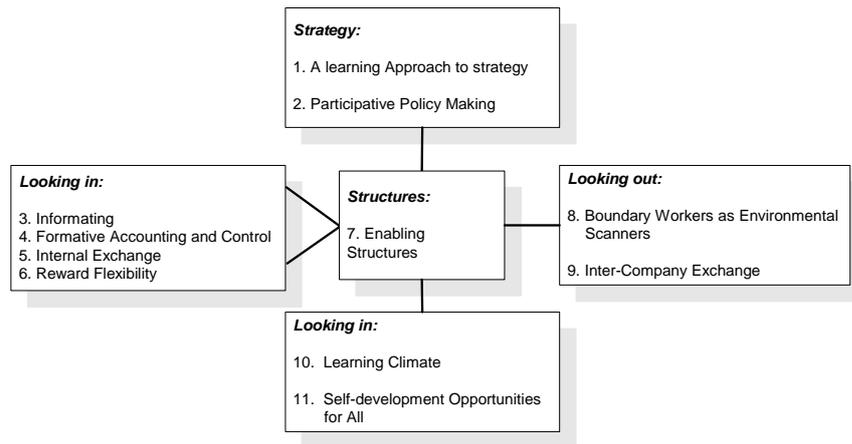


Figure 2.13: Pedler's Model of Organisational Learning
Source: Cited in Thomsen & Hoest, 2001

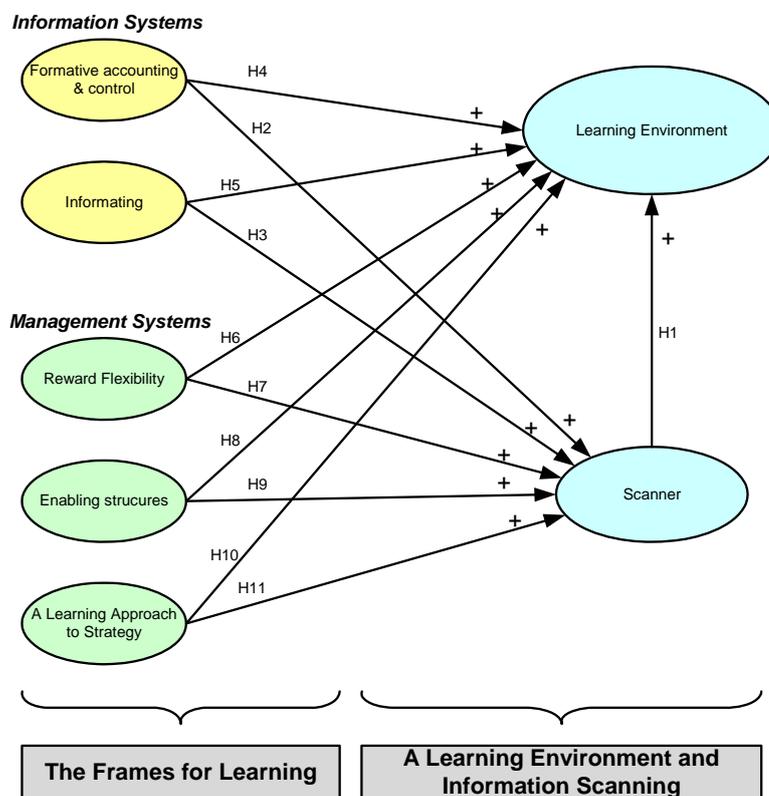


Figure 2.14 Theoretical Model of Organisational Learning based on 11 Characteristics
Source: Thomsem and Hoest, 2001

In support of their new model they put forward eleven hypothesis (2001, p476 et seq):

- H1 Increased information scanning will exert a positive influence on the learning environment.
- H2 Increased use of a more transparent accounting system will exert a positive influence in the learning environment.
- H3 Increased use of IT will exert a positive influence on an information scanning process.
- H4 Increased use of a more transparent accounting system will exert a positive influence on the learning environment.
- H5 Increased use of IT will exert a positive influence on the learning environment.
- H6 The reward system with a wide spectrum of reward possibilities will exert a positive influence on the learning environment.
- H7 The reward system with a wide spectrum of reward possibilities will exert a positive influence on the employees' scanning of the environment.
- H8 Increased use of flexible structures will exert a positive influence on the learning environment.
- H9 Increased use of flexible structures will exert a positive influence on the employees' motivation to scan the environment for themselves.
- H10 Increased use of involvement in the strategy work will exert a positive influence on the learning environment.
- H11 Increased use of involvement in the strategy will exert a positive influence on the employees' attention to what is going on in the surrounding environment.

A useful insight into the difference between 'learning in organisations' and 'learning by organisations' is provided by Popper and Lipshitz (2000, p184). The former they consider (citing Simon 1991, p25) is that which takes place within the human mind; whilst the latter can only take place in one of two ways; either through the learning of the organisation's members or through the ingestion of new members into the organisation who possess the knowledge the organisation lacks.

They ponder question of 'can we really hope to design effective methods of instituting 'organisational learning' or 'learning organisation' - without knowing how to go beyond learning by individuals'. To do this they put forward the concept of Organisational Learning Mechanisms (OLMs) that they define as 'institutionalised structural and procedural arrangements that allow organisations to learn non-vicariously, that is, to collect, analyse, store and disseminate, and use substantially

information that is relevant to their and their members performance. Thus OLMs, they claim, link learning in organisations to learning organisations.

Popper and Lipshitz (2000, p185) conclude that individual learning and learning organisations ‘are similar in that they involve the same phases of information processing; namely, collection, analysis, abstraction and retention. But are dissimilar in two respects: (i) information processing is carried out at different systematic levels by different situations; and (ii) organisational learning involves an additional plan, dissemination; i.e. the transmission of information and knowledge among different persons and organisational units.’

Driver (2002, p99) proposes that ‘earning in organisations can be linked to leadership in organisations and can be conceptualised ‘as a role negotiated between superiors and subordinates, and that ‘individuals in organisations accomplish learning by specialising in certain learning tasks’. Driver argues that ‘this specialisation is based on role behaviours and resources that constrain or facilitate learning opportunities negotiated in the workplace between subordinates and their superiors as well as the transfer of such learning to the larger organisational context.’ He further postulates that ‘individuals in organisations accomplish learning by specialising in certain tasks’ which may be based on ‘roles, behaviour and resources, such as power and money, that constrain or facilitate learning opportunities. Driver believes that it is this specialisation that leads to individual learning that needs to be transferred into organisational learning. This would suggest that the construction industry, with its high level of roles specialisation would provide the ideal vehicle for the creation of individual learning. However, in order to create the learning organisation there is a need to transfer this knowledge into the organisation. Within the construction industry, there is a high degree of workforce fragmentation through subcontracting and more recently increasing levels self-employment. Given this high degree of fragmentation will the creation of a construction learning organisation be impeded or negated?

Elkjaer (2001) provides a useful insight into the process of creating a learning organisation. Elkjaer's observations and studies of a company attempting to transform itself into a learning organisation highlight the real and perceived difficulties of this process. In the case study reported, the company fails in its attempt to change members through a formally imposed training programme, as opposed to 'including employees actively in the development of their own work practices and of the organisational structures supporting these... there is no such thing as a quick pedagogical fix to a learning organisation... it is a long and winding road in which the notions of inquiry and experience may help members to actualise the wonderful image of a learning organisation: It requires that management abandons the detailed control that tends to inhibit employees from sensing and inquiring into the uncertainties they meet in everyday work practices.' (Elkjaer, 2001, p450).

Popper and Lipschitz (2000, p184) similarly found that organisational learning and ultimately learning organisations would most likely fail unless at least some of the following were present

- A high level of environmental uncertainty
- Costly potential errors
- A strong leadership commitment to learning
- A high level of professionalism

Some or all of these factors are invariably present in all but the smallest of construction organisations.

Both Elkjaer (2001) and Wijnhoven (2001) suggest that members need to be empowered to initiate evolutionary changes that will lead to the creating of a learning organisation rather imposed revolutionary changes. Holt et al (2000) also believe that worker empowerment will not only provide a high degree of flexibility and tolerance of the diversity in the construction industry whilst allowing senior management to retain the ultimate control of the business, but will also negate many of the factors for which the construction industry is notorious, typically:

- Lowering of individual's feelings of self-efficacy and belonging.

- Bureaucratic and authoritarian management structures which result in powerlessness in individuals through over-dependency.
- Negative manipulation.
- Ill-defined organisational goals.
- Poor two-way communication, both vertically and laterally
- Poor recognition and reward structures

Holt et al (2000, p49)

These findings are not dissimilar to those reported by Currie (1999). The problems Elkjaer (2001) observed, that ultimately led to the failure of the creation of a learning organisation, and found as impediments to worker empowerment by Holt et al (2000) were also in evidence. Whilst Holt et al (2000) never actually use the term 'learning organisation' their description of the characteristics of a worker empowered organisation are very similar to those that describe a learning organisation. The characteristics identified by Holt et al (2000, p49) are:

1. Leadership: establishing new goals for the organisation that can clearly be disaggregated (devolved) and encountered at all levels.
2. System: an empowerment implementing (and sustaining) system that acts as an enabler to (1) above.
3. Resources: built into the system so as to enable realisation of the new goals, with emphasis on continual training.
4. Involvement: embracing all within an organisation to become enthusiastic about making the new structure work.
5. Training: continuous training for the entire organisation as an integral feature.
6. Teamwork: various teams at all levels implement the goals defined under *leadership* and within the parameters of the *system* and *resources*.
7. Process improvement: to align individuals' strengths with the goals of empowerment and making every employee a process owner.
8. Measurement: making continual performance measurement the cornerstone of mounting an empowered organisation.
9. Recognition: as a motivator, by placating the aspirations of individuals and rewarding enthusiasm for change and improved performance.

Holt et al (2000, p50) state that empowering workers may fail if the process of empowerment does not address the potential barriers to change:

- A lack of management commitment.
- Underestimation of empowerment (e.g. extent of change).
- Resistance to behavioural change.
- Failure to adopt continuous learning.
- Too much bureaucracy
- Ineffective communication.

These barriers are very similar to the causes of to create a learning organisation encountered by Elkjaer (2001) but unlike Elkjaer they recommend an implementation model of worker empowerment (see figure 2.15)

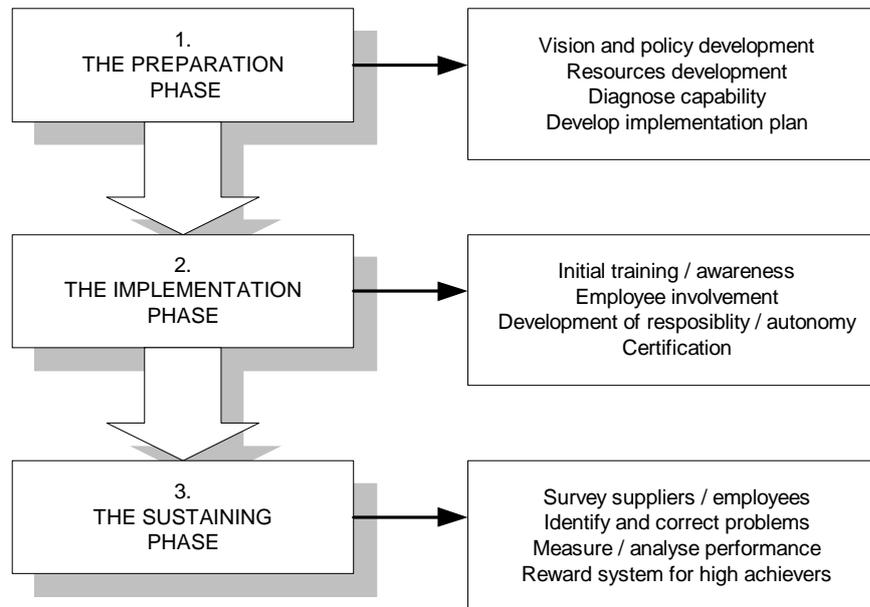


Figure 2.15: Empowerment Implementation Model
Source: Holt et al, 2000, p50

Jankowicz (2000, p479) adopts a different perspective on these issues and draws attention to the debate on learning organisations and concludes that many real-world organisations have many layers of management control arranged in order of seniority (hierarchy), each of which in turn monitors the subordinate layer without necessarily changing them. He argues that whilst learning can occur at any level of the organisation it is more likely to occur at the lower levels whilst at upper levels a more adaptive approach occurs, thus an organisational occurs from a learning organisation to an adaptive organisation as progresses through the levels of management. This approach supports Scott et al's (1997) observations of the attitude towards, and occurrence of management training at different level in a construction organisation.

Jankowicz (2000) questions the validity of some organisational learning models which suggest that the lowest levels of management can contribute to the organisation's policy making on an equal basis with senior managers. Vince (2002) observed similar problems and noted that when newly 'empowered' staff encountered the entrenched power relationships and structures that blocked their initiatives their enthusiasm turned to disappointment and cynicism. Clegg (1999) also cites a number of examples where workers 'empowered' with the aim of increasing productivity had their initiatives stifled, resulting not only in disappointment and cynicism, but ultimately to lower productivity and the eventual demise of the organisation.

However, an acknowledge that learning can take place at any level in the organisation is provided by Scott et al (1997) and Vince (2002). The degree of learning that occurs at any level is dependent upon the socio-cognitive relationships between the levels and within each of the organisational levels. Bogenrieder (2002, p203) terms the nature of these relationships ‘social architecture’, and related them to organisational learning by considering the cognitive diversity within the organisation. The degree of cognitive diversity depends upon two dimensions of a problem

- The dimension of the goal (un)certainty.
- The dimension of the technical (un)certainty

is broadly in line with the findings of Popper and Lipshitz (2000), and is supported by the finding of Vince (2002, p65).

2.3.3 Lifelong Learning.

Rethinking Construction (2000) identified CPD and lifelong learning as key contributor to their aim of improving education, training and skills in the construction industry. These problems are not unique, either to the construction industry or the United Kingdom, for as Vivian Reding, EU Commissioner for Education, stated ‘last year fewer than 10% of Europeans of working age undertook any training’ (Europa, 2001a). Thus the lack of education and training in industry is a European wide problem, which needs ‘to invest more effectively in training human resources and consequently sustainable prosperity.’ Reding was supported by Anna Diamantopoulou, EC Commissioner Responsible for Employment and Social Affairs, who stated ‘Skills and competence enhancement... requires... increasing investment in human capital and in raising participation in education and training throughout working life... Particular attention should be given to workplace training, an important dimension of our strategy for Lifelong Learning.’ (Europa, 2001a)

Following the Lisbon European Council Meeting (CEC, 2000a) in March 2000 the CEC published its ‘Memorandum on Lifelong Learning’ in October of that year

declaring that ‘lifelong learning was no longer just one aspect of education and training, but must become the guiding principle for provision and participating access across the full continuum of learning contexts’ (CEC, 2001b, p3). The memorandum put forward six key messages for debate on a strategy for putting lifelong learning into practice. The lifelong learning strategy should aim to:

- guarantee universal and continuing access to learning for **gaining and renewing the skills** needed for sustained participation in the knowledge society;
- visibly **raise levels of investment** in human resources in order to place priority on Europe’s most important asset – its people;
- develop effective **teaching and learning methods** and contexts for the continuum of lifelong and lifewide learning;
- significantly improve the ways in which learning participation and outcomes are understood and appreciated, particularly non-formal and informal learning;
- ensure that everyone can easily access good quality information and advice about learning opportunities throughout Europe throughout their lives;
- provide lifelong learning opportunities as close to learners as possible, in their own communities and supported through ICT-based facilities wherever possible.

(CEC, 2001b, p4)

Following the Stockholm European Council Meeting (CEC, 2001a) the CEC published its communication entitled ‘Making a European Area of Lifelong Learning.’ Here lifelong learning is defined as

all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies within a personal, civic, social and/or employment related perspective.

(CEC, 2001b, p9)

The CEC (2001b, p12) identify the following five areas of work as the basis for a strategy for lifelong learning:

- Literacy, numeracy, ICT and other basic skills needs: the foundation for further learning, which will often need to be updated throughout life. Citizens/groups most alienated from learning, whose needs and interests are varied, may require tailored measures.
- Addressing the impact of lifelong learning on learning facilitators such as teachers, trainers, adult educators, and guidance workers. Strategies and partnerships must address their role and support their adaptation.
- The needs of employers in general, as well as the particular needs of SMEs, who employ a significant proportion of the EU’s workforce, yet who often encounter

difficulties in making finance or time available for training or in finding training which is relevant to their needs. Motivating employers is important in this respect;

- Understanding (potential) learners' interests, reflected in surveys, evaluations, feedback from guidance surveys and consultations, data on imbalances in learning participation (e.g. gender mix in ICT learning);
- Taking into account the implications of the knowledge-based society for the needs of learners (new basic skills, including entrepreneurship, science and technology), and labour markets (for example the importance of competence forecasting to avoid shortages, upskilling those inside the labour market to ensure they do not become excluded).

The CEC (2001b, p13) stress the importance of creating a 'learning culture', and the need for 'direct measures to be taken to motivate (potential) learners and raise overall participation levels by making learning more desirable in terms of active citizenship, personal fulfilment and/or employability'. In pursuit of this objective they identified the following measures for creating a learning culture:

- Valuing and rewarding learning, especially non-formal and informal learning in all sectors, thereby recognising its intrinsic worth. Regarding learning can also encourage those who are lost alienated returning to learning;
- Promoting more positive perceptions of learning and raising awareness of any entitlements and the benefits of learning, e.g. through media campaigns, from the earliest age – at pre-school, school, and higher education levels, as well as in youth organisations and among the adult population;
- Making appropriate use of targeted funding, promoting activity and other methods, such as reaching out to (potential) learners.;
- Promoting the role of information, guidance and counselling providers working directly with voluntary/community organisations to raise awareness on the individual/social/economic benefits of learning, and to encourage diversification of studies and non-traditional career/learning choices.
- Enterprises should be facilitated to become learning organisations, where everyone learns and develops through the work context, for the benefit of themselves, each other and the whole organisation, with such efforts being publicised and recognised.
- Encouraging public service providers, voluntary and community groups, employers and trade unions to develop and/or promote learning opportunities tailored to their particular constituencies and, e.g. disabled people.

The CEC (2000b, p8) identifies three categories of 'purposeful learning activity' that takes place:

Formal learning: takes place in educational and training institutions, leading to recognised diplomas and qualifications'. It is structured in terms of learning

objectives, learning time or learning support, and is intentional from the learner's perspective. (CEC, 2000b).

Non-formal learning: takes place alongside mainstream systems of education and training and does not typically lead to a formalised qualification. Non-formal learning may be permitted in the workplace and through activities of civil social organisations and groups (such as youth organisations, trades unions, political parties). It can also be provided through organisations or services that have been set up to complement formal systems (such as arts, music and sports classes or private tutoring to prepare for examinations). (CEC, 2000b).

Informal learning: is a natural accompaniment to everyday life. Unlike formal and non-formal learning, informal learning is not necessarily intended learning, and so may well not be recognised even by individuals themselves as contributing to their knowledge and skills. (CEC, 2000b).

It is clearly within the context of non-formal and informal learning that the CEC intend to bring into the compass of lifelong learning alongside formal learning. They draw attention to the fact that non-formal learning is not usually seen as 'real' learning and consequently undervalued, whilst informal learning is rarely considered as learning and given little or no value.

Much of the non-formal learning and most of the informal learning that takes place within organizations, takes place within the informal (or shadow) organization, where interactions are based on free choice, preference, benefit and self-interest of the individual which is often in conflict with the requirements and needs of the formal organization. However conflict is not always bad as out of conflict creativity and innovation often emerge to resolve the conflict (Aram and Noble, 1999; Mastenbroek, 1993), together with the cultures and sub-cultures created 'will eventually be a necessary resource for learning and innovation' (Schein, 1992, p370). However the ability to produce creativity and innovation out of conflict depends, to a

certain extent, upon the learning styles of the students (Mainemelis, Boyatzis and Kolb, 2002; Sadler-Smith, 2001; Fox and Grey, 2000) and the students' sociological background (Mutch, 2002).

Whilst the importance and value of informal and non-formal learning is rightly recognised, it is not without its problems or critics. Marsick and Watkins (1997) consider issues of informal and incidental learning (they use the term 'incidental learning' here which is synonymous with the term non-formal learning') and use the model below (see Figure 2.16) to illustrate how informal and incidental learning occurs in the workplace.

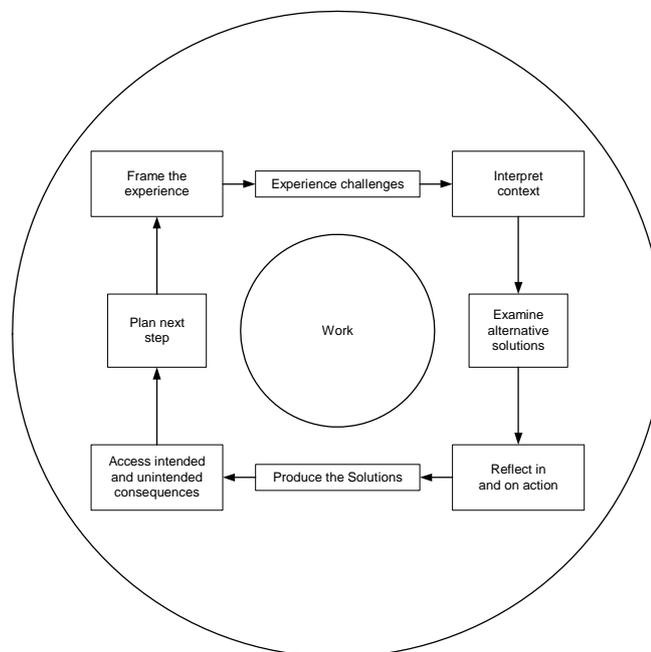


Figure 2.16: Informal and Incidental Learning Model

Source: Marsick and Watkins (1997, p297)

Potential source of error in the informal and incidental learning model identified by Marsick and Watkins is shown in figure 2.17 below.

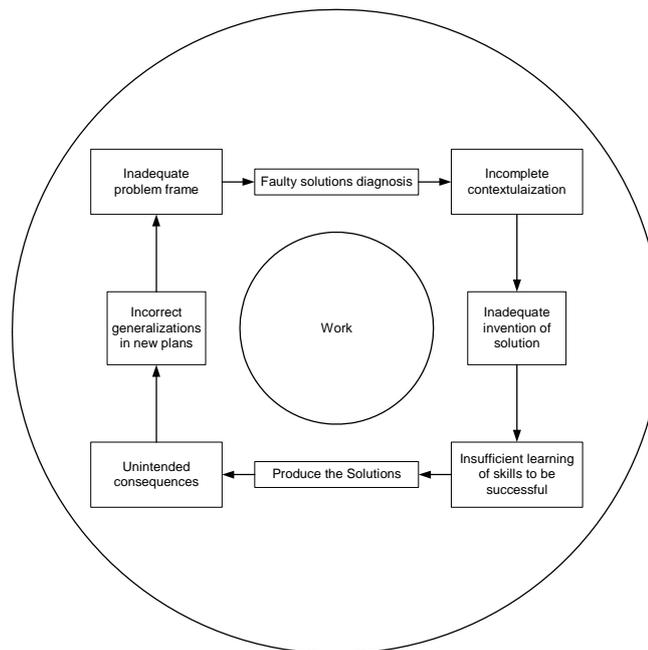


Figure 2.17: Potential Sources of Error in Informal and Incidental Learning
Source: Marsick and Watkins (1997, p299)

The one area where both non-formal and informal learning is often recognised is in the field of continuous professional development (CPD). CPD is generally most closely associated with ‘employment related learning and life-skills’ whilst lifelong learning relates to any learning which is employment related (Peake, 2000, p2). The CEC (2000, p8) state that ‘lifelong learning draws attention to time: learning throughout life, either continuously or periodically. Yet in so doing it is necessary to be aware of the limitations and contexts of non-formal and informal learning (Marsick and Watkins, 1997)

CEC (2000) also bring into the arena the concept of ‘lifewide’ learning which draws attention to the spread of learning, which can take place across the full spectrum of our lives at any one stage in our lives. Thus lifewide learning embraces the full range of formal, informal and non-formal learning, giving them all recognition and value. Peake (2000) argues that any individual disposed towards learning and self-development, in whatever situation or subject, is an asset to the company. This value is set to increase in future, Europe-wide, national and industry-wide, as there is an

increasingly aging population, fewer people entering the labour market and industry for the knowledge and skill demand to be met (CEC, 2000b).

1996 was declared the 'European Year of Lifelong learning' by the EC with the aim of promoting awareness of the need for lifelong learning by the public and the desirability of continuing to learn. (EC, 2001b) and in so doing has helped to change society and fundamental attitudes towards lifelong learning. Their report however highlights the fact that fewer than 22% of people had undertake any training of any type in the previous 12 months, but 70% expressed an intent in becoming involved in lifelong learning. Concern is expressed over an apparent contradiction between attitudes and behaviour toward lifelong learning, and particularly in the area of new technologies, and amongst the young. The largest group expressing any interest in lifelong learning was the over 55s who hoped to continue training through their retirement in order to occupy their leisure time and improve their general level of knowledge.

2.3.4 Continuing Professional Development

CPD is a requirement of many professional institutions and organizations with the aim keeping the members abreast of current thinking and developments in their professions. The CIOB, for example, along with many other professional bodies, requires its members to undertake CPD activities as an ongoing requirement for membership of the institute. Members are required CPD through self-set objectives, self-evaluation, self-motivation and to maintain records, with evidence/certification, of the CPD activity. In fact many professional conferences, seminars and meetings automatically offer CPD certificates of attendance. Sadler-Smith et al (2000) notes however that the 'CPD ideal' and the translation of professional requirements into reality was somewhat problematical, and tended more towards a great aspiration for most employees rather than the intended reality. The reason this might be so, according to Sadler-Smith et al, lies with the learning preferences and cognitive styles of the employee. Thus CPD activities, to be successful, must consist of learning activities that are congruent with the learning preferences and cognitive

styles of the employee, and should inevitably be based around workplace experiences and problems.

Egbu (1999) and Graham (1999) provide useful insights into areas where management skills and knowledge needs to be developed in the construction industry, and the construction industry manager. An important differentiation is drawn by Davies and Csete (1998) not only to the differing requirements of employers (the industry) and employees, but in the differences in emphasis and importance attached to particular skill needs and requirements. Taylor (1999) reported similar findings but notes that these types of problem often occur where the organization failed to make adequate resources available to support staff, or where resources and support were merely arbitrarily distributed amongst staff, with some staff having their CPD supported, whilst others were not supported. Failure to make resources available, she states, is both unprofessional and unethical (Taylor, 1997, p170).

2.3.5 Conclusions

Whilst the concept of learning organisations is not new it is only since the mid 1990s that interest in the subject has really developed, and the amount of literature published dramatically increases. Although most of the literature reviewed in this subject area is of a generalist, theoretical or academic nature, or where there was application to the workplace it was in either commercial or manufacturing environments. No literature was found that addresses the issues of learning organisations in the construction industry, with its attendant problems of self – employment and subcontracting. The problems of creating learning organisations and reasons for their possible failure have been identified.

Even though a major thrust of the CEC and national government agendas for lifelong learning is that of bringing young people who have fallen outside the post-16 compulsory education system and or have few, if any, formal qualifications back into the education system there are major implications and opportunities here for the

ongoing education and development of managers. As with the literature for learning organisations the overwhelming majority of literature reviewed was of a generalist nature and published since the mid 1990s when interest in lifelong learning developed.

The key themes identified which will be investigated in future research are:

- The creation and development of learning organisations,
- Learning organisations in the construction industry, theory, practice and application,
- Developments and inputs of the lifelong learning agendas by the CEC and national government in the construction industry,
- Creation of lifelong learning environments in construction companies,
- The development of CPD as a contributor to lifelong learning in construction companies.

2.4 e-Learning and New Learning Technologies

2.4.1 Introduction

This chapter reviews literature concerning the following topics:

1. e-learning
2. e-learning implications for higher education
3. barriers to e-learning
4. strategies for e-learning
5. M-learning.

The creation of e-learning (electronic learning) and e-learning environments is seen by the CEC and national government as a key component of the lifelong learning environment. e-Learning embraces a number of educational concepts such as 'distance learning', 'open learning' and 'flexible learning'. These terms are reviewed and a taxonomy provided to compare e-learning and flexible learning. A comparison is also made between traditional and distance educational delivery. The significance of these systems is reviewed. e-learning is predicted to have a significant impact on higher education and the way higher education is delivered. Literature discussing e-learning in the higher education environment is reviewed, however much of the literature published in this field was found to be either of a pedagogical nature, or focussed on operational technology, therefore outside the scope of this review at this stage of the research project where a more strategic overview is consideration is required.

There are however barriers to the implementation of e-learning that can be encountered and these are identified in the review. Both driving forces and restraining forces for the change to the implementation of e-learning are identified and a model provided. If these barriers are overcome, or not actually encountered, then strategies for e-learning implementation are required and these are reviewed.

Finally a new development, that of the use of the PDA as a means of delivering e-learning in a mobile environment, or M-learning, is reviewed although the author

found few publications on this topic, as it is so relatively recent, research and development is current and ongoing that there is not been sufficient time for many research projects to have been completed and their findings published, or academic papers written about the subject. Such literature as was found tended to be either of a pedagogical nature or concerned with the technical operational level of the M-learning environment, rather than have a strategic perspective.

2.4.2 e-Learning

Fletcher (2001) draws our attention to the terms ‘distance learning, ‘open learning’ and ‘flexible learning’. Such terms are frequently interchanged, often mixed together, and the term ‘e-learning’ has tended to further confuse the issue. He considers the ‘e-learning refers to the application of the internet and web-based technology to learning processes. It is often assumed that e-learning is open and flexible by its nature (Fletcher 2001, p1). Daniel’s (1999) consideration of open learning supports Fletcher’s view.

Herbsman and Elias (1998, p503) make an important distinction between ‘distance education’ and ‘distance learning’, two terms also (incorrectly) interchanged. They argue that distance learning is the result of distance education, a method of instruction that has the following characteristics:

- The student and teacher are geographically or spatially separated,
- Either formal or informal learning takes place under the auspices of an educational institution,
- Technical media (audio, video, computer) replaces somehow written text, and
- Involves student-instructor led two-way communication.

Moran and Myringer (1999) however state believe that ‘the days of distance learning, as such, are numbered. An unsteady, problematic, profound process of change is under way. Distance education methods and systems are converging with those of face-to-face teaching, strangely influenced by new electronic technologies... [which] will transform university teaching and learning as a whole, not merely adding some distance teaching here, and some on-line technologies there.’ This convergence of distance and traditional education is supported by Tait and Mills (1999) who believe this will bring increased access as a range of modes of study or flexible learning

becomes commonplace. This concept of flexibility, according to Bridge (1998, p159), might also be extended to include the ability to choose the learning environment.

Fletcher provides a useful taxonomy for analysing flexible learning and applying it to e-learning. See figure 2.18 below.

| | | | |
|--|--------------------------|----------------------------------|---|
| | | Open Learning | |
| | | ← Duration → | |
| | | Fixed learning | Open |
| Geographical proximity ↑ Close ↓ Far | Centred Learning | 1. Timetabled classes. | Fixed date(s) 3. Timetabled study 4. The 'book-in' model <hr style="border-top: 1px dashed black;"/> 5. The 'book of tickets' model 6. The 'drop-in' model |
| | Distance Learning | 2. Timetabled distance learning. | Open Date(s) 7. Timetabled study 8. The 'clinic' <hr style="border-top: 1px dashed black;"/> 9. Flexi-study 10. The 'helpline' Open date(s) |

Figure 2.18 Taxonomy of flexible Learning and e-Learning
 Source: based on Fletcher (2001)

Herbsman and Elias (1998, p504) provide an important comparison between traditional 'classroom' and distance learning educational delivery (see table 2.01) below.

Table 2.1: Differences between traditional and distance education delivery systems.
Source: Herbsman and Elias (1998, p504)

| Item | Traditional Classrooms | Distance Education |
|----------------------|--|---|
| Time to learn | Set by academic calendar or teacher availability. | Flexible. Compressed or expanded to fit individual needs and deadlines. |
| Location and Placing | Regular meetings at fixed locations. Equipment when needed. Library for research. Structure and classroom atmosphere meet student expectations. | Variable times and locations, often at work or home. Fits into irregular schedules. Few limits on class size. Often self-paced. Some programs offer library support. |
| Cost | Extensive administrative and other fixed costs, requiring state and federal support. Out-of-pocket costs include travel, time away from home and work. | Often wholly or mostly self-supporting; strong pressures to hold down costs. Competitive costs a concern. Low 'opportunity costs' with fewer job conflicts. |
| Learning Outcomes | Real advantages when individual tutoring is needed; necessary when course objectives require interaction, discussion, or fixed resources (as library, laboratory facilities). Identification with teacher. | Achieves cognitive goals, but not necessarily affective or motor skill goals, as well as better than the classroom. All courses are carefully planned. Self motivation is a factor. |

The importance of e-learning as a key method of implementing and achieving lifelong learning is widely recognised. But to implement lifelong learning through e-learning requires a society that not only has access to the requisite technology, but is able to embrace and utilise it. The EU recognises that to bring this about will require the biggest change in our society since the industrial revolution (CEC, 2000a, p2), through the creation of the 'Information Society'. The EU's 'e-Europe' initiative was established with the intention of

Bringing every citizen, home and school, every business and administration into the digital age and online:

- Creating a digitally literate Europe, supported by an entrepreneurial culture ready to finance and develop new ideas.
- Ensuring the whole process is socially inclusive, builds consumer trust and strengthens social cohesion.'

Even by the EU's own admission (p2) this is an ambitious objective. Whilst much of the focus of the report is on ICT provision in schools, the importance of ICT in business by way of e-commerce, and higher education, are recognised through what the EC terms 'e-Education – a whole new approach to learning and training – where

students access a host of academic and research material and facilities online.’ (CEC, 2000, p10). The term ‘e-Education’ has not been found outside of this CEC report, and it has been displaced by the term ‘e-learning’ which is used in all papers and publications in this field.

2.4.3 e-Learning Implications for Higher Education

Birchall and Smith (2002, p4) suggest that e-learning ‘might be seen as the application of information technology to the learning process’. Furthermore they cast doubt on the effectiveness of pure e-learning, seeing it rather as part of a blended-learning approach. More worrying is their finding that most Universities do not have a strategy for e-learning development, and that e-learning development is at best patchy and fragmented. Garrison and Anderson (2003, p17) do however point out the ‘many universities are making substantial, albeit fragmented, investments in e-learning but, because of the lack of strategic direction and coherent approach, there is little benefit or fundamental change.’ They emphasise that e-learning is a disruptive technology in a traditional institution of higher education because the existing sustaining technology – the lecture – is threatened. They argue that these disruptive technologies are often a threat to the established institution and can ultimately lead to its demise, but paradoxically, those who fail to adopt these disruptive technologies may fail through lack of adoption. Birchall and Smith do however concede that although e-learning is a disruptive technology its adoption should not preclude attention to the institutions existing sustaining technologies that will allow the institution to maintain its core values and market position.

Schofield and Rylance-Watson (2002) note that the early forecasts and optimism for e-learning have not been realised, with take-up in industry reaching only one-third of the predicted training time forecast, despite the considerable expenditure and publicity given to e-learning. UKEU (2003) believe that the limited uptake is attributable to a combination of hastily adapted academic material, unproven technology and inadequate support. An indication of the amount of expenditure on e-learning is provided by the European Parliament (EP, 2003, p19) which (although

unable to give precise figures) estimates that it has spent, in 2001 alone, at least €50 million on projects promoting e-learning. To this must be added funding from national governments, commercial and other institutions.

Waller (2001) also supports the view that there is no evidence that e-learning is any better or worse than traditional instructor led training, and likewise there is little or no evidence that e-learning is any more effective than traditional instructor led training. He does however make an important differentiation between e-learning and traditional instructor led training, in that the e-learning environment provided the opportunity for in formal continuous and daily learning, which would not otherwise take place in the workplace. However this is with the proviso that employees actually have ICT access, and in particular access to the internet and e-mail.

This begs the question ‘why use e-learning?’ Little (2000) attempts to answer this question through a number of factors including:

- Cost,
- The number of people,
- Geography (location of the learners)
- Repeatability and consistency,
- The importance of ‘just-in-time’ delivery,
- The cultural fit, i.e. the degree of organizational readiness to embrace new technology.

However there are also many Government drivers pushing the use of e-learning, not only in Europe and the UK, but also in other parts of the world. Hanson (2002) notes that Australian universities have been subject to the following external forces:

- Political drive by Government to lower higher education to the needs of the economy. Through widening access to higher education and by promoting the concept of lifelong learning, more people are being attracted to higher education who would not traditionally have considered going to university.

- The resultant increase in student numbers and growth in diversity of the student population.
- More flexible strategies for learning and teaching.
- Increasing flexibility of access from locations other than campus, for example, home and the workplace.
- Rising costs and reducing per capita funding from government forcing universities to seek more economic and efficient ways of delivering education,
- Income generation through exploitation of new markets such as industry and commerce.

It is not however just the universities that are being subjected to these types of pressures. The further education sector is also under these pressures as well (Martin et al, 2000). Thus universities and the further and higher education sector are being forced into rethinking their teaching, something that Laurillard (1993 & 2002) has been advocating for some time. Bridge (1998, p159) notes

... information technology would seem to form a natural link to meeting changes in demand. Certainly the new private and commercial institutions and some of the larger open and distance learning institutions have now recognised the importance of this link in the development and implementation of their information technology strategies. For those institutions who have been considerably less aggressive in their adoption of information technology strategies, and particularly those traditionally campus based institutions, the question remains: to what extent and form should information technology be used in order to compete in the rapidly changing HE market?

Brown (1998) offers ten reasons for not adopting virtual (e-) learning:

1. The costs are not yet fully understood, but are considerable and in the climate of diminishing higher education resources funding has to be diverted from other areas.
2. e-learning material and computer systems take considerably longer to develop than traditional teaching. However competing e-learning organizations need to be able to respond rapidly and flexibly to the new market opportunities and threats.
3. Classroom teaching can be modified much more readily (and cheaply) than e-learning material with its long development times.

4. The infrastructure of the virtual (e-learning) institutions are very different from those of the traditional institution and requires considerable levels of funding.
5. Whilst the economics of on-line education can be made to work, making the transition to mixed mode requires two systems to be run concurrently, with all the associated costs and tensions.
6. Staff attitudes to this type of change are often a significant barrier.
7. Student needs. Not all learners are comfortable with independent learning, particularly the 18 to 22 year olds in established universities.
8. Reallocation of resources could weaken the traditional side of operations in a time of increasing competition.
9. Traditional universities have strengths that cannot be converted into on-line resources: physical locations providing respite from home and work; facilities and equipment that are not readily simulated in a virtual environment; people with whom they can socialise, and physically interact, etc.

Whilst O’Leary (1998, p335) acknowledges the problem to be faced ‘... there is a growing weight of argument to the in flexibility, communication, economy and speed that web-based learning can deliver, it is the enrichment of teaching materials that the new technology can most improve the output for students.’ Institutional policy is identified by Brown (1998) as a key factor in the success of e-learning. McNaught and Kennedy (2000, p96) identify three themes that determine the successful (or otherwise) introduction of e-learning (McNaught and Kennedy use the term ‘Computer Facilitated Learning’ CFL), policy, culture and support. See figure 2.19 below.

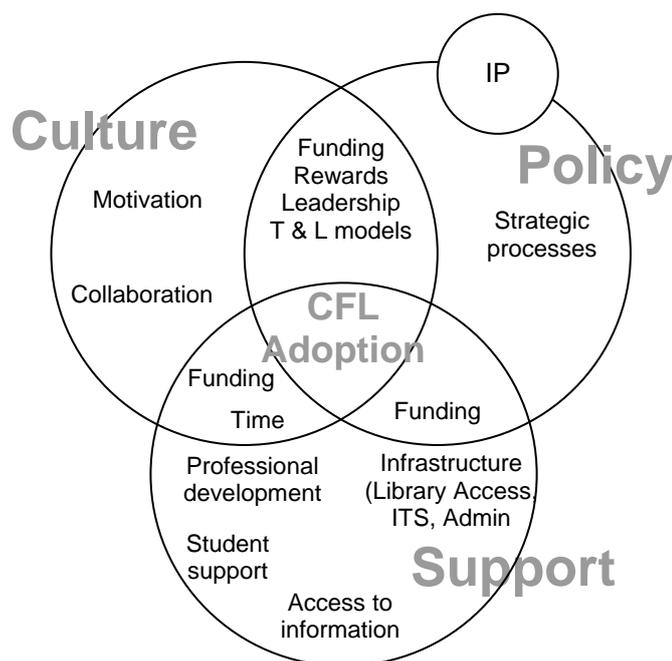


Figure 2.19: Themes and their relationships affecting the adoption of CFL
 Source: McNaught and Kennedy P (2000, p97)

In so doing they identify several factors they claim are ‘universal’ in relation to the widespread use of CFL:

- Coherence of policy across all levels of the institutional operations and specific policies which impact on CFL with each institution,
- Intellectual property, particularly the role of copyright in the emerging online environments,
- Leadership and institutional culture,
- Staff issues and attitudes, namely, professional development and training, staff recognition and rewards, and motivation for individuals to use CFL,
- Specific resourcing issues related to funding for maintenance or updating of CFL materials and approaches, staff time release and support staff.

McNaught and Kennedy (2000, p97)

An example of how students ‘can benefit from increasing skill and comfort in working, networking and learning online’ is provided by Salmon (2000, p11; 2002, p26) as five-stage model indicating what must be done at each stage to help them be successful (see figure 2.20 below).

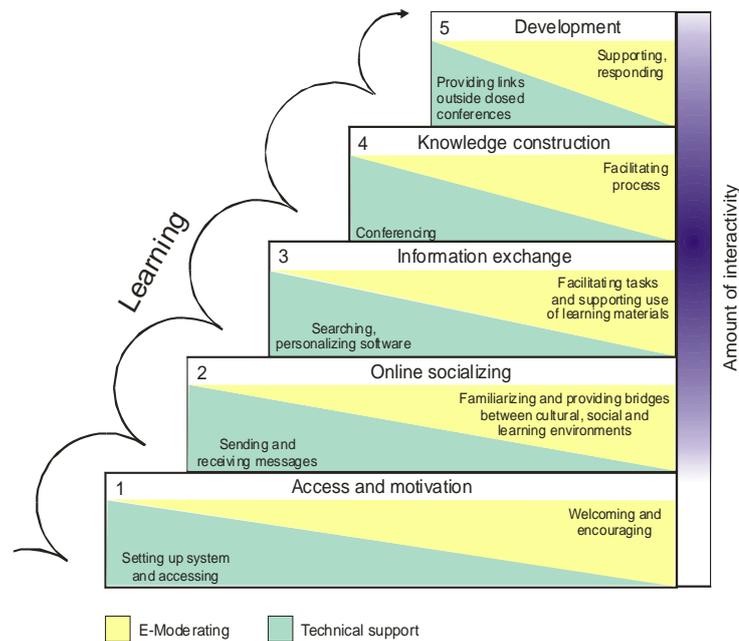


Figure 2.20: Model of teaching and learning online through CMC
 Source: Salmon (2000, p11; 2002, p26)

The importance of open communication is seen by Salmon as one of the key contributors to successful e-learning. Hodgson (1997, p221) too, stresses the need for dialogue in e-learning as ‘to assume that dialogue is no longer required in a technology supported learning environment clearly conflicts with both experience and well established beliefs about learning and the processes of learning.’

2.4.4 Barriers to e-learning

Snook (2001) raises the issue of organisational inter-functional conflict that frequently inhibits the adoption of learning technology or on-line learning in the corporate environment. Typically between the human resource function that has responsibility for corporate education, training and development and the ICT function with responsibility for corporate IT. Snook (2001, p6) notes ‘that e-learning calls not just for cooperation but cohabitation’ between these functions whereas in reality ‘rivalry or even mutual hostility is not uncommon.’ Often this can be attributed to cultural differences, human resource personnel often having an arts background whilst IT personnel have a science background with very different perspectives and agenda. Goulding and Alshawi (2002) also report that these cultural barriers between business functions often cause difficulties in the workplace.

Further insights into the problems faced by e-learning in the corporate environment are proffered by both Broadbent (2002) and Sloman (2001). Broadbent (2002, p107) provides a useful analysis of the driving and restraining forces of corporate e-learning (see figure 2.21 below).

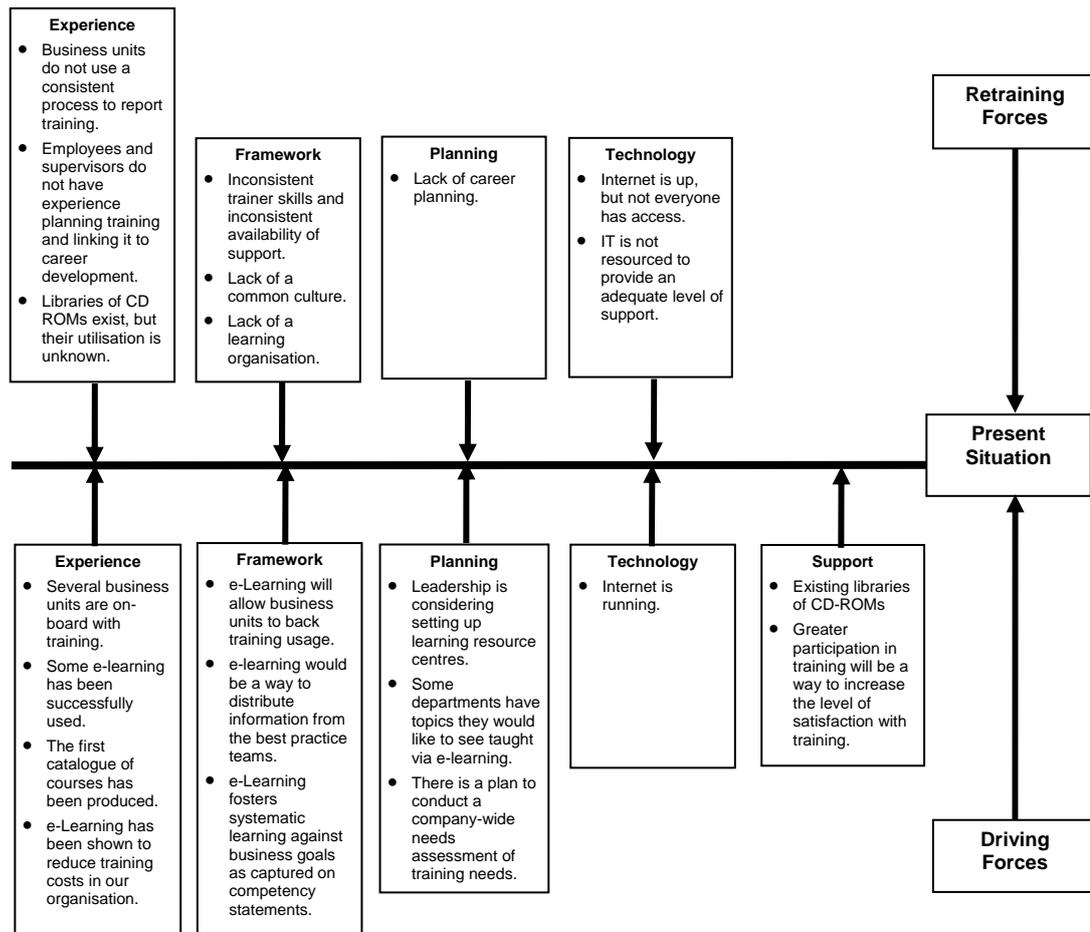


Figure 2.21 – The Restraining Forces and Driving Forces of e-Learning.
Source: Based on Broadbent (2002, p107)

Barriers to the implementation of e-learning can be both intrinsic and extrinsic to e-learning itself and extrinsic in the environment. (Brown, 1997, p189) identifies these intrinsic barriers as:

- Design of the learning materials,
- The study arrangements,

- Physical infrastructure,
- Learning support,
- Management systems.

Whilst extrinsic barriers are identified as those that lie beyond the control of the e-learning environment but must be taken into account when planning and implementing e-learning, such as the effects of changing technology. Brown further identifies other areas which can be barriers to e-learning including:

- Provision of technical support,
- Undertaking of necessary staff development,
- Adopting the e-learning concept, which can sometimes be a resultant effect of a previous poor experience of IT based learning,
- Loss of ownership and control over learning materials through having to adopt someone else's materials,
- Passing of own learning materials over to a 'third party',
- Possible fears about job quality and job security.

Brown does believe that some of these barriers can be overcome through the judicious use of enablers such as:

- Taking advantage of technology changes to exploit previously unavailable facilities,
- Attracting external funding and internal funding,
- Publication of findings,
- Participation of awareness raising events,
- Making supporting tools and resources easily available,
- Rewarding staff in terms of promotion, consultancy payments or enhanced salaries, or relief from other duties.

Brown is however careful to issue cautionary notice that despite the commonality of the barriers there is no simple universal panacea to them.

2.4.5 e-Learning Strategies

If e-learning is to be successfully introduced then a strategy is required. Morrison (2003) identifies four principles that are considered to underpin a successful e-learning strategy:

- The driver of change: business needs,
- The enabler of change: technology,
- The agent of change: content,
- The arena of change: corporate culture,

(Morrison (2003, p113))

which he represents in the following manner:

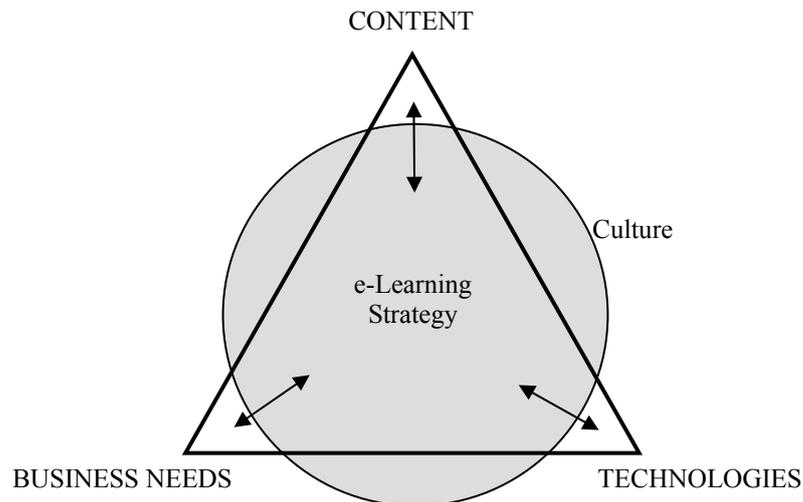


Figure 2.22: E-Learning Strategy
Source: Morrison (2003, p113)

Morrison advises that any e-learning strategy must be aligned with other corporate strategies:

- Business strategy,
- E-business strategy,
- Human resource strategy,
- Knowledge management,
- I.C.T. Strategy

It is also recommended that support for e-learning strategy has to come from the highest levels of the organization and follow down through the organization (Waller, 2000; Littlejohn and Cameron, 1993).

2.4.6 M-Learning

The technology considered so far for e-learning has tended to be passed on the traditional PC environment with learner accessing the learning environment using a desktop or laptop PC connected to a network and the internet through a hard-wired or wireless system, or through a modem and phone line using either narrow-band or broad-band connections.

M-Learning (mobile learning) seeks to use the emergent technology of personal digital assistants (PDAs), notebook and tablet PCs accessing the internet through the mobile phone network. Most of the funding for research in this area is directed at the post-16 education and training, and social inclusion environments, funded through the EC's 'eEurope' Initiative (CEC, 2000a).

However attractive the use of PDAs and G3 phones may seem for the delivery of e-learning and m-learning the use of PDAs and G3 phones can still be regarded as an emergent technology. Waycott (2002) provides an insight into the ways that PDAs can be used together with their benefits and limitations, shown in table 2.02, overleaf. However in the 12 months or so since Waycott's paper was published there have been many advances in PDAs, such as colour screens, larger screens with higher definition/resolution, larger memories and faster processors, but many of the underlying issues still remain, not least of all the high degree of fragmentation required to deliver effective m-learning material (Pehkonen, Syvänen and Turunen, 2003).

Research by Attewell and Savill-Smith (2003) revealed that young adults make extensive use of mobile technology, particularly mobile telephones, which, when considered with the very high level of mobile phone ownership amongst this age group, makes this an attractive technology for the potential delivery of education and training. Indeed as the power of PDAs increases and PDA and telephone technology

merges the potential for anywhere anytime time learning increases (Colley, 2003; Glew et al, 2003) and for the development of lifelong learning (Keefe, 2003).

Table 2.2: Benefits and limitations of PDAs
Based on: Waycott (2002).

| Benefits | Limitations |
|--|--|
| <p><u>Portability</u> Very small, lightweight, and highly portable.</p> | <p>Technical <u>Screen Display</u> Small screens and poor screen quality</p> |
| <p><u>Reading</u> Can be easily fitted in around other activities and in any location.</p> | <p>Reading <u>Reading</u> Small screen size requires 'line-by-line' reading, preventing scan-reading and the ability to gain an overview of the text. Only a small amount of text visible at any one time.</p> |
| | <p>Navigation <u>Documents</u> Difficult to navigate, a lot of scrolling required, and cannot 'bookmark' pages to return to later. Difficult to pick up on navigational clues such as headings.</p> |
| <p>Can be undertaken anywhere, anytime. Easily transferred to a desktop or laptop PC. Small portable keyboards, and speed and accuracy of note-taking.</p> | <p>Note-taking Slow and difficult, problems with accuracy (improves with practice). 'Graffiti' type handwriting software very slow and prone to error.</p> |
| <p>Additional to, not replacement of existing tools such as paper, PCs, etc.</p> | <p>Use of Tools Reduced functionality when compared to existing tools such as PCs. Requires different way of working.</p> |

2.4.7 Conclusions

e-learning continues to attract a lot of attention and with a high political profile, considerable amounts of funding and sponsorship are available from the EC and national government. E-learning embraces a number of educational delivery systems which were identified.

The technology and pedagogy required to provide, operate and deliver e-learning environments has been intentionally excluded from this review as it is beyond the scope of this research project.

The adoption of e-learning and adaptation of higher education to e-learning is clearly a cause for concern in some areas and literature reviewed highlights a number of problems and issues involved. These barriers can be overcome and strategies developed for the implementation of e-learning in higher education.

The key themes identified here which will be the subject of further research are:

- The development and application of e-learning,
- The development and application of e-learning in construction education in higher education institutes,
- The application of e-learning to the construction industry,
- The adoption of e-learning and adaptation by construction companies to e-learning,
- New learning technologies that might benefit the construction industry.

2.5 Conclusions and Recommendations

This document has sought to review literature pertinent to the author's research proposals for management education, training and development in the construction industry. The review therefore identified three key areas for review:

- The construction industry and higher education.
- The learning organisation and lifelong learning.
- e-learning and new learning technologies

As was stated in the introduction a review of literature in these areas can never be complete or exhaustive, particularly in the subjects of learning organisations and lifelong learning, and e-learning and new learning technologies. The amount of literature in these fields continues to grow at a steady rate with new publications appearing almost daily, and the author is continuing to seek out new publications and more widespread sources of publications in support of future studies and research areas for this research project.

The Construction Industry and Higher Education

The government's statistics reports for employment in the construction industry will continue to be collected and analysed to determine how the industry is evolving. Likewise UCAS statistics reports will also continue to be collected and analysed to determine how recruitment to construction management degree courses is changing, and whether the decline in applications continues, or will it follow the recruitment trends of industry and begin to increase? The author's concerns here are that only two more sets of annually published data will be available before the research project is completed. Efforts to locate statistical records for construction industry employment prior to 1969 will continue. In the case of degree recruitment reports prior to 1994 when UCCA and PCAS merged to form UCAS, records do not appear to be available for the years prior to their merger. It is also interesting to note that none of the published reports reviewed refer to recruitment data prior to 1994 either, but never-the-less UCCA and PCAS records must exist somewhere, perhaps in a HE

institution's recruitment office, but locating and accessing those records might prove exceptionally difficult.

The author will continue to take an active interest in the work of the Rethinking Construction and other agencies such as CEML, DTI, etc., as they pursue their agendas to improve the performance of the construction industry. All future research will be carried out against the industry backdrop and the structure of the industry and higher education for the construction industry. Additional studies and/or initiatives undertaken by agencies such as the CBPP and ITCBPP will become increasingly important for future research studies, even though they have not been included in the literature review at this stage.

The Learning Organisation and Lifelong Learning.

This will form one of the main areas for future research. The amount of literature published in these fields is growing at a considerable rate since the mid 1990s when interest in these subject areas developed rapidly.

The idea of construction companies becoming, or having to become, learning organisations will be explored will need to be explored in future research studies. If the construction industry is to be able to meet its future needs for managers it will need to be able to educate, train and develop staff in-house, as well as recruit from traditional university sources, and for this to be effective a learning organisation will have to be created. Despite the quantity of literature reviewed little was found on construction companies as learning organisations.

Research will have to be undertaken with construction companies to establish whether or not construction companies with their high levels of subcontract (self-employed) labour, including quite often subcontract management staff, are actually capable of becoming the learning organisations recommended by Government.

Lifelong learning is a key government objective with its own government agenda, and although it has a high level of focus on young people who have fallen outside the

normal education system, i.e. those with few, if any, formal qualifications at any level, may prove to be a fruitful source of future management for the construction industry. Invariably such people enter the industry through the 'craft' or 'trade' routes and often end up in supervisory or low level management positions with little or no training for those roles. Lifelong learning, the government believes, will help these people improve their skills and knowledge base, so that they are truly competent to undertake their supervisory or managerial role and so raise their own and industry standards of productivity.

As with the learning organisation, there is an increasing amount of literature being published on the subject of lifelong learning. The author is continuing to collect and review published material in this area, and to monitor, in particular, reports and ongoing initiatives from the EC and national government agencies to promote and implement lifelong learning strategies for the construction industry. Research with construction companies is proposed to establish how the principles of lifelong learning can be established and implemented in construction companies.

e-Learning and New Learning Technologies

e-learning is set to play a key role in the implementation of lifelong learning, and therefore educational systems must be able to deliver and receive e-learning systems. This will mean quite profound changes in educational systems for both higher education institutes as deliverers of education, and construction companies and their employees as receivers of education.

The e-learning environment has been brought about by advances in ICT, and in particular the internet. Whilst a large amount of literature was reviewed in this area much of it as found to be concerned with 'low level' (operational) technological issues, and therefore not included in this review, although it may well be required for future research purposes in this field. The review attempted to take a strategic overview of e-learning from both a higher educational and an industry/corporate perspective. The concept of e-learning has been developed over the last few years

and, therefore, can still be considered to be an emergent form of education, with its development and implementation yet to reach a mature steady-state.

M-Learning, a very new development in learning technology, has been reviewed. Very little literature has yet been published in this area, but it has potentially a huge capability for the provision of anytime-anywhere distance learning and hence lifelong learning. Its development will be watched with interest as it could have a significant impact on various areas of research for this project.

By way, almost, of a postscript the author, as a result of the literature reviewed has been left with the concept of a rhetorical question as either the main or alternative title for the future research work and thesis:

'Construction Companies – Can They Ever Learn?'

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2.7 Appendices

Appendix 2.7.1

Table 2.03 Acceptances to construction industry related degree courses

Source: UCAS

| Acceptances to degree courses | | | | | | | | | Source: UCAS | | | |
|-------------------------------|----------------------|------------------------------|-----------------|----------------------------|-------------------------------|----------------------------|-----------------|------------------------|--------------------------------|---------------------|------------------------|------------------------------|
| | H2 Civil Engineering | K0 Arch, Building & Planning | K1 Architecture | K2 Building / construction | K3 Environmental technologies | K4 Town & country planning | KK Combinations | z No preferred subject | K9 other architectural studies | Total Section K + H | Total sections H2 & K2 | Total All degree acceptances |
| 1994 | 3,453 | | 1,972 | 2,367 | 373 | 1,036 | | | | 9,201 | 5,820 | 247,567 |
| 1995 | 3,437 | | 2,159 | 2,718 | 306 | 1,056 | 4 | | | 9,680 | 6,155 | 264,738 |
| 1996 | 3,218 | | 2,174 | 2,430 | 297 | 1,057 | 41 | | | 9,217 | 5,648 | 273,032 |
| 1997 | 3,143 | | 2,368 | 2,498 | 258 | 1,092 | 102 | | | 9,461 | 5,641 | 308,236 |
| 1998 | 2,869 | | 2,311 | 2,345 | 236 | 964 | 95 | | | 8,820 | 5,214 | 302,683 |
| 1999 | 2,624 | | 2,333 | 2,211 | 267 | 895 | 107 | | 1 | 8,438 | 4,835 | 307,677 |
| 2000 | 2,493 | | 2,340 | 2,131 | 230 | 877 | 139 | | 6 | 8,216 | 4,624 | 311,635 |
| 2001 | 2,362 | | 2,535 | 2,080 | 246 | 784 | 127 | | 9 | 8,143 | 4,442 | 329,218 |
| 2002 | 2,452 | 10 | 2,754 | 2,013 | 221 | 689 | 1 | | 27 | 8,167 | 4,465 | 344,581 |

Appendix 2.7.2

Table 2.04 Employment in the Construction Industry

Source: DOE Housing & Construction Statistics; DTI/DTLR Construction Statistics Annuals

| | 1000's Contractors | | | Public Authorities | | | Operatives total | APTC total | Total registered employees | Estimated employees not on register | Self Employed | Total Employed |
|------|--------------------|------|------------------|--------------------|------|-----------------|------------------|------------|----------------------------|-------------------------------------|---------------|----------------|
| | Operatives | APTC | Contractor Total | Operatives | APTC | Public A. Total | | | | | | |
| 1969 | 995 | 239 | 1,234 | 266 | 99 | 365 | 1,261 | 338 | 1,599 | | 293 | 1,892 |
| 1970 | 912 | 230 | 1,142 | 258 | 103 | 361 | 1,170 | 333 | 1,503 | | 300 | 1,803 |
| 1971 | 856 | 222 | 1,078 | 250 | 108 | 358 | 1,106 | 330 | 1,436 | | 328 | 1,764 |
| 1972 | 861 | 211 | 1,072 | 249 | 113 | 362 | 1,110 | 324 | 1,434 | | 367 | 1,801 |
| 1973 | 902 | 224 | 1,126 | 246 | 114 | 360 | 1,148 | 338 | 1,486 | | 428 | 1,914 |
| 1974 | 874 | 238 | 1,112 | 230 | 109 | 339 | 1,104 | 347 | 1,451 | | 427 | 1,878 |
| 1975 | 820 | 239 | 1,059 | 235 | 114 | 349 | 1,055 | 353 | 1,408 | | 375 | 1,783 |
| 1976 | 788 | 236 | 1,024 | 235 | 114 | 349 | 1,023 | 350 | 1,373 | | 341 | 1,714 |
| 1977 | 756 | 229 | 985 | 227 | 111 | 338 | 983 | 340 | 1,323 | | 323 | 1,646 |
| 1978 | 750 | 231 | 981 | 224 | 110 | 334 | 974 | 341 | 1,315 | | 366 | 1,681 |
| 1979 | 763 | 232 | 995 | 220 | 112 | 332 | 983 | 344 | 1,327 | | 343 | 1,670 |
| 1980 | 767 | 235 | 1,002 | 212 | 110 | 322 | 979 | 345 | 1,324 | | 343 | 1,667 |
| 1981 | 678 | 230 | 908 | 205 | 104 | 309 | 883 | 334 | 1,217 | | 388 | 1,605 |
| 1982 | 619 | 223 | 842 | 187 | 95 | 282 | 806 | 318 | 1,124 | | 388 | 1,512 |
| 1983 | 600 | 214 | 814 | 183 | 88 | 271 | 783 | 302 | 1,085 | | 409 | 1,494 |
| 1984 | 585 | 214 | 799 | 172 | 84 | 256 | 757 | 298 | 1,055 | | 464 | 1,519 |
| 1985 | 556 | 213 | 769 | 169 | 84 | 253 | 725 | 297 | 1,022 | | 470 | 1,492 |
| 1986 | 530 | 212 | 742 | 160 | 82 | 242 | 690 | 294 | 984 | | 487 | 1,471 |
| 1987 | 542 | 219 | 761 | 159 | 81 | 240 | 701 | 300 | 1,001 | | 542 | 1,543 |
| 1988 | 543 | 227 | 770 | 155 | 84 | 239 | 698 | 311 | 1,009 | | 593 | 1,602 |
| 1989 | 552 | 242 | 794 | 140 | 77 | 217 | 692 | 319 | 1,011 | | 722 | 1,733 |

| | 1000's Contractors | | | Public Authorities | | | Operatives total | APTC total | Total registered employees | Estimated employees not on register | Self Employed | Total Employed |
|------|--------------------|------|------------------|--------------------|------|-----------------|------------------|------------|----------------------------|-------------------------------------|---------------|----------------|
| | Operatives | APTC | Contractor Total | Operatives | APTC | Public A. Total | | | | | | |
| 1990 | 539 | 249 | 788 | 129 | 68 | 197 | 668 | 317 | 985 | | 718 | 1,703 |
| 1991 | 526 | 252 | 778 | 120 | 64 | 184 | 646 | 316 | 962 | 90 | 683 | 1,735 |
| 1992 | 437 | 221 | 658 | 112 | 56 | 168 | 549 | 277 | 826 | 98 | 652 | 1,576 |
| 1993 | 390 | 204 | 594 | 101 | 50 | 151 | 491 | 254 | 745 | 95 | 597 | 1,437 |
| 1994 | 361 | 198 | 559 | 90 | 42 | 132 | 451 | 240 | 691 | 90 | 571 | 1,352 |
| 1995 | 350 | 199 | 549 | 86 | 38 | 124 | 436 | 237 | 673 | 80 | 621 | 1,374 |
| 1996 | 350 | 201 | 551 | 76 | 32 | 108 | 426 | 233 | 659 | 87 | 625 | 1,371 |
| 1997 | 384 | 200 | 584 | 70 | 26 | 96 | 454 | 226 | 680 | 112 | 593 | 1,385 |
| 1998 | 431 | 205 | 636 | 68 | 25 | 93 | 499 | 230 | 729 | 183 | 518 | 1,430 |
| 1999 | 484 | 206 | 690 | 60 | 23 | 83 | 544 | 229 | 773 | 131 | 511 | 1,415 |
| 2000 | 520 | 225 | 745 | 57 | 23 | 80 | 577 | 248 | 825 | 128 | 498 | 1,451 |
| 2001 | 534 | 250 | 784 | 51 | 21 | 72 | 585 | 271 | 856 | 106 | 572 | 1,534 |
| 2002 | 544 | 251 | 795 | 45 | 19 | 64 | 589 | 270 | 859 | 169 | 586 | 1,614 |

Appendix 2.7.3

Table 2.05: APTC Employment in the Construction IndustrySource: DOE, *Housing and Construction Statistics*

Employees x1000

| | Managerial Staff | Architects, Surveyors, Engineers | Technical Staff | Draughtsmen & Tracers | Foremen | Clerical & Sales Staff | Total of All APTC Staff |
|------|------------------|--|-----------------|--------------------------|---------|---------------------------|----------------------------|
| 1974 | 57.9 | 24.7 | 30.4 | 5.5 | 40.4 | 97.0 | 255.9 |
| 1975 | 56.1 | 24.2 | 30.8 | 5.1 | 38.7 | 95.4 | 250.3 |
| 1976 | 58.5 | 23.9 | 30.6 | 4.6 | 38.6 | 95.4 | 251.6 |
| 1977 | 56.8 | 22.9 | 32.2 | 4.4 | 38.7 | 93.0 | 248.0 |
| 1978 | 59.3 | 23.0 | 33.0 | 4.0 | 40.3 | 95.3 | 254.9 |
| 1979 | 57.7 | 18.7 | 26.7 | 3.5 | 39.3 | 91.9 | 237.8 |
| 1980 | 61.3 | 18.3 | 27.6 | 3.2 | 38.1 | 90.7 | 239.2 |
| 1981 | 60.1 | 16.7 | 26.4 | 3.0 | 34.7 | 85.3 | 226.2 |
| 1982 | 58.8 | 16.8 | 25.2 | 2.8 | 34.0 | 82.2 | 219.8 |
| 1983 | 60.0 | 17.1 | 24.7 | 2.7 | 33.6 | 82.5 | 220.6 |
| 1984 | 59.3 | 17.3 | 24.7 | 2.8 | 33.8 | 82.6 | 220.5 |
| 1985 | 57.0 | 17.4 | 24.9 | 2.6 | 32.1 | 78.7 | 212.7 |
| 1986 | 56.5 | 17.1 | 24.6 | 2.5 | 32.2 | 78.9 | 211.8 |
| 1987 | 54.5 | 18.0 | 27.6 | 2.5 | 31.0 | 77.5 | 211.1 |
| 1988 | 66.0 | 17.9 | 31.4 | 2.8 | 29.6 | 79.5 | 227.2 |
| 1989 | 69.2 | 19.0 | 32.3 | 2.9 | 30.1 | 82.4 | 235.9 |

**Nottingham Trent University
The Nottingham Business School**

Doctor of Business Administration Programme

***Management Education, Training and
Development of Construction Managers -
Will They Ever Learn?***

Qualitative Research Project

Document 3

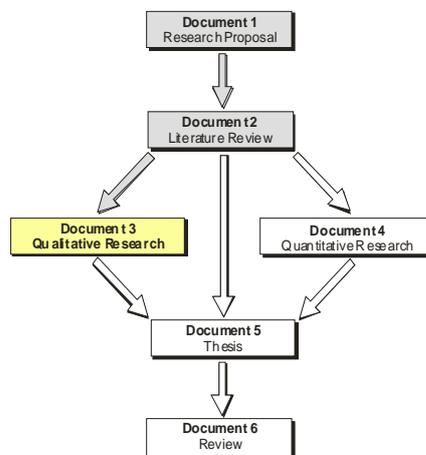
**A.G. Hurst
N0013040
September 2004**

**NOTTINGHAM
TRENT UNIVERSITY** 

This document is submitted in fulfilment of Document 3, being a partial fulfilment of the Doctor of Business Administration programme.

Title: Management Education, Training and Development for Construction Managers – Will They Ever Learn?

Qualitative Research Project



Supervisors: Professor Alistair Mutch
Professor Myra Hodgkinson

September 2004

A.G. Hurst MSc, MBA, MCIQB, MAPM, MCMII

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3.0.2 List of Abbreviations and Acronyms

| | |
|------------------|--|
| APM | Association of Project Managers |
| AS | Advanced Supplementary |
| BIM | British Institute of Management (now called the CMI) |
| CBI | Confederation of British Industry |
| CIOB | Chartered Institute of Building |
| CITB | Construction Industry Training Board |
| CMI | Chartered Management Institute |
| CPD | Continuing Professional Development |
| DES | Department of Education and Science |
| DTI | Department of Trade and Industry |
| FE | Further Education |
| GNVQ | General National Vocational Qualification |
| HE | Higher Education |
| ICT | Information and Communications Technology |
| IES | Institute of Employment Studies |
| ICE | Institute of Civil Engineers |
| IStructE | Institute of Structural Engineers |
| LSC | Learning and Skills Council |
| MCG | Major Contractors' Group |
| M ⁴ I | Movement for Innovation |
| MSC | Manpower Services Commission |
| NCFE | National Certificate of Further Education |
| NEDC | National Economic Development Council |
| NTO | National Training Organisation |
| NEDO | National Economic Development Office |
| NVQ | National Vocational Qualification |
| ODPM | Office of the Deputy Prime Minister |
| RIBA | Royal Institute of British Architects |
| RICS | Royal Institute of Chartered Surveyors |
| SME | Small and Medium (sized) Enterprises |

| | |
|------|--|
| SRHE | Society for Research in Higher Education |
| SSDA | Sector Skills Development Agency |
| VCE | Vocational Certificate of Education |

3.0.3 Acknowledgement of Trademarks.

MiniDisc is a registered trademark of Sony Corporation, Japan.

QSR NVivo is a registered trademark of QSR International Pty. Ltd., Australia

MindManager is a registered trademark of Mindjet LLC, Germany

3.1 Introduction and Research Question

3.1.1 The Research Project

In order to undertake this research project Bryman & Bell's qualitative research model (2003:283) shown in Figure 3.1 below will be used to provide the basic framework for the research and for this report.

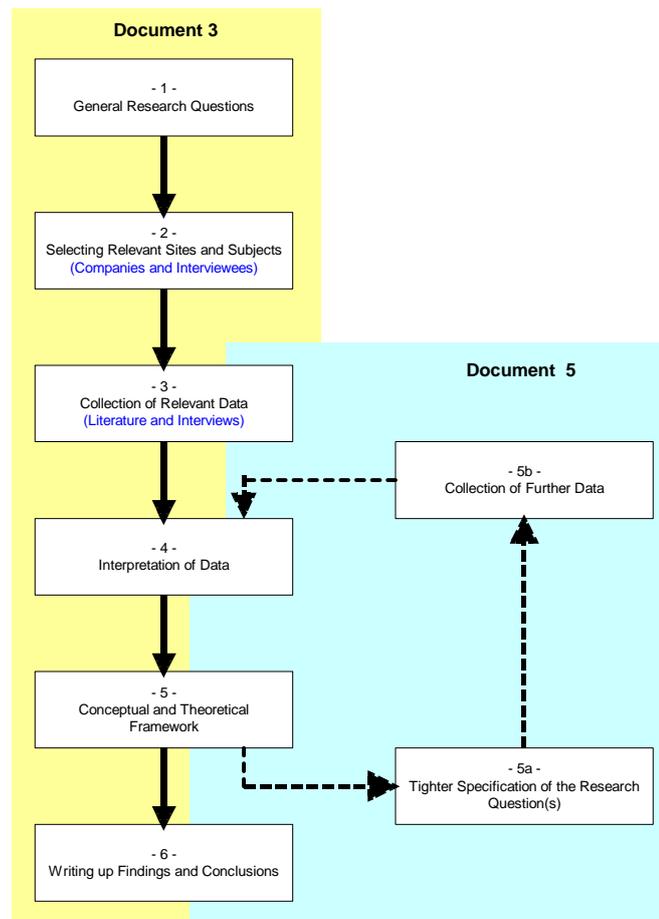


Figure 3.1: Qualitative Research Model
Source: Based on Bryman and Bell (2003: 283)

This research project will act not only as a research project in its own right, but also as a pilot study and forward feed for Document 5. The findings may impact upon and influence the qualitative research project to be undertaken in Document 4.

Firstly this chapter (Chapter 3.1) will establish the general research question [1]. Consideration will then be given as to how and from whom the data will be collected

[2], together with a discussion of the data collection process [3] in the form of interviews in Chapter 3.2. The data interpretation [4], conceptual and theoretical framework [5] findings form the basis of Chapter 3.3, whilst the conclusions will form the basis of Chapter 3.4.

One departure from the model is the omission of the literature review [3] which might otherwise be expected, as it has already been included in Document 2. Where new literature has been encountered it has been incorporated into chapters 3.2 and 3.3, as an integral part of the discussion.

3.1.2 The Report Structure.

Chapter 3.1 Introduction and Research Question: Having already introduced the qualitative research model this chapter will introduce the research question.

Chapter 3.2 Research Methodology: This chapter considers research design models and the various research philosophies available to the author. A critical realist approach is adopted and the most appropriate research approaches, strategies and time horizons are considered.

Chapter 3.3 Research Method: Continuing from the previous chapter this chapter discusses the research methods used, following a critical realist philosophy, to carry out the research through the use of interviews. Various types of interview method are considered and the unstructured conversational type of interview method is adopted. The methods of selection of interviewees and the execution of the interviews are also described.

Chapter 3.4 Research Findings: This chapter discusses the findings of the research interviews, considered under three headings that were emergent themes from the interviews, these being:

- Poor image of the construction industry,
- Poor recruitment levels into the industry, and
- Poor management education, training and development in construction companies.

It will be seen that these themes are heavily interdependent and share many common constituent sub-themes.

Chapter 3.5 Research Conclusions: This chapter applies a grounded theory approach to the research findings from which various conclusions are drawn and hypotheses postulated in order that future research and the next stages of the DBA project can be considered.

Chapter 3.6 Research Recommendations for the Future: This chapter considers the research undertaken and proposes areas for future research based on the emergent themes of the research findings. The research areas to be taken forward to the qualitative research and thesis stages of this DBA project are proposed and considered, whilst other areas for possible independent or future research projects are identified.

3.1.3 The Research Question

Over the last decade or so the construction industry has been the subject of various reports (e.g. Latham 1994; Egan 1998, 2002) that have sought to try to improve productivity in the construction industry (see documents 1 and 2) by examining the practices of the industry and promoting improvements through best practice initiatives. One of the issues identified in these reports has been the poor standard of management, education, training and development, not least within the construction companies themselves. More recently there have been a number of reports highlighting the plight of both the national skills shortage (e.g. LSC 2003, 2004B) and the construction industry in terms of skills shortages (e.g. CITB 2004; LSC, 2004A) and a dramatic decline in the number of applicants for construction management courses in universities (Coulter, 2003; Wilkie and Giddings, 2003).

This report discusses the initial outcomes of a qualitative research project carried out in an attempt to try and identify:

What are the structures and mechanisms behind the perceived poor state of management education, training and development and the decline in entrants to the construction industry with particular reference to construction management?

3.2 Research Methodology

3.2.1 Introduction

In order to execute this research an appropriate qualitative research methodology had to be adopted taking into account the research methods appropriate for the research question, the requirements and constraints of the research project brief and the author's situation and circumstances.

This chapter will therefore firstly consider the methodology and design adopted before considering the methods used for the research.

3.2.2 Research design

In designing this research project various research philosophies had to be considered. Easterby-Smith, Thorpe and Lowe (2002: 55) set out the matrix of research philosophies shown in Figure 3.2 below,

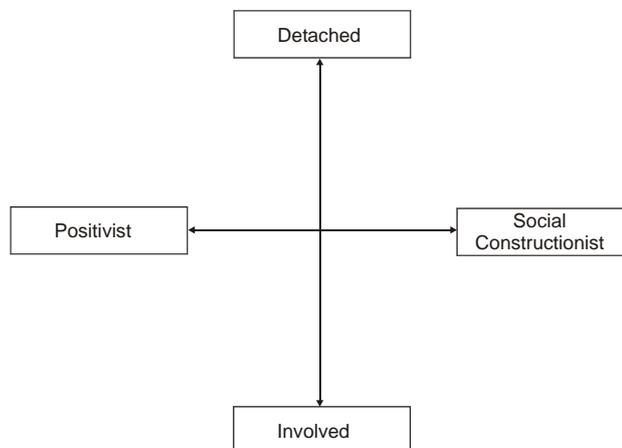


Figure 3.2: Matrix of Research Philosophies
Source: Easterby-Smith, Thorpe and Lowe (2002: 55)

against which they map various possible research designs shown in Figure 3.3 overleaf.

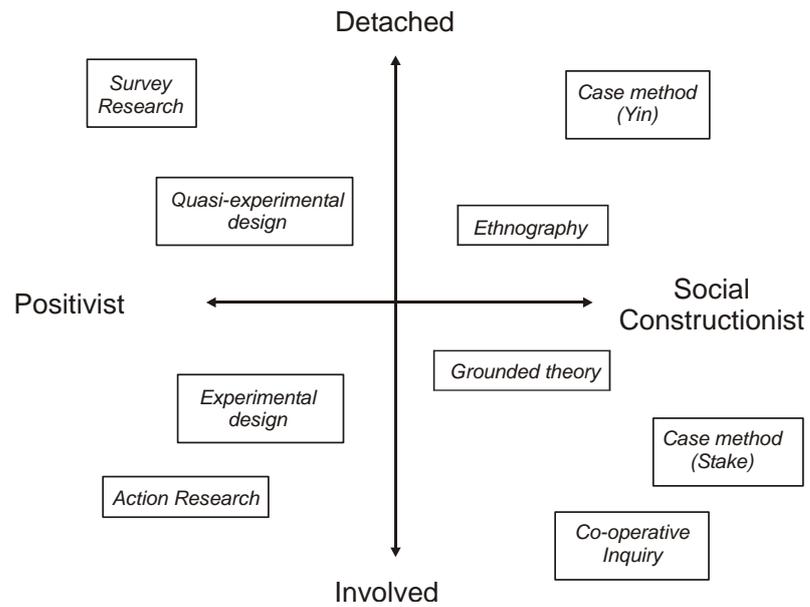


Figure 3.3: Research Designs
 Source: Easterby-Smith, Thorpe and Lowe (2002: 57)

An alternative model, the Research Process ‘Onion’, proposed by Saunders, Lewis and Thornhill (2003: 83) shown in Figure 3.4 below was also considered and using both the Easterby-Smith, Thorpe and Lowe model and the Saunders, Lewis and Thornhill models together will establish the methodology to be adopted.

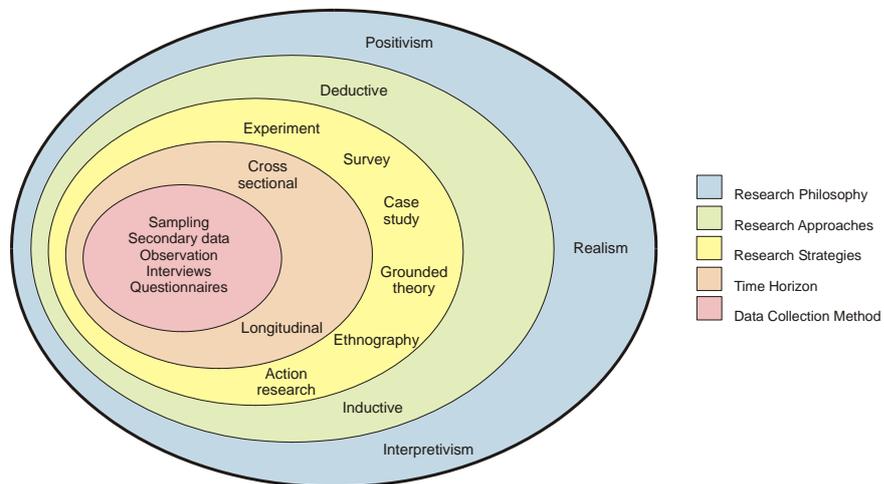


Figure 3.4: The Research Process ‘Onion’
 Source: based on Saunders, Lewis and Thornhill (2003: 83)

3.2.3 The Research Philosophy

Of the various philosophies given in the two models only 'Positivism' (or 'Positivist') (Donaldson 1996) appears in both models, whilst at the other ends of the axis Easterby-Smith, Thorpe and Lewis place 'Social Constructionist' whereas Saunders, Lewis and Thornhill place 'Interpretivism' although Easterby-Smith, Thorpe and Lowe acknowledge that the social constructionism is one of a group of approaches that are generally referred to as interpretive methods. For the purposes of consistency in this report the Saunders, Lewis and Thornhill model and terminology will generally be adopted. Saunders, Lewis and Thornhill provide a third philosophy, that of 'Realism' which must also be considered (Sayer 1992 and 2000). Which therefore of the three philosophies, if any, is the most appropriate to adopt for this research project? This, as will be seen, will largely be determined by the approaches, strategies, time horizon and methods to be adopted.

3.2.3.1 The Positivist Approach.

Remenyi et al (1998:32) states that the Positivist Approach:

implies that the researcher is working with observable social reality and that the end product of such research can be the derivation of laws or law-like generalisations

and that (p33) the

... underlying position is the assumption that the researcher is independent of and neither affects nor is affected by the subject of the research.

whilst Saunders, Lewis and Thornhill (2003: 83) citing Remenyi et al above further state that

The researcher in this tradition assumes the role of an objective analyst, coolly making detached interpretations about the data that have been collected in an apparently value-free manner. There will be an emphasis on a highly structured methodology to facilitate replication and a quantifiable observation that lend themselves to statistical analysis.

Both Bryman and Bell (2003) and Miles and Huberman (1994) adopt similar approaches and provide a consensus of opinion with the above with Bryman and Bell (2003: 14) providing an insight to the epistemological position of positivism:

Positivism ... is the application of the methods of natural sciences to the study of social reality and beyond Positivism also is also taken to entail the following principles:

1. Only phenomena and hence knowledge confirmed by the senses can genuinely be warranted as knowledge (the principle of phenomenalism);
2. The purpose of the theory is to generate hypotheses that can be tested and thereby will allow explanation of laws to be assessed (the principle of deductivism);
3. Knowledge is arrived at through the gathering of facts that provide the basis for laws (the principle of inductivism);
4. Science must (and presumably can) be conducted in a way that is value free (that is, objective); and
5. There is a clear distinction between scientific statements and normative statements and a belief that the former are the true domain of the scientist.

A more complex set of what they term 'implications' is proposed by Easterby-Smith, Thorpe and Lowe (2002: 28) required for a positivist approach

1. *independence*: the observer must be independent from what is being observed;
2. *value-freedom*: the choice of what to study, and how to study it, can be determined by objective criteria rather than by human beliefs and interests;
3. *causality*: the aim of social sciences should be to identify causal explanations and fundamental laws that explain regularities in human social behaviour;
4. *hypothesis and deduction*: science proceeds through a process of hypothesizing fundamental laws and then deducing what kinds of observations will demonstrate the truth or falsity of these hypothesis;
5. *operationalization*: concepts need to be operationalised in a way which enables facts to be measured quantitatively;
6. *reductionism*: problems as a whole are better understood if they are reduced into the simplest possible elements;
7. *generalization*: in order to be able to generalize about regularities in human and social behaviour it is necessary to select samples of sufficient size, from which inferences may be drawn about the wider population;
8. *cross-sectional analysis*: such regularities can most easily be identified by making comparisons of variations across samples.

Whilst Easterby-Smith, Thorpe and Lowe acknowledge that not all 'positivists' agree with all of the implications it does however serve as a good test for a positivist approach. Mapping this project against these implications gives the following outcomes:

- *Independence:* The researcher is not independent and will not be unaffected by the research subject and the research subject will not be unaffected by the author;
- *Causality:* The end result of the research will not be the derivation of laws or law-like generalisations;
- *Value-freedom:* The researcher is not value-free;
- *Hypothesis and deduction:* This project does not seek to establish and test an hypothesis;
- *Operationalization:* The data collected will not be quantifiable and hence not subject to statistical analysis.
- *Reductionism:* The reduction of the problem into simple elements is not achievable;
- *Generalization:* The sample size will be small, and may not be a representative cross-section of the population;
- *Cross-sectional analysis:* regularities will not be easily identifiable by comparison across the samples.

Thus it can be seen above that as there is little fit in this research project to these implications the positivist approach cannot be considered as an appropriate philosophy as none of the assumptions and generalisations to be met for a positivist approach are satisfied for as Rubin and Rubin (1995: 32) state:

Positivist social researchers look for the uniform, precise rules that organize the world... Positivists in the social sciences examine simplified models of the social world to see how a smaller number of variables... interact.

The result is that they miss how the complexity in the real world affects human behaviour.

The very essence of this research is to begin to determine how the complexities of the real world affect human behaviour.

3.2.3.2 The Social Constructionist/Interpretivist Approach

A contrasting philosophical approach to positivism is that of Social Constructionism. Easterby-Smith, Thorpe and Lowe (2002: 29) state that

... Social Constructionism ... focuses on the ways that people makes sense of the world, especially through sharing their experiences with others via the medium of language.

A view supported by Bryman and Bell (2003) who also further consider this from the anti-positivist view of phenomenology.

Saunders, Lewis and Thornhill propose similar arguments to Easterby-Smith, Thorpe and Lowe as business situations are complex and unique, and a function of the particular set of circumstances and individuals at any one time. Saunders, Lewis and Thornhill (2003: 84) further draw upon Remenyi et al concerning the interpretivist's need to discover 'the details of the situation to understand reality or perhaps a reality lurking behind them' (Remenyi et al; 1998: 35). Saunders, Lewis and Thornhill further state (2002: 84) that

People are likely to share interpretations of their socially constructed environment. This may point to the existence of commonly experienced stimuli in terms of generating a shared interpretation. Such stimuli may or may not be explicitly evident to those in a given situation or environment. These stimuli will nevertheless exert an influence on the way in which those affected socially construct their world.

Easterby-Smith, Thorpe and Lowe (2003: 30) provide a useful comparison between the positivist's approach and the social constructionivist's approach shown in Table 3.1 overleaf:

Table: 3.1 Contrasting Implications of Positivism and Social Constructionism
 Source: Easterby-Smith, Thorpe & Lowe (2002: 30)

| | Positivism | Social Constructionism |
|-----------------------------|---|--|
| The observer | must be independent | is part of what is being observed |
| Human interest | should be relevant | are the main drivers of science |
| Explanations | must demonstrate causality | aim to increase general understanding of the situation |
| Research progresses through | hypotheses and deductions | gathering rich data from which ideas are induced |
| Concepts | need to be operational so that they can be measured | should incorporate stakeholder perspectives |
| Use of analysis | should be reduced to its simplest terms | may include the complexity of 'whole' situations |
| Generalization through | statistical probability | theoretical abstraction |
| Sampling requirements | large numbers selected randomly | small numbers of cases chosen for specific reasons |

For as Rubin and Rubin (1995: 55) state

Interpretivist researchers try to elicit interviewees' views of their worlds, their work, and the events they have experienced or observed.

which is very much in line with what the author will be attempting in the research.

Thus it can now be seen that the Social Constructionist approach provides a more appropriate research philosophy as most, but not all, of the criteria for this approach are met.

3.2.3.3 The Realist Approach

Saunders, Lewis and Thornhill (2003: 85) provide the following explanation of realism:

Realism is based on the belief that a reality exists that is independent of human thoughts and beliefs ... this can be seen as indicating that there are large-scale social forces and processes that affect people without them necessarily being aware of the existence of such influences on their interpretations and behaviours. Social objects or phenomena that are external to, or independent of, individuals will therefore affect the way in which these people perceive their world, whether they are aware of these forces or not.

As Bryman and Bell point out (2003: 15):

Realism shows two features with positivism: a belief that the natural and social sciences can and should apply the same kinds of approaches to the collection of data and to explanation, and a commitment to the view that there is an external reality to which scientists direct their attention.

Both Bryman and Bell (2003) and Easterby-Smith, Thorp and Lowe (2002) identify different forms of realism. The former identifying what they term 'Empirical Realism' and 'Critical Realism' whilst the latter identifies 'Traditional Realism', 'Internal Realism' and 'Relativism'. Other such as Saunders, Lewis and Thornhill (2003) and Remenyi et al (1998) make no differentiation whilst Miles and Huberman refer to both realism and relativism without defining the latter.

Bryman and Bell's approach (2003: 15) which draws heavily on Bhaskar will be adopted:

Empirical Realism [or 'realism'] simply asserts that, through the use of appropriate methods reality can be understood. As such 'it fails to recognise that there are enduring structures and generative mechanisms underlying and producing observable phenomena and events' and is therefore 'superficial' (Bhaskar 1989: 2)

Critical realism is a specific form of realism whose manifesto is to recognise the reality of the natural order and the events and discourses of the social world and holds that 'we will only be able to understand – and so change – the social world if we identify the structures at work that generate those vents and discourses. These structures are not spontaneously apparent in the observable pattern of events, they can only be identified through the practical and theoretical work of the social sciences'. Bhaskar (1989: 2)

Easterby-Smith, Thorpe and Lowe (2003: 33) do however acknowledge that critical realism 'is a variant of relativism which starts with the realist ontology of Bhaskar and then incorporates an interpretive thread of Sayer (2000)'

Sayer himself (2000: 2) claims that:

Critical realism provides an alternative to several philosophical and methodological positions which have been found wanting ...

Firstly, in the philosophy of natural science, realism offered a third way between empiricism and positivism on the one hand, and relativism on the other ...

Secondly, in the philosophy and methodology of social science, critical realism provides an alternative to both hopes of law-finding science of society modelled on natural science methodology and the anti-naturalist or Interpretivist reductions of social science to interpretation of meaning ...

Thirdly, with respect to debates around modernism and post-modernism, it opposes the reductionism and closure of the overly confident 'modernist' kinds of social science.

Thus critical realism can be seen to make

A conscious compromise between the extreme positions: it recognises social conditions (such as class or wealth) as being real consequences whether or not they are observed and labelled by social scientists; but it also recognises that concepts are human constructions. Easterby-Smith, Thorpe and Lowe (2003: 33)

From the three philosophies outlined above it can be seen that the most applicable for this research project is that of critical realism, although the interpretivist approach could also be adopted.

3.2.4 The Research Approach

This project does not seek to establish and test a hypothesis by proposing a theory and then collecting data to prove or disprove the theory (the deductive approach), consistent with the positivist philosophy. Thus the inductive approach will be employed, consistent with the interpretivist approach (Easterby-Smith, Thorpe and Lowe, 2002) and critical realist approach (Sayers, 2002).

Bryman and Bell (2003:12) provide what is, by their own admission, a crude definition of the processes with each being the reverse of the other:

Deduction entails:

Theory \Rightarrow Observation / findings

Induction entails:

Observation / findings \Rightarrow Theory

whilst Saunders, Lewis and Thornhill (2003: 89) provide the following useful comparison of the major differences between the deductive and inductive approaches to research:

Table 3.2 Comparison of the Deductive and Inductive Approaches to Research
Source: Saunders, Lewis and Thornhill (2003: 89)

| Deductive | Inductive |
|--|---|
| <ul style="list-style-type: none"> • Scientific principles • Moving from theory to data • The need to explain causal relations between variables • The collection of quantifiable data • The application of controls to ensure validity of data • The operationalisation of concepts to ensure clarity of definition • A highly structured approach • Researcher independent of what is being researched • The necessity to select samples of sufficient size in order to generalise conclusions. | <ul style="list-style-type: none"> • Gaining and understanding of the meaning humans attach to events • A close understanding of the research context • The collection of qualitative data • A more flexible structure to permit changes of research emphasis as the research progresses • A realisation that the researcher is part of the research process • Less concern with the need to generalise |

The nature of the research question already proffered requires that the data be collected and findings made before any theory can be postulated. The only approach that can be adopted is that of induction, being consistent with both the interpretive and critical realist philosophies.

3.2.5 The Research Strategy

Of the research strategies identified by Saunders, Lewis and Thornhill (2003) in their research process 'onion':

- Experiment
- Survey
- Case study
- Ethnography
- Action research
- Grounded theory

both experiment and surveys (including structured interviews) are invariably identified with the deductive approach and therefore not applicable to this research project. Of the remaining four strategies, which are normally identified with the inductive approach, only one, grounded theory, will be found to be of practical use.

Case study: The nature of the data to be collected does not require ‘the detailed and intensive analysis of a single case’ (Bryman and Bell, 2003: 53), and therefore this technique is not relevant in this instance as data will be collected from multiple sources.

Ethnography: Miles and Huberman (1993), Bryman and Bell (2003) and Saunders, Lewis and Thornhill (2002) all explain the fact that ethnographic studies require prolonged in depth studies of the subject, in which the researcher often becomes immersed in a part of the entity being studied. This strategy is not appropriate in this research project for the following reasons:

1. The time frame for the project and the time available to the researcher are insufficient for an ethnographic study;
2. The project does not seek to study a specific entity, but gather data from a number of entities.

Action Research: This usually involves collaborative project between the researcher and a client to address a specific problem, usually through a process of change (Bryman and Bell, 2003; Saunders, Lewis and Thornhill, 2003; Easterby-Smith, Thorne and Lowe, 2002; Remenyi et al, 1998). This technique is clearly inappropriate at this stage as the author is not working with any specific client to resolve (at least in this project) any specific issue.

Grounded Theory: The concepts of grounded theory are invariably attributed to Glaser and Strauss in their 1967 book ‘The Discovery of Grounded Theory: Strategies for Qualitative Research’. However a useful definition cited from Strauss and Corbin (1998: 12) is given by Bryman and Bell (2003: 428):

Grounded theory has been defined as ‘theory that was derived from data, systematically gathered and analysed through the research process. In this method, data collection, analysis, and eventually theory stood in close relationship to one another’ (Strauss and Corbin, 1998: 12)

Furthermore Bryman and Bell (2003: 431) provide a useful representation (see Figure 3.5 overleaf) of the processes and outcomes in the grounded theory research strategy.

This research will cover the entire process as it is, as has already been stated, intended to act as a pilot study for document 5. The relevant stages of the process covered in this report and those to be covered in a future report are indicated in the diagram overleaf.

However the concept of grounded theory is not without its criticisms (Bryman and Bell, 2003; Saunders, Lewis and Thornhill, 2003) which include:

- The research is not value-free and observation theory-neutral as the author invariably has some pre-conceived ideas and notions from existing knowledge and understanding of the social contract being studied.
- The defining of the research question itself can be regarded as largely contrary to the principles of grounded theory.
- Research carried out to tight time schedules can make the transcription and grounded theory analysis of the interviews very difficult due to the interplay of data collection and conceptualisation.
- It is often questionable whether grounded theory can actually result in theory in many cases as the explanation being proffered may not contain any readily identifiable theory.
- Data coding tends to result in fragmented data by dividing it into discrete segments, thus losing the context and narrative flow.
- There are many conflicting and competing approaches to grounded theory.

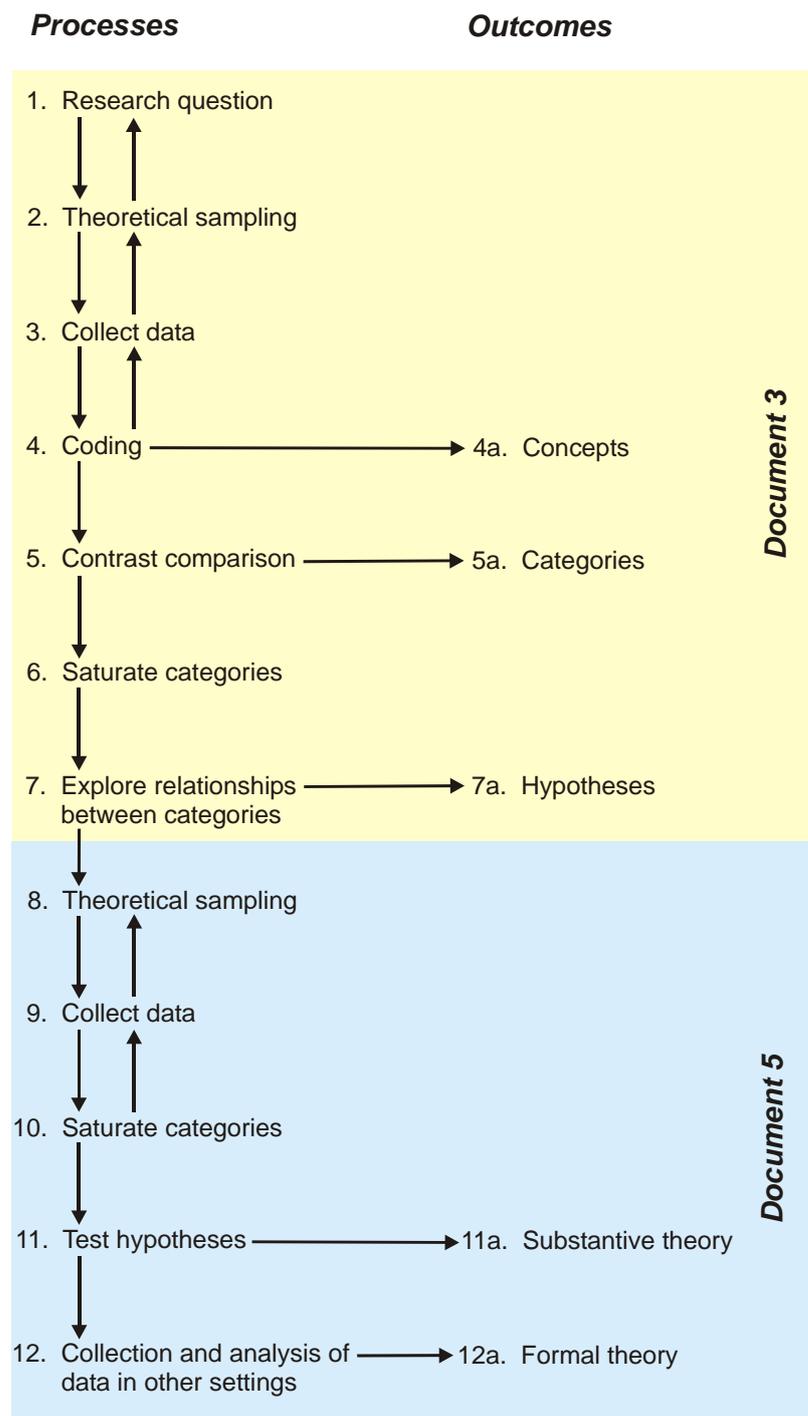


Figure 3.5: Processes and Outcomes of Grounded Theory
 Source: based on Bryman and Bell (2003: 431)

Yet in spite of the various criticisms labelled at grounded theory it has many advocates for its use for qualitative data analysis. Bryman and Bell (2003: 434) cite Locke's (2001) suggestion that grounded theory is good at:

Capturing complexity: Grounded theory is good at capturing the complexity of contexts as action unfolds.

Linking with practice: It frequently facilitates an appreciation among organizational members of their situation. Such understanding can provide a helpful springboard for organizational actions.

Facilitating organizational research in substantive areas that have not been well researched by others: As new forms of organizational or technological change emerge and become prominent in the business world, grounded theory is ideal for an open-ended research strategy that can be employed for the generation of theory out of resulting data.

Putting life into well established fields: Grounded theory can provide the basis for an alternative view of well-established fields ... through its open-ended approach to data collection, followed by a rigorous approach to theoretical work.

It is these first three advantages that will prove beneficial to the author's research as these accord with the nature of the research to be conducted. However the author must be mindful of the criticisms levelled at grounded theory as his entire working life has been in the construction industry or lecturing in construction subjects, thus it is not possible to claim value freedom or theory-neutral observation; and the time constraints of the project limit the extent of the research and interviews that can be carried out and analysed.

3.2.6 Time Horizons

This research report will take a cross-sectional approach by interviewing a selected number of persons in construction organisations. A longitudinal study is not proposed, partly because of the time constraints involved, but mostly because of the importance of gaining data within a time frame where consistency of commercial/industrial environment is likely. The volatility of the construction industry could mean that within the time frame of a longitudinal study the commercial/industrial environment might change significantly, providing inconsistency of response. It is however noted that this potential longitudinal

inconsistency would, within itself, provide an invaluable supply of data of changing attitudes and perceptions, and would be useful for a longer term study.

3.2.7 Data Collection Methods

Of the five data collection methods given by Saunders, Lowe and Thornhill (2003) (sampling, secondary data, observation, interviews and questionnaires) interviews will be used as the most appropriate method of the interpretivist and critical realist philosophies, as this will permit coding of data gained enabling both confirmative and contradictory data to be identified. Sampling and questionnaires are normally associated with positivist philosophies, and aspects of secondary data and observation can fit with any philosophy. The interview process will be discussed in depth in the next chapter.

3.2.8 Conclusions

Of the research philosophies considered, that of critical realist has been found to be most appropriate, although there is perhaps also a strong case for the interpretivist or social constructionist philosophy.

The nature of the research to be undertaken requires an inductive approach as the theory is to be derived from the data collected; hence a grounded theory strategy will be used.

The time horizon will be cross-sectional at this stage in order to obtain views and opinions during a period of consistent environment.

Data collection methods are discussed in the next chapter.

3.3 Research Method

3.3.1 Introduction

This chapter, a continuation of the last, considers the data collection methods employed for this project.

Firstly the selection of the type of interview to be used is discussed. Secondly the selection of the interviewees from the Building magazine Top 50 Contractors list is then considered followed by, thirdly, a discussion of the execution of the interviews. Fourthly a discussion of the methods of analysis of the interviews is provided, followed finally by the conclusions.

3.3.2 The Research Questions

This research project sought to find information about the state of management education, training and development, and the problems of recruitment of personnel into the industry. Interviewees were given an outline of the research subject and asked to provide their opinions, views, perspectives, etc., on the issues and factors they believed contributed to them, and what they considered could be done to solve the problems. The brief was deliberately 'loose' to allow free ranging discussion on and around the issues involved.

3.3.3 Determining the Research Method

In order to elicit the information needed for the project, and to comply with the course requirements, the author had to adopt a research technique that would comply with the following parameters:

- 1) The information was to be elicited from organisations external to the author's normal working environment.
- 2) These organisations are located throughout the United Kingdom, rather than locally or regionally to the author, and therefore might involve extensive travelling.
- 3) The nature of the author's employment meant that only limited time windows were available during any one week for potential visits to companies.
- 4) The author had very few contacts within construction companies and would have to develop contacts.
- 5) The limited timescale for the research project.

These parameters would effectively eliminate many of the ethnographic and anthropological methods (Czarniawska-Joerges, 1992) of qualitative research such as participant observation (Bryman & Bell, 2003; Easterby-Smith Thorpe and Lowe, 2002) as the author had neither the access nor the time resources available for such a study (Tietze, 2004).

Thus the technique to be adopted that fitted within the parameters was identified as interviewing. Of the interview methods described:

Table 3.3 Comparative Terminology of Interview Techniques

| | Bryman & Bell (2003) | Remenyi et al (1998) | Jankowicz (1995) | Rubin & Rubin (1995) | Miles & Huberman (1994) |
|------------------|----------------------|----------------------|------------------|-----------------------------|-------------------------|
| Interview method | Structured | Structured | Structured | Structured | Structured |
| | Semi-Structured | Semi-Structured | Semi-structured | Semi-structured or Focussed | Semi-structured |
| | Unstructured | Open-ended | Conversational | Unstructured | Unstructured |

Both structured and semi-structured interview techniques were discounted early on as being potentially too quantitative in nature.

An unstructured personal interview technique where, as Rubin and Rubin (1995: 5) state 'The interviewer suggests the subject for discussion but has few specific questions in mind' was adopted and developed for the following reasons:

- 1) It would allow for a free-ranging discussion on and around the research topic, and would allow the interviewee to proffer ideas, information, anecdotes, etc., that might not otherwise have been contemplated in a structured or semi-structured interview.
- 2) The interviews could be scheduled not to exceed a specified length of time.
- 3) Interviewees would be more likely to provide their own ideas and opinions on the topic rather than providing answers that they believed the interviewer might want to hear in a structured or semi-structured interview.
- 4) An interview could be conducted within a day, including travelling.
- 5) Personal contacts could be built up in the industry that could be used / useful for both future aspects of the research work and in the author's line of work.

However Remenyi et al (1998) find that both the open-ended interview and the semi-structured interview are effective tools for the non-positivist approach. Of the unstructured interview techniques available, telephone or face-to-face contact (Bryman & Bell, 2003), the latter was chosen as it best enabled personal contacts to be established.

It was decided that the interview would be recorded and the recordings transcribed at a later date, after the interview. This would allow the author to concentrate on the discussion with the interviewee without the distraction of trying to take notes during the interview with the inherent problems of misreporting, misunderstanding, misinterpreting or simply missing what was being said due to the inability of being able to write fast enough (the author cannot write shorthand), or whilst concentrating on writing on a previous discussion point, although Rubin and Rubin (1995)

recommend the taking of notes during an interview whilst it is being recorded. Nevertheless it must be remembered that transcribing an interview itself is open to interpretation, and that the information given by an interviewee is not necessarily factual, but an interpretation of the construction of their perceived world.

Recording would allow for accurate and, hopefully, precise transcription of the conversation, and a record of the interview to be analysed in detail for both current research and also possibly at a future date for other research issues. Recording also allows for identification of conversational nuances, such as self-contradiction, insincerity and uncertainty suggested by tone of voice and inflection, repetition and emphasis of points by the interviewee, etc. Additionally any or all interviews could be re-analysed at a future date if other research issues or techniques were to be required. Recording would provide substantive proof of the interview having taken place for audit purposes.

3.3.4 Selecting the Interviewees

In selecting the interviewees Rubin and Rubin (1995: 5) advise:

All the people you interview should satisfy these requirements:

1. They should be knowledgeable about the cultural arena or the situation or experience being studied;
2. They should be willing to talk and;
3. When people in the arena have different perspectives, the interviewees should represent the range of points of view.

The target interviewees were therefore personnel, training and development managers/directors in construction companies or construction organisations. These were selected because of their knowledge and experience in training and development of personnel in the construction industry, thus complying with Rubin and Rubin's recommendations above. Additionally one interview would be conducted within an industry not connected with construction, but still in a project-based organisation to provide different/comparable perspectives on the issues of management education, training and development faced by their own companies, and

to see what, if any, lessons the construction industry might be able to learn from another project-based industry.

The author decided to begin the initial selection of companies for interview from the 'Top 100 Contractors and Housebuilders' list as published in Building (2003A), but then refined the selection to general construction companies in the 'Top 50 Contractors' as published in Building (2003B), effectively omitting the specialist house building companies from the study for the time-being. The 'Top 50 Contractors' list is shown in appendix 3.8.1, and the 'Top 100 Contractors and Housebuilders' list is shown in appendix 3.8.2. Companies would be chosen on the basis of a random selection, with an initial selection of ten companies. Ten was chosen as the maximum number of interviews that the author believed could be conducted, transcribed and analysed within the time available. Companies were approached sequentially in groups of twos and threes to test the response for a request for an interview with the director/manager of human resources/training, given that it was considered unlikely that the author would be able to conduct more than one interview a week.

Initial contact was made by e-mail using company web sites for contact details or, where no contact details or e-mail contact facility existed, by letter. Response was, as expected, slow and not particularly fruitful. Out of the initial ten approaches three positive responses were obtained, together with one outright and somewhat blunt refusal, the remaining six did not respond. Additionally two further interview contacts were established as a result of personal contacts in two organisations. These two contacts were former students with whom the author had had recent contact, both of whom now held senior positions in their respective companies. Although these do not quite fit within the original intentions, even Bryman and Bell (2003) noted that at times researchers had to be grateful for any cooperation they could get. A further interview was conducted with a project-based engineering company training director to elicit views as to how another industry might approach this problem.

Thus a total of six interviews were eventually conducted with further interviews in the process of being arranged. This will be carried forward to the final thesis. The interviews actually conducted were:

- 1) A project manager (Interviewee 1) with a national firm of consultant project managers.
- 2) The training and development manager (Interviewee 2) of a national/international construction company.
- 3) A project manager (Interviewee 3) undertaking management education research in a national construction company.
- 4) The training and development manager (Interviewee 4) of a regional/national construction company.
- 5) The training director (Interviewee 5) of an international engineering company.
- 6) The human resources manager (Interviewee 6A) and the training and development manager (Interviewee 6B) (joint interview) of a regional/national construction company.

3.3.5 Executing the Interviews

Once contact had been established and an agreement for an interview established, an appointment was made for the author to conduct the interview at the interviewee's place of work.

All interviewees were given an assurance that the interviews would be treated in the strictest confidence, and although recorded for transcription the recordings would not be made available to anyone else other than the author, and that the transcripts, although verbatim, would not contain any references to names of individuals, companies or other entities and places that might enable either the interviewee and/or his or her company to be identified, thus assuring anonymity. A further assurance was given that at the conclusion of the research project all recordings would be erased.

Interviews were usually conducted in either a meeting room or other place where the interviewee would be free of disturbance and interruption, invariably at the interviewees request and without such a request having been made by the author. This was greatly appreciated and generally helped produce recordings with a lower background noise level than might otherwise have been achieved, thus assisting with transcription. One notable exception was an interview conducted in a general meeting area located in a large atrium of a company's prestigious new offices, of which the interviewee was extremely proud. The atrium, prestigious though it was, produced high background noise levels due to its openness and highly reflective surfaces (glass ceiling, walls of glass and polished marble, and floor of polished granite). This ultimately made transcription more difficult than it might otherwise have been, not least when faced with the passage of a tea-trolley that rattled across the atrium floor on a number of occasions!

All interviews, as explained to the interviewees, would last a maximum of one hour, thus giving interviewees sufficient time to discuss the subject and develop topics of conversation without making the interview too protracted and time-consuming for the interviewee. A secondary, although not unimportant, consideration was the time it would take to transcribe the interviews. In practice it took between ten and fifteen hours to transcribe each interview, depending largely upon the clarity and coherence of speech of the interviewee; around double that suggested by both Jankowicz (1995) and Rubin and Rubin (1995). Each interview commenced with a reminder of the purpose and subject of the interview, and reassurances of confidentiality and anonymity. Interviewees were offered the opportunity of having a copy of the interview transcript (all declined) and, in due course, a copy of the findings (all accepted).

Using the conversational or unstructured interview technique requires the interviewer to:

- a) Keep quiet without interjecting your own stories into narrative, using your own comments to clarify the other person's meaning or elicit fresh meanings from him or her, rather than to initiate fresh topics of your own.

- b) Be sensitive to the non-verbal signals as well as the verbal, so that you can hear the emotion and feelings expressed by your informant, as well as the words.

Jankowicz (1995: 196)

In conducting the interviews it would be important to bear in mind that:

... the tone of a conversation is something that's set naturally, and that, to a degree, you can shape and model your respondent's answers deliberately by the form and language you're using yourself, if you choose to do so. (Interest in the other person creates interest in yourself; in the extent to which you use metaphors in your utterances will influence their use by your respondent; agreeing, nodding the head, and appropriate eye contact induce your respondent to express his or her material; and so forth). Your role as an interviewer, whether in a highly structured survey interview or a non-directive conversation, is never neutral, and the meaning of your respondents answers is something created by both of you.

Jankowicz (1995: 199)

Having regard to this, the interview was conducted and recorded, with the time-limit of one hour being upheld.

A new departure here for the author was the use of a Minidisc[®] dictation recorder (see Figure 3.5 overleaf), rather than a portable tape recorder (see Figure 3.6 overleaf) that had been used for earlier research projects. This was selected for the following reasons:

- 1) Very high quality (digital) recording without the background hiss inherently present in tape-recorded interviews.
- 2) Very high quality microphone with variable sensitivity and field width designed for recording meetings and interviews.
- 3) Up to five hours recording time per Minidisc[®]. The actual setting used was 'double length' giving approximately two and a half hours recording time per Minidisc[®] that provided more than sufficient safety margin in addition to the interview recording time. This eliminated the problem inherent with portable tape-recorders of having to halt the interview and turn the tape around or insert a new tape part-way through an interview.

- 4) Around twenty hours recording battery life using just one AA battery, without the slowing down and gradual loss of recording strength associated with a tape-recorder, with a recording battery life of one to two hours using four AA sized batteries; thus no risk of the batteries going flat part-way through a recording.
- 5) No risk of tape jamming, or recording 'drop-out' that can occur with a tape.
- 6) The Minidisc[®] recorder and microphone are extremely small and compact, thus not as intimidating to an interviewee as a larger tape-recorder might be.
- 7) Variable speed playback, enabling the Minidisc[®] playback to be slowed right down (or speeded up) to make deciphering speech easier in difficult sections. This proved invaluable for transcribing unclear sections of speech, or when two or more people spoke at once.
- 8) Speech enhancement facility on playback, boosting the normal speech frequency ranges to make speech more audible. This also proved to be a useful facility where a high ambient background noise level was encountered.



Figure 3.5 MiniDisc Recorder, 2004
c.1982



Figure 3.6 Portable Tape Recorder

3.3.6 Analysis of the Interviews

Following the transcription of the interviews, each interview was analysed to determine the key themes, issues and topics identified by the interviewee.

Bryman & Bell's (2003) advice was followed in that each interview was listened to before transcription to ascertain whether or not the interviewee yielded sufficient data to justify the time and effort involved in full transcription. In the case of one interview its transcription has been deferred as the interviewee too frequently strayed too far away from the subject of the interview, but notes were made about key issues identified where relevant to the current topic of research. The interview will be transcribed at a later date for use in a later part of the research programme where its contents might prove more useful.

QSR NVivo[®] software was used to code and identify the themes and topics of the interviews. In practice this proved to be less easy than at first envisaged, because of the author's inexperience with the software, and also because of the difficulty of transferring NVivo[®] files between computers (work PC, home PC and laptop). Additionally an attempt has been made to produce a simplified causal diagram (based on Miles & Huberman; 1994) for each of the key themes identified in the interviews using MindManager[®] mind-mapping software.

3.3.7 Conclusions

The concept of qualitative research, whilst not entirely new to the author, is one in which the author has had little previous or recent experience, last using some qualitative analysis for an MSc dissertation in 1983. The author's MBA research project in 1993 used entirely quantitative research techniques.

The adopted technique of using unstructured conversational type interviews worked very well, allowing the interviewees to provide their own thoughts and opinions on and around the research questions. Questions and prompts were kept to a minimum in order to avoid influencing the interviewee, and were used either to ask the interviewee to clarify an issue or to keep the interviewee from straying too far from

the research topic, although allowing them to do so did also introduce new, unexpected areas and perspectives on the research topics for discussion or new sub-themes to be established. The use of a structured interview which would have restricted the interviewees to a fixed agenda of questions might not have produced some of the interesting ideas and topics that came forth, unsolicited, from some of the interviewees. Furthermore the use of a structured interview would possibly have required the preparation of different question sets allowing for the different backgrounds of the interviewees, not least with the interviewee from outside the construction industry.

None of the interviewees were intimidated or fazed by the recording of the interviews. The discreet nature of a small recording device and small microphone were helpful in this. The long recording time of the MiniDisc[®] was helpful in that interviews did not have to be interrupted to change tapes or batteries whilst conversation was in progress, thus interviewees were able to continue the flow of their conversation uninterrupted and without distraction or losing their continuity of thought. The high quality and features of the Minidisc[®] recording system were found to be very advantageous when the recordings were transcribed, the clarity of recording, and the absence of tape hiss present with tape recorders was a considerable improvement, although occasionally the clarity of recording of background noise was not welcomed!

The principal weakness of the technique adopted was that it was found to be far more time-consuming than originally expected:

- In establishing contact and arranging interviewees with willing participants in industry, when both interviewee and interviewer (author) had very limited windows of opportunity available to meet.
- The time taken to transcribe the interviews was much longer than anticipated.

The one-hour time limit for the interviews was rigidly adhered to prevent over-running.

The problem was not with the author's somewhat limited (slow) speed of typing, but with the time involved in continuously going back and forth through the interview recordings to transcribe them. Unlike a tape, a MiniDisc[®] can only be 'rewound' to a predetermined point known as a 'track mark' which can be added (or removed) by the user at any point in the recording without affecting it. It is therefore not easy to 'rewind' a Minidisc back over a word or phrase in the interview that is indistinct for whatever reason. It was however discovered that up to 256 track marks could be added to any MiniDisc[®] recording, thus a one hour interview could be divided up into approximately 15 second sections, although in practice some sections were much longer, whilst others were much shorter. A tape here has the advantage, with a little practice, of being able to be easily rewound in very short sections to replay a single indistinct word or phrase. Thus in practice the playback and transcription of interviews from Minidisc was found to be much slower than from tape, due to the technical differences in the way the respective technologies work. The author found that this was an acceptable 'price' to pay as the higher quality of the MiniDisc[®]'s digital recording system was higher than that achievable with tape and fewer replays were required than might have been required with a tape.

The coding structure used was partly pre-established by the author in anticipation of the interviewees' likely themes from knowledge of the subject areas and sub-themes, and by the addition of emergent themes and sub-themes from the interviews as they occurred. Coding and analysis of the transcripts proved harder than anticipated due to the author's lack of experience with the NVivo[®] software, and the difficulty of transporting NVivo[®] files between work and home PCs. After inadvertently deleting all the coding from an interview transcript whilst trying to correct an incorrectly allocated code the author reverted to using coloured highlighter pens and printed copies of the transcripts! However the NVivo[®] code structure will continue to be developed, expanded and edited as research work continues. Inevitably some recoding of work will be required. It is also envisaged that at some stage the original interviews will be recoded.

The knowledge and experience gained and lessons learned from these research methods will be re-employed later in the DBA research project. The author has a number of new contacts and arrangements in abeyance that will be used in due time as the interview programme continues and the information gained will be utilised for the benefit of the final thesis.

3.4 Research Findings

3.4.1 Introduction

This chapter considers the findings of the interviews and seeks to examine the attitudes and opinions on the interviewees to establish the envisaged problems of the construction industry, and to compare them to the problems stated in various industry and government reports wherever possible.

An initial analysis of the interview revealed that the discussions covered in essence three principal themes:

- The perceived poor image of the construction industry
- Recruitment into the industry
- Education and training in the construction industry

However it was apparent that these themes could not be, and were not, considered in isolation from one another as there is a high degree of interdependency amongst them, to the extent that they can be considered as interlocking themes:

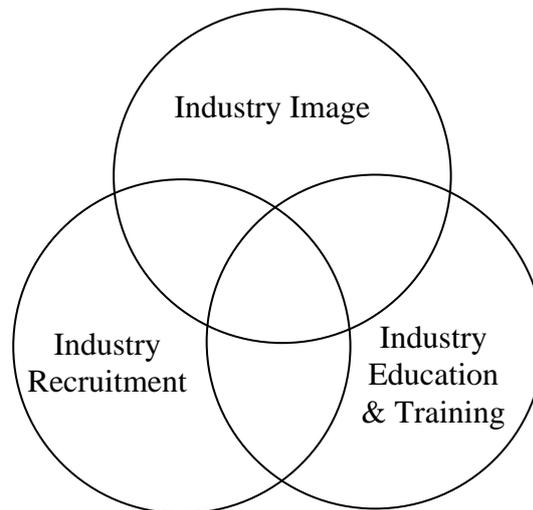


Figure 3.8 Research Findings - The interlocking themes

Whilst each theme clearly has its own unique areas of discussion, many areas of discussion were found to be interdependent with one or more of the other themes.

Whilst each of these themes will be addressed separately in this report this interdependency cannot be disregarded or ignored, particularly in the causal diagrams that have been produced separately for each theme for reasons of simplicity and clarity, but are in fact heavily interconnected.

3.4.2 The Public Image of the Construction Industry

The public's perception of a poor industry image (Howell, 2004A) was identified by all interviewees as a major determinant in people not wishing to join the construction industry. Figure 3.9 overleaf shows the perceived causal relationships for poor industry image identified by the interviewees. Within these were identified four perceived principal causes that inter-reacted to generate a poor image of the industry; these being:

- Poor working conditions including
 - Long hours
 - Low pay
 - Job security
- Negative media representation
- Influence of families, friends and relatives
- Industry awareness of schools and colleges.

The last two of the causal relationships identified above are incorporated into the next section looking at industry recruitment.

The inter-related constituent-cause components of the above are also identified and shown in Figure 3.9verleaf.

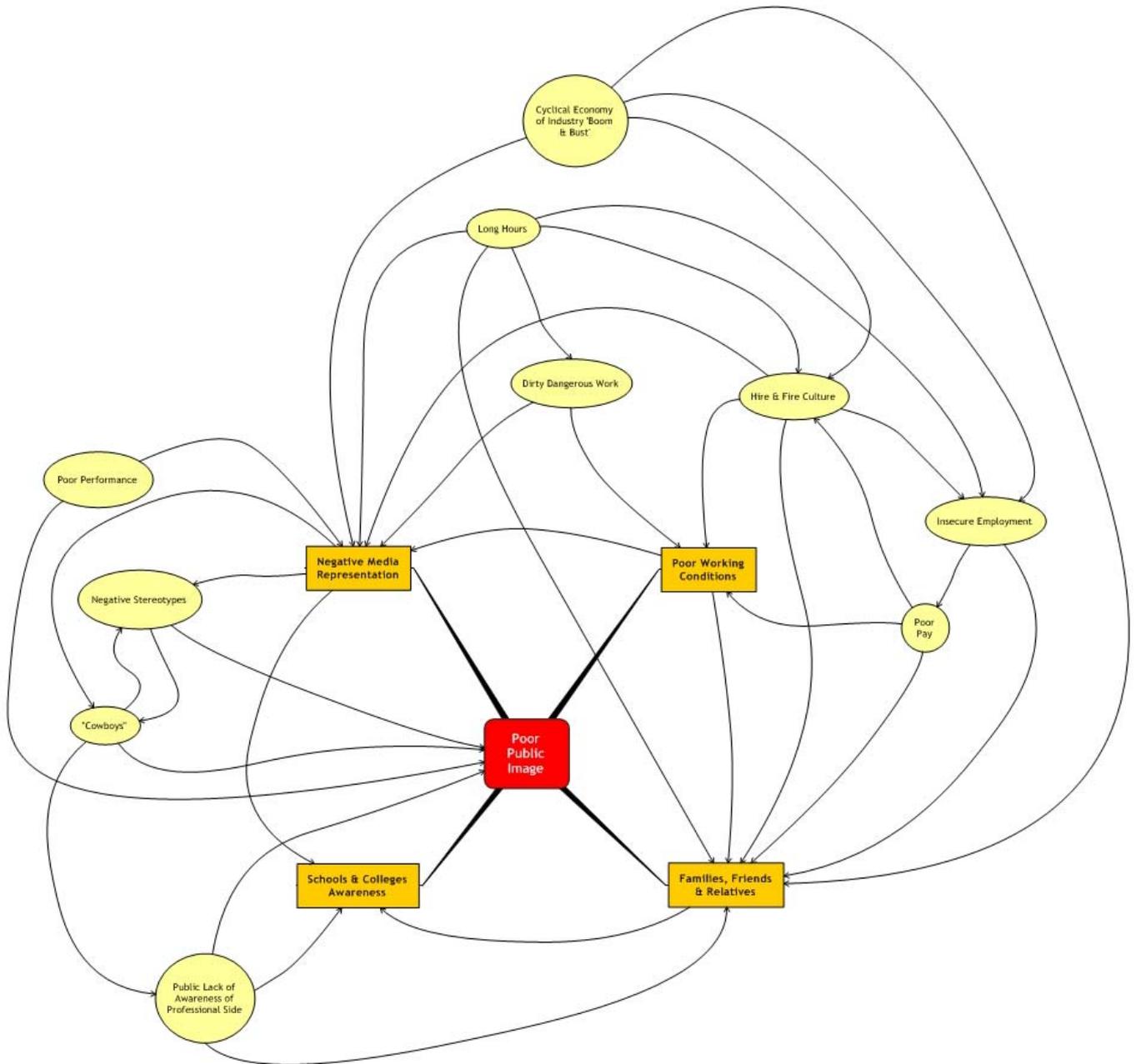


Figure 3.9: Causal Relations Identified for Poor Public Image

3.4.2.1 Poor Working Conditions

The industry has always had an unenviable reputation for providing poor working conditions for its employees, especially on construction sites, where around half the work carried out is done so in the open air subject to the elements, regardless of time of year, as Interviewee 4 stated:

“You’ll never make working outside in the middle of January attractive will you... it’s difficult to do. I think we could do some more, our conditions of employment could be better... and if someone doesn’t want to work outside they won’t go into site management”

These sentiments were echoed by Interviewee 6A:

“... they have a good idea of what they think it’s like... and it’s not that attractive. They think of it as being cold and wet, and out on a building site and wearing a hard hat, and having accidents,... and not very well paid, and who the hell wants to do that when they can go into banking and finance or whatever it is and earn big money, and be in a modern comfortable environment.”

It is perhaps surprising that in the many reports reviewed concerning skill shortages (e.g. CITB, 2004; Egan 2003A, 2003B; LSC 2003, 2004A, 2004B) only one report makes reference to the move away from blue collar employment towards white collar employment (CITB; 2004) and it is generally acknowledged that this move into white collar work is not within the construction industry, but in other service industries.

Certainly some of the larger contractors are becoming increasingly aware of this problem and steps are being taken to address the conditions, as Interviewee 6B observed, referring to their new prestigious offices:

“If you brought a young person into this building and said “This is the head office of a major construction company” I think they’d be highly surprised, ... and indeed if you come onto one [of our] major sites... the offices on those sites, all be it that they are Portacabin cities... they’ll have a reception desk, they’ll have people working in offices very much as we have here; and alright those people will go from the office onto the construction site, but... the general public, and I think of it as an influence on young people, they don’t [see] that side of it, they’re just not seeing that side.”

Similar views were also expressed by Interviewee 2.

This issue was also recognised as a key part of the problem by Rethinking Construction (2000: 20):

“For too long the industry has accepted poor standards of welfare and arrangements for site logistics. Whilst some projects provide a very high standard of site welfare beyond the legal minima, this is the exception rather than the norm.”

Neither is the business impact of this lost as it is acknowledged that good site working conditions not only improve productivity, but will, as the report continues:

“help ensure that construction work brings only good publicity and builds public trust and better respect which will improve the image of the industry” (p.20)

This industry has however, begun to respond to some of the challenges through the auspices of the Considerate Constructors Scheme, a voluntary code of practice for the industry that seeks to:

- Minimise noise, dirt and inconvenience sometimes caused in the neighbourhood.
- Eradicate offensive behaviour and language from construction sites.
- Recognise and reward those contractors who look beyond their statutory duties in site management, safety and environmental awareness.

(Rethinking Construction: 2002b: 4)

The importance of these issues is again reflected upon by Rethinking Construction (2002b: 23) that commented:

Some of the best sites have working conditions that exceed those found in many offices, though these are unfortunately still rare. Legal minima exist yet it is still the case that even these minimum provisions are not in place. Construction sites remain the shop window of the industry, and an untidy and shabby building site is a poor advert for the industry.

Reflecting upon the impact construction sites have on the public image, Interviewee 2 endorsed this view stating:

“[construction sites] can either be a nuisance because they’ve [the public] got to walk on the road because the pavement’s been cordoned off with hoarding or whatever, or they can be impressed by the speed the thing goes up, if they’re passing a project [regularly], the speed it goes up, or they can be unimpressed by the labour that’s on there, wolf-whistling on the scaffold or whatever.”

3.4.2.2 Long Hours

A part of this problem is the long hours people are expected to work in construction, as Interviewee No.2 confirmed:

“I’d be expecting you to do 50 or 60 hours a week. If that’s not what you want, then don’t do it. It’s still a lot, that is the norm within the industry, or working long hours, because we all went through the recession where you’re glad to keep your job and all the rest of it,... and therefore it’s hard to get out of that mindset.”

Smith (2004: 14) notes particularly that dissatisfaction with working long hours is seen as a deterrent to people entering the industry.

3.4.2.3 Poor pay

The industry has a reputation for low pay being a deterrent to people entering the industry (Smith, 2004) although there appears to be little evidence to substantiate this claim. What is apparent, however, is that wages rates, and to some extent salaries, tend to follow the fortunes of the industry, and the supply and demand in the labour market. This rise and fall of wages and salaries is well documented, but this literature has not been generally reviewed, other than occasional incidental references, as it lies outside the main research area.

Wage and salary rates are currently cited by the interviewees as a negative factor in recruiting, although none stated that wages and salary levels are a particular incentive to neither join the industry (not that high) nor leave the industry (not that low) or a particular company (competitive compared to other companies).

Interviewee 6a stated about wages and salaries paid:

“Nobody... should leave for those reasons. They always say the reason is cash of course, but it’s never cash... cash is always given as the number one reason because it’s easy to put, and the fact is they are getting more money because once you go into

the job market and you find something they'll always give you more than you're on..."

This simply reflects the current labour demand/ shortage; a far cry from ten or twelve years ago in the height of the recession when industry workers often had to accept substantial pay cuts just to retain their jobs, or face dismissal with little or no prospect of imminent re-employment. It should not be forgotten that during the last recession an estimated 400,000 jobs were lost in the construction industry (see document 2). Leftly (2003) notes that between 1995 and 2002 the average construction workers pay rose by 47% to £27,200; whilst noting in the same period the average directors salary rose by 101% to £427,000.

A survey by Construction Manager (Smith; April 2004: 4) of final year construction graduates revealed:

Cash, its seems, is not the driving force behind this generation's job choices. They want a chance to develop their skills; money, yes; but they also want security.

3.4.2.4 Job Security

Job security is seen as an important factor, and the economic cycle of 'boom and bust' in the industry have given it a reputation for lacking job security (see document 2 for industry employment levels). There is much anecdotal evidence suggesting that many of those who lost their jobs in the last recession left the industry, and did not return, having found employment in other industries whilst many of those who did retain their employment did so on reduced income and suffered financial hardship as a result.

The influence that the experiences of parents, friends and relatives can have on a young person's educational choice cannot be underestimated (Gordon, 1981). Many of the workers affected by the last recession are today the parents of offspring who might otherwise have been considering a career in the construction industry, or have friends, family and relatives who were employed in the construction industry and

suffered in the recession. These potential entrants to the industry are hardly likely to be presented with a positive image of the industry, or positive role models that would have otherwise encouraged them to enter the industry.

As Interviewee 6B commented:

“I think it’s a little of the history... The industry went through a very, very severe recession in the nineties, and it hit industry really, really hard. Probably up to the mid-nineties we were able to attract and induct [into] the industry good quality graduates,... top quality graduates with As and Bs in their A levels and it just seems [that now] those people are not being attracted into the industry.”

With an estimate of more than 1 in 14 of the adult working population in the UK being employed in the construction industry in one form or another (CITB; 2004) the influence and impact on young who might otherwise have contemplated a career in the construction industry is very high.

3.4.3.5 Media Representation of the Industry

Interviewee 6B expressed concern that the industry was not projecting the right sort of image to the public through the media and as Interviewee 6A explained:

“Unfortunately we get linked to the ‘cowboy’ builders, who put tarmac on your drive and make a mess of it, and then they talk about [cowboy builders] and [ourselves] and they think that it’s all the same... you know in terms of media portrayal it does damage our image, with all of these things on the TV and what have you... how do you counteract it? You can’t stop it can you?”

Much of the adverse publicity that the industry receives is directed against the ‘cowboys’, rogues and tricksters that masquerade as builders that regularly feature in TV series such as ‘Builders from Hell’ (ITV), ‘Rogue Traders’ (BBC), ‘Watchdog’ (BBC) and many other similar programmes as well as local, regional and national press. As Smit (2004) points out, many of these TV programmes are screened during peak viewing times, attracting massive viewing figures. They are also cheap and easy to make. In defence of the criticism, the house-building sector, a regular ‘contributor’ to these programmes, complained that they felt that they were being unfairly singled out because they were easy targets, but independent surveys had

found that many of the complaints featured were fully justified and that house-building was suffering from an increasing number of defects and customer dissatisfaction. The house-building sector has always been regarded as the poor-relation in the industry and regarded as having the lowest levels of skills base, poorest management, and an over-emphasis on profit margins.

In the press, articles invariably concentrate on either the issues above, health and safety in terms of reporting of accidents and injuries, and site conditions; as Howell (2004:B) states, lamenting the poor health and safety record of the industry:

“Apart from the personal tragedies involved, and the cost to the country, this is not a good advertisement for persuading talented young people to opt for a career in the construction industry.”

Such high profile articles in a national Sunday newspaper, part of a regular series invariably berating the industry, do nothing to promote the image of the industry, and can have a very negative effect on recruitment, as such articles are read by families, friends and relatives of those who might have considered the construction industry as a career.

Interviewee 1 stated that the only positive image of the industry presented on the TV was ‘Bob the Builder’ aimed at infant audiences, and certainly not on during prime time peak viewing hours. Notwithstanding a certain ‘cult’ status that this programme is alleged to have achieved with some adult audiences one can only wonder if these infant viewers of ‘Bob the Builder’ will grow up with a positive role model image of the industry and want to join the industry in their adult life.

The industry’s lack of positive role models was also raised by Interviewee 5 who cited the great icons of the construction industry of yesteryear, such as Brunel, Telford, Wren, Jones, who are virtually household names today, but who is known in the industry today apart from Lord Rogers? What is needed, according to Interviewee 5, is a Richard Branson of the construction industry.

3.4.3 Industry Recruitment

Recruitment was identified as a key theme by all interviewees, and is currently a preoccupation with both industry (e.g. CITB, 2000, 2001, 2004) and education (Wilkie and Giddings, 2003; Coulter, 2003), whilst the government is concerned about the inadequacy of the skill levels of potential recruits, and how to make them recruitable for the industry. An analysis of the interviews produced the causal map below in Figure 3.10 below:

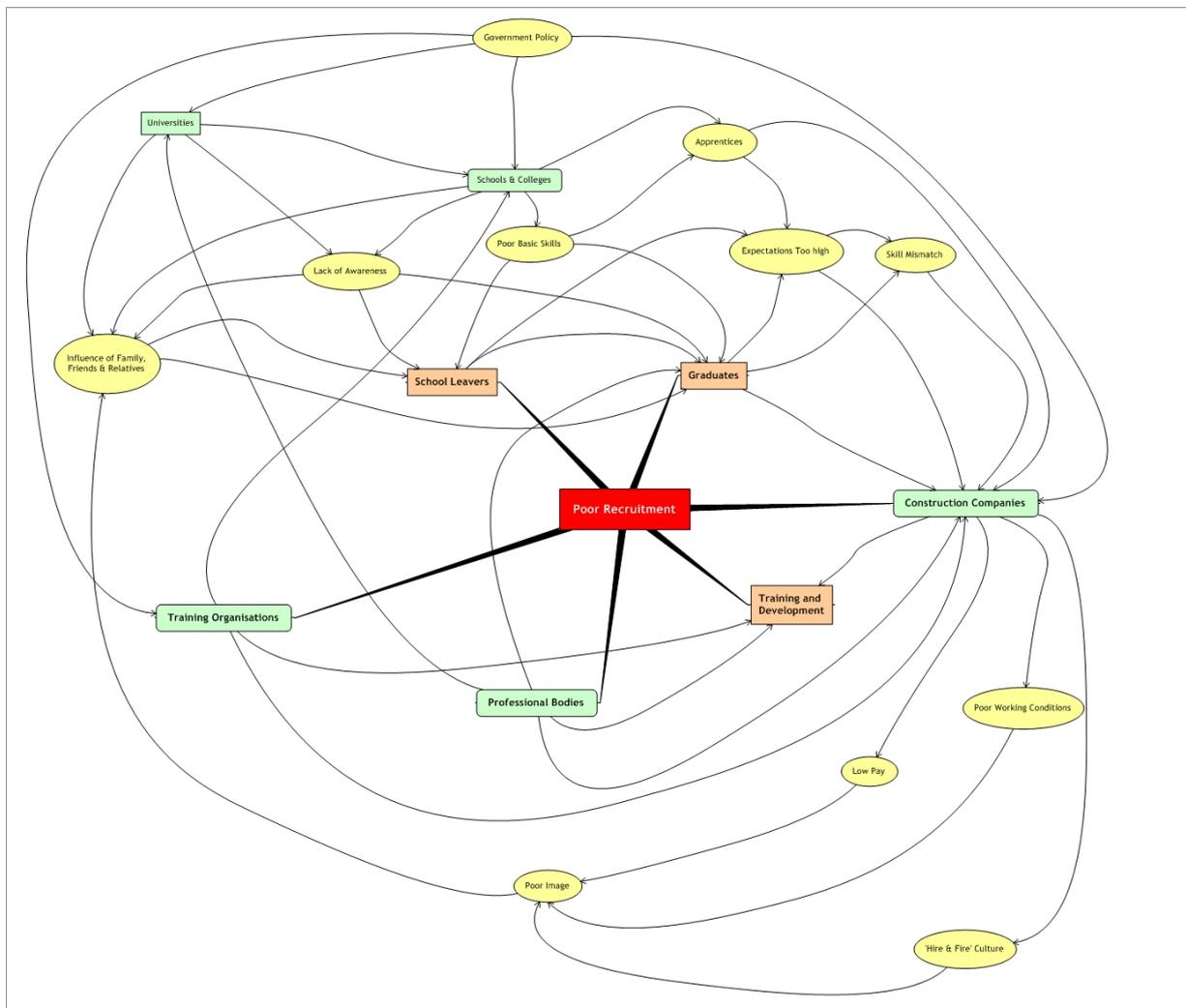


Figure 3.10: Causal Relationships Identified for Poor Recruitment

The interview discussions identified five principal sources for the recruitment of entrants into the construction industry:

- school leavers
- college leavers
- university graduates
- university post-graduates
- mature 'converts'

Only the first three of the above are discussed in this section as there was insufficient discussion of the latter to warrant inclusion at this stage.

Figure 3.11 below shows the perceived recruitment routes for people into the industry, identified by the interviewees:

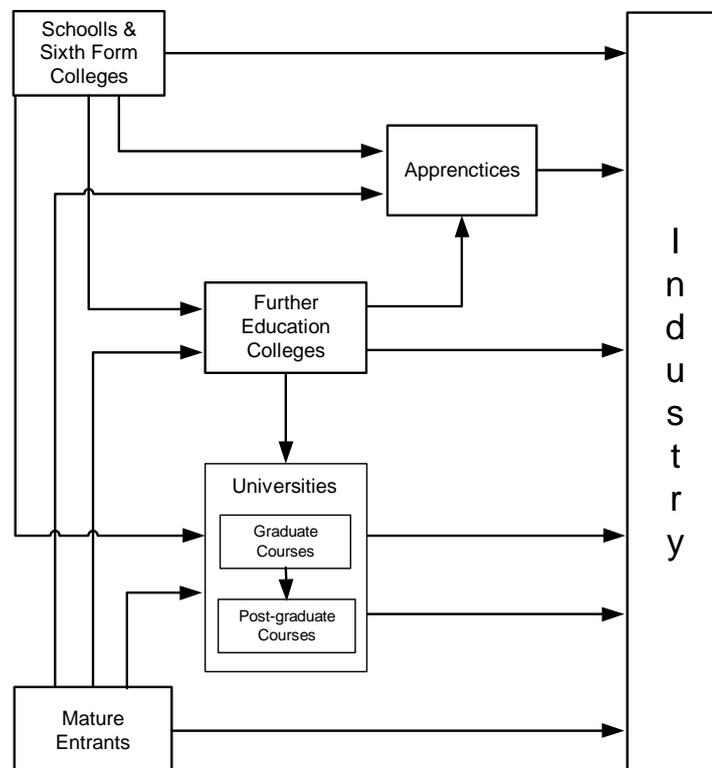


Figure 3.11: Identified Entry Routes into the Construction Industry

One of the problems encountered in the discussions was defining what the interviewee meant by ‘school and college leavers’ due to the overlap of schools, sixth form colleges and further education colleges, and to some extent universities. The diagram overleaf, Figure 3.12, attempts to clarify the terminology used in relation to various educational levels. A comparative table of sub-degree level qualifications is given in appendix 3.8.3, and an accompanying overview of the major qualification types available in the United Kingdom is given in appendix 3.8.4.

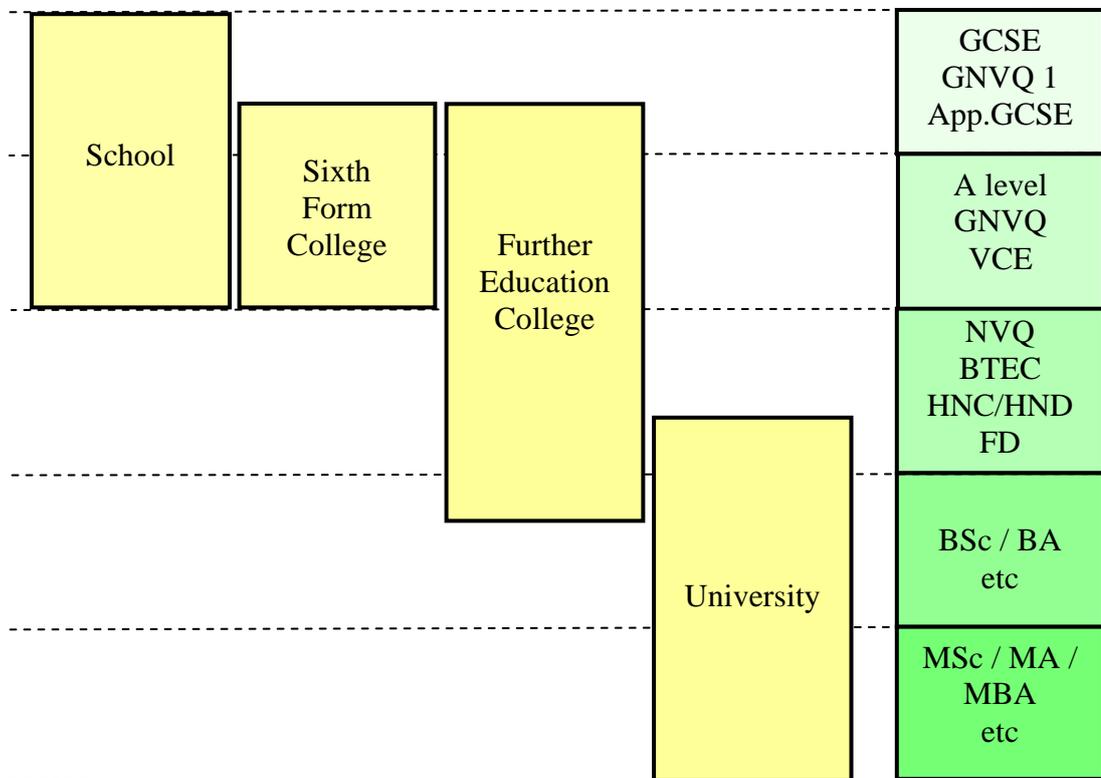


Figure 3.12 Comparison of Institution and Educational Qualification Levels

3.4.3.1 School and College Leavers.

The approach to school leavers was markedly different between the larger national/international contractor and the national/regional contractors. Health and Safety legislation does not permit anyone under the age of eighteen to work

unsupervised on a construction site [SI.1999 No.3242]. This was clearly an aspect of concern for Interviewee 2, and was further seen as a barrier to recruitment and employment of school leavers under the age of eighteen who wanted to consider a career in the construction industry, and particularly prevented taking on students from schools wanting to gain work experience. When asked about employment of school leavers Interviewee 2 replied:

“We tend not [to]... actually it’s an issue on one of our projects. We took on someone who was seventeen and because we can’t legally put them out on site they’re stuck on site in the office all the time and they can only go out on site when they’re chaperoned with somebody else.”

As a result of this it appears that they want to employ only those who are aged eighteen and over, thus closing the door on the sixteen to eighteen year old entrants. This question of young apprentices did not arise as all trade/craft work is subcontracted out. The fact that they are ultimately responsible for the health, safety and welfare of all employees on site, whether sub-contract or not (SI.1999 No.3242), seemed to have escaped Interviewee 2. The issue of employing under-eighteens also arose with the two national/regional contractors who were quite willing to take on young people as apprentices and trainees despite having recognised not only the problems of employing under eighteens, but in educating and training them as well:

“we do have young people who have started with us [at] seventeen...it is difficult in this industry because you can start a young person off on a course [in] one locality and then suddenly realise your business and the project they are working on is finished and they’ve got to move somewhere else in the country.”

Whilst Interviewee 4 reported rather a different perspective on the issue of recruiting school leavers as apprentices:

“... they have a hell of job getting decent quality people who want to do it, and who will stay the course, so sometimes at sixteen they want to do it, but by the time they get to seventeen and a half, eighteen, they’ve discovered the world and its interests, and girls, and all the rest of it, and they fall out of it.”

Interviewee 4 was further convinced that a part of the problem was exacerbated by the government’s policy of a target of 50% of all school leavers going to university,

thus substantially diminishing the potential labour pool for trade and craft apprenticeships and other school leaver entry routes.

3.4.3.2 Graduates

But how does this affect recruitment for construction management; if more school leavers are going onto university then are there not more construction graduates available for management positions? Interviewee.4 suggested that this was not the case. The traditional route into construction management was not by the full-time university course route, but by HNC, HND or building degree, frequently part-time, at further education colleges (formerly technical colleges) or what are now known as the 'new' universities (former polytechnics). The number of students engaged on construction courses (building, as opposed to architecture and civil engineering) prior to 1985 was so few that the subject was not listed by UCCA, the number being consolidated into 'other professional/vocation' courses for the subject area, which intriguingly included subjects such as hotel management!

Polytechnics and technical colleges were the traditional educational entry routes for many vocations (Pratt: 1997) including construction management and building.

More traditionally in construction, vocational education was achieved by working one's way up 'off the tools' through a move into site supervision, and then taking day-release courses, night school courses, or correspondence courses to gain academic and professional qualifications for entry into construction management.

These traditional entry routes are still held in high esteem by the industry, as Interviewee 4 commented:

"I've heard senior management saying that what they really like is to have good A level students coming in, who then do a part-time degree whilst they're working, because they're making a commitment to the industry. We call them our industrial diamonds, because they are bright, they're clever enough [having] done A levels. They can learn the things they need to learn whilst they're in the business, also they absorb the culture of your business so you bring them up in your own way... and that for preference is where a lot of our senior managers would like to get our managers of tomorrow."

This might clearly seem like a case of managers in their own image, the ‘like me’ syndrome.

There have been many complaints in recent years about graduate output from universities not meeting the needs of industry (e.g. SSDA, 2004). The construction industry is no exception to this, and in response to this the CIOB has established a Presidential Commission to try to identify if the complaints are justified, and if so, what needs to be done to bring the universities and industry into alignment. The Presidential Commission is due to report in late 2004 or early 2005. Like most professional institutions the CIOB publishes an Educational Framework (CIOB, 2003) for various grades of membership setting out the skills and knowledge expected of students and members at the various levels. This Educational Framework is established by the CIOB in conjunction with industry and academia, and educational bodies wishing to have its courses accredited by the CIOB must meet the criteria of the Educational Framework.

The five construction company interviewees expressed satisfaction with the skills and abilities of the students they had recruited, regardless of the educational establishment from which they had been recruited.

As Interviewee 4 stated, referring to graduate attitude

“The graduates that really succeed are the ones who don’t know it all and are prepared to learn...”

and continued, of the complainants,

“they must know something, they’ve got a degree. They’re expecting what you can never get at that level. Maybe [they] want to be looking somewhere else – and if [they] are getting people in consistently from a certain institution, who are not always meeting [their] need then maybe [they] need to go and talk to [the institution], stop using them and go somewhere else instead.”

Interviewee 6B also expressed concern that too much was often expected of graduates and that they needed to be managed and nurtured like any other new person in an organisation. Too often they were expected to know everything and

have the same knowledge and experience of someone who has been in the business for 30 years, consequently expectations of new graduates were too high. Evidence of this attitude was presented at the Skills Convention 2003 (SSDA, 2004) where it was noted that many employers had demanded that schools leavers and graduates should be delivered ‘oven ready’ (sic) complete with work experience, clearly with the expectation that they should be taught everything they will ever need to know, and have sufficient experience to be able to walk straight into a job and function competently without any further instruction. This demand was tempered a little by the acknowledgement that employers must work with schools, colleges and universities to make work opportunities available to students.

3.4.3.3 Awareness of the Industry

One of the problems identified by industry was the lack of a co-ordinated and coherent approach from industry, the training organisations and the professional institutions to promote the industry and its opportunities to potential recruits.

“I think a lot of work needs to be done within the industry [and] also outside,... with the help of schools, and the government, and colleges to try and promote [construction]... What we haven’t managed to sell to the public at large, and to young people coming through, is how exciting it is and how tremendously rewarding and fulfilling it is to put up one of these” (referring to building) “and to see the end result,... to have been part of that team, absolutely tremendous, and really interesting work” Interviewee 6B.

Similar sentiments were echoed by Interviewee 3, and Interviewee 4 who was especially aware of the importance of getting into schools and promoting awareness and generating interest in the industry.

Interviewee 6B was very clear about this issue:

“I think the industry has missed the trick. At one time, through the CITB,... there was a very proactive education arm that was right across the U.K...Their whole purpose was to go out into the schools and educate young people about the industry... There is a little bit of that still in evidence, nothing like enough.”

The interviewee continued to explain that he had done some recruitment and promotion work in schools over the last few years, but lamentably noted:

“... quite honestly one of the last options sixth formers seem to be thinking about is going into construction.”

This both Interviewees 6A and 6B put down to a lack of awareness, and a lack of understanding of the construction industry, and as Interviewee 6B continued:

“... that other industries are getting there before us. Of those who had an awareness, they often had a poor image of the industry, and ignorance of about what it was actually like, but held that it was an unattractive industry.”

3.4.3.4 The Professional Institutes

In drawing comparisons between the UK construction industry and its European counterparts Winch (1996) highlights the division and specialisation within the UK industry caused by the professional institutions and the powers they yield over the construction process, not all of which are beneficial to the construction client, or indeed the construction industry, as they often result in the industry not operating in the most efficient and effective manner. Whitley (1999: 104) observes that the professions

... tend to concentrate on monopolising particular work jurisdictions... Competition between these occupational groups for control over problem-solving tasks encourages a rather narrow identification of particular skills with particular jobs and roles within the groups seek to maintain their distinctive social identity and privileged position in the labour market. The high degree of specialism in the British construction industry stems from the competition between occupational associations.

Interviewee 4 commented

“I think that probably the CIOB and RICS could do a lot more than just sitting on their laurels and saying “well we’re a professional body and if you want to join us you’ll have to do that...” “

The disunited front that the professions present of the industry by sometimes openly competing against one another (Winch: 1996) was also highlighted by Interviewee 5

who cited, by way of example, the Countryside Alliance as a group of disparate bodies and peoples who had come together under a common cause to tackle a problem they believed to be a common concern or threat to them all in various ways. Interviewee 5 then questioned why could not the various bodies that constitute the construction industry, contractors, professions, major suppliers, and even major clients, set aside their differences and get together to promote the industry as a whole? A part of the answer lays with attitudes in the industry, expressed by Interviewee 4 that contractors, due to their low profit margins, were not prepared to finance activities that would not benefit them immediately, .i.e. they were not prepared to commit themselves to long term strategic initiatives requiring investment.

3.4.4 Education, Training and Development

The third of the principal themes identified was that of education, training and development in the construction industry. This theme fell into two sections, that concerned with education, training and development for the crafts and trades, and that concerned with the education, training and development of construction managers. It is this latter part of the theme that is explored here, with particular reference to improving the standards of management in construction companies, which is often regarded as poor.

The causal themes identified that lead to poor standards of management are shown in Figure 3.13 overleaf.

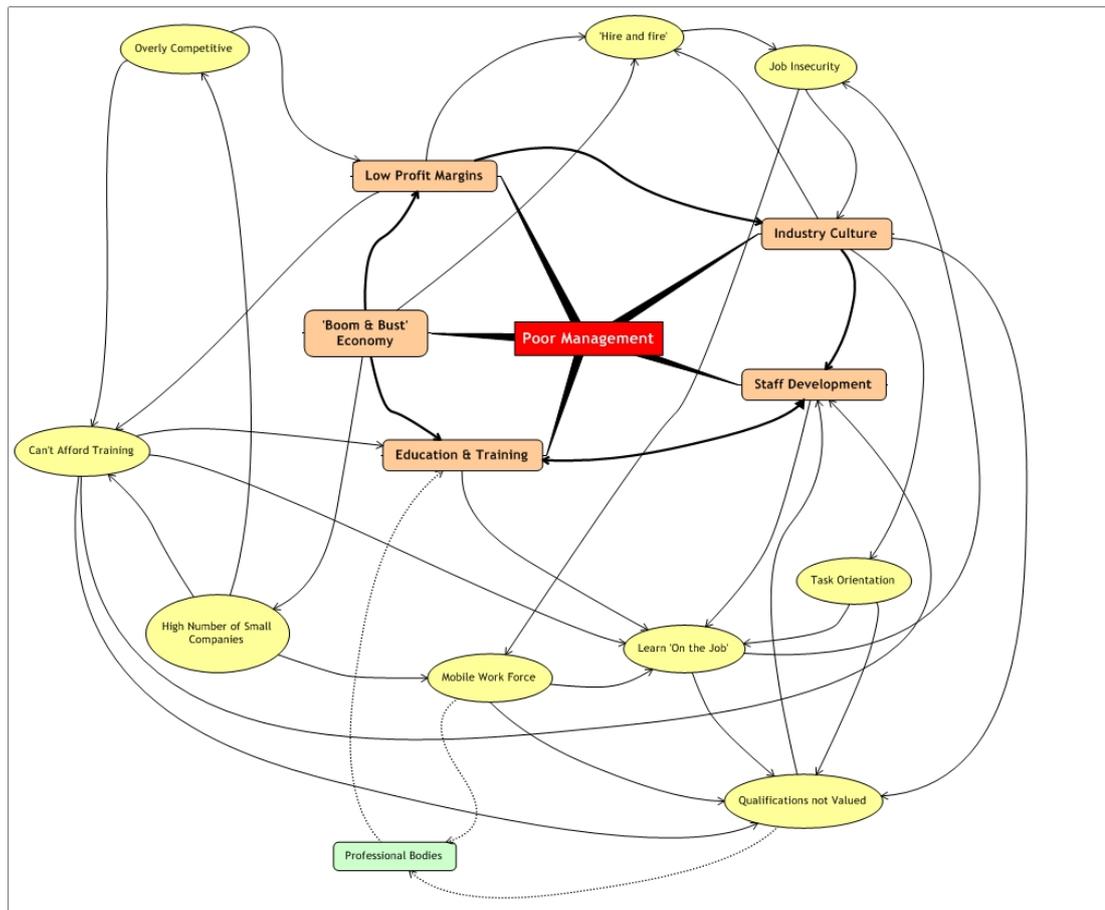


Figure 3.13: Casual Relationships Identified for Poor Management

3.4.4.1 Government Concerns

A key concern of Government, also a major client for the construction industry, is the poor standards of management and skill in many companies, and the low level of education and training of those managers. The construction industry is not alone in this problem as it is a problem of many UK industries when compared against our European neighbours and international competitors.

Handy et al's 1987 study commissioned by the MSC, NEDC and BIM revealed that, of top managers with degrees, the UK had the lowest number out of the major industrialised nations:

| | |
|--------------|-----|
| USA | 85% |
| Japan | 85% |
| France | 65% |
| West Germany | 62% |
| UK | 24% |

(Source: Handy et al; 1987:2)

For the UK in general they found that:

- Only 21% of all managers appear to have degrees or professional qualifications of any sort (including HND) although the record is better for top managers.
- 36% of middle managers in one survey had had no management training since starting work.

Handy et al (1987: 10)

It might therefore be considered that the probable qualification levels amongst construction managers was very low, due to both the culture of the industry and the very low numbers of degree courses prior to this report.

At the same time as Handy et al's (1987) study was being undertaken Constable and McCormick (1987) were carrying out a similar study on behalf of the CBI and BIM. They found that each year some 90,000 people entered management roles, with the great majority of these having had no formal management education and training, and that the majority of managers were receiving no formal training.

Duke et al (1987), in a constituent report [the Mangham Working Party Report] to the Constable and McCormick report, state that in 1985, 56% of UK companies undertook no formal management training whatsoever. Whilst they acknowledged that 'on-the-job' experience has a value, Duke et al (1987: 12) state

Twenty years 'experience' is not to be sneezed at unless, as may often be the case, that is one bad year repeated nineteen times. Such experience may well occasion a barrage of sneezing.

It is perhaps interesting to note that the CMI has just announced (April 2004) that almost twenty years on from Handy et al's and Constable and McCormick's original reports a new study is being commissioned. After twenty years do these situations and approaches still exist within the construction industry, or have the many recommendations of these reports found their way into the construction industry?

3.4.4.2 Industry Concerns

The CITB report (2004) notes that only 46% of construction employers provided any form of training, with only 78% of these companies having a senior manager with responsibility for training. Of the 46% who do provide any form of training 18% consisted of off-the-job training of which only 56% would lead to any form of qualification. Furthermore, of those who did provide 'off-the-job' training 89% of it constituted Health and Safety training for which, in many instances, there is a mandatory requirement. Thus the actual amount of management training and development would still appear to be only a tiny fraction of any training in industry. The CITB further report that they found that 65% of construction companies had a business plan, whilst only 25% had any form of human resources plan, with only 12% having staff with some form of responsibility for training staff or any form of training facilities.

Interviewee 6A, with a background originally in the financial services industry, observed:

“[financial services] was decades ahead in terms of training and management,... and it is interesting to see some of the things just coming through now into construction.”

continuing that it was only two and a half years earlier that they had recognised the need for management training in the organisation. Interviewee 6B disagreed commenting:

“major contractors have always been interested in management training... but one of the things that has tended to inhibit management training is the Construction Industry Training Board because in the early nineties when this business was trying to drive management training and get funding for it... the CITB just didn't recognise management training was necessary because they, and it is a big criticism of them, were funding [only] craft training”

In an industry where profit margins are low, Interviewee 6B continued to explain that many companies could not afford the cost of management training and looked for funding from external sources, principally the CITB.

Drawing on both Interviewee 6B's comments and the author's own industry experience there was, and possibly still is, a great deal of resentment over the imposition of statutory training levies on the industry by government to finance the training boards and industry training, the levy being largely regarded as simply another form of taxation with little or nothing to be had from it in return. The training levy is currently raised and collected under section 11(1) of the Industry Training Act 1982, but has been in existence since 1975. The amount of the levy is determined annually by the Industry Training Levy (Construction Board) order, currently SI.2004 No. 368, although the levy was originally created under different legislation in 1964 (Winch, 1998)

Interviewee 4 regarded the CITB as a body for craft and trade training, and not as a body for management education and training. Winch (1998) similarly regards the CITB as having a principal function of craft and trade training through apprenticeships.

3.4.4.3 Professional Qualifications

Interviewee 4 further considered that management education and training was, in many ways, impeded by the professional bodies, singling out the RICS for particular criticism as being somewhat inflexible in its attitudes and approaches, a sentiment shared by Interviewee 6B about the ICE. Both institutions, it was felt, had a very narrow focus on qualifications and eligibility for membership. Both interviewees commented on the CIOB having a much broader and more flexible approach, but that it lacked the 'professional standing' of the other industry institutions: although formed 170 years ago was only granted its chartered status in 1980. A comparison of the principal professional institutions of the construction industry is shown in Table 3.4 overleaf.

Table 3.4: Principal Professional Institutions of the Construction Industry
Source: Respective Institutions

| | ICE | RIBA | RICS | IStructE | CIOB |
|--------------------|--------|--------|---------|----------|--------|
| Founded | 1818 | 1834 | 1868 | 1908 | 1834 |
| Charter Granted | 1828 | 1837 | 1881 | 1934 | 1980 |
| Current Membership | 70,000 | 30,000 | 110,000 | 22,000 | 40,000 |

None of the interviewees in the construction companies felt that there was a real need for professional qualifications in construction, although it looked good on CVs and in tender presentations. Interviewee 1 confirmed that they always asked contractors to submit details of proposed staff, together with their CVs, but paid no heed whatsoever to either the qualifications or experience that the staff had. Their overwhelming concern was simply that of the tender price and the only check that was carried out was that of the contractor's ability, in terms of the financial size of the project relative to the contractor's turnover, i.e. the financial risk involved with the contractor.

Incongruously at the same time as the contractors stated that they didn't recognise a need for professional qualifications in themselves they recognised the need for professional qualifications in other areas as mark of skill and competence in a profession, such as accountants who were required to sign off company accounts. If they recognise the need and value of professional qualifications in other professions then why not their own? Interviewee 2 did recognise some need and value in professional qualifications stating:

"It's like OK I'm qualified, most of the people here are fairly well qualified, [but] how much more than my MCIQB do I need? What does it value? Is it going to look that much better on my CV? – I don't think so – it doesn't help me do my job."

Interviewee 1's employers did recognise the need for professional qualifications and actively encouraged its staff to gain professional qualifications:

"Because they are measured on the number of chartered surveyors they employ against our competitors so they encourage every graduate to do RICS [qualifications]"

further stating that without the RICS qualification employees could not reach a senior position in the company, that other construction industry professional qualifications were not accepted or recognised, and the company would not sponsor any employee to study for qualifications other than those of the RICS. This was qualified, however, by the interviewee as referring to the core business area: in ‘support’ areas, such as I.T. and accounting, other qualifications were deemed appropriate and acceptable. The comments were also further tempered by an admission that the company was starting to ‘re-brand’ itself as ‘Project Managers’ rather than ‘Chartered Surveyors’ and that there was beginning to be a move towards recognition of the APM as it was regarded as being more progressive than the RICS.

Interviewee 6A, having already acknowledged a previous lack of management training in the company admitted that they had realised that this couldn’t continue and that they were now focussing on how they could enable their managers

“...to develop their leadership skills and actually start adding strategic value to what they’re doing in day to day business.”

However, in order to do this it was acknowledged that a cultural change was required because:

“...managers themselves have got to where they are by being good technicians, which they enjoy, which they excel at, and which they like to spend their time doing”

but now they were

“... trying to help them understand that actually now your job is to get the technicians to out-perform and to deliver excellence, which is a different set of skills.”

This changing role of management and the need for new management skills is also highlighted by Bevan, Toye and Frost (1995).

3.4.4.4 Industry Focus

Interviewee 6B acknowledged that the industry had tended to focus on technical skills rather than management skills, yet noted that they did not undertake the physical building work, that they subcontracted out, but provided the people to manage the process, which quite often required ‘soft’ management skills rather than ‘hard’ technical skills. A study by Hurst (1993) revealed that a very strong task

orientation existed within construction companies in both their organisation and culture.

It was confirmed by Interviewee 6A that they now sponsored staff on CMS, DMS and MBA courses, as well as running a wide variety of in-house training courses. In order to facilitate this they had established their own learning centre equipped with training rooms, a computer room and an extensive library all supported by a full-time learning support officer. The library was a source of a wide range of managerial training materials as well as books, documents, videos and technical literature. In so doing the company had been able to establish itself as a LearnDirect centre for its employees. Interviewee 2 noted that the costs of such facilities were often difficult to justify in accountancy terms as the benefit may not be immediate and may be hard to quantify and value. Keep, Mayhew and Corney (2002) found likewise.

In order to meet their external and higher level needs they had also set up sponsored closed post-graduate degree courses with two universities. These, it was claimed, were highly successful as by fully sponsoring the courses they had been able to have a direct input into the course content and had been able to influence, to a limited extent, what was taught on the programmes, with some staff giving lectures on the course as practitioners alongside academics from the universities. The importance and value of such arrangements is recognised and encouraged by the DTI (1990).

Interviewee 1's company tended to sponsor students on undergraduate courses, but they did not, at that time, have a sponsored post-graduate programme. Another group of major contractors has also set up a consortium sponsoring a part-time post-graduate course to meet their specific needs. The author has approached two of the companies in this group and requested interviews, but has not yet received any replies, although earlier informal discussions with the training manager of one of the consortium members indicated a high degree of satisfaction with the arrangements and outcomes of the course. Similarly Interviewee 5, who is not in the construction industry, described how they too had set up a consortium with their principal subcontractors and sponsored a specialist post-graduate course to meet the specific

needs of the types of the projects on which they work. This course has been so successful the consortium now franchises it to their sister and parent companies in the USA where it is run in conjunction with two American universities, one on the east coast and one on the west coast.

In the construction companies the number of people going through the specialist programmes is only a small percentage of the companies' employees (CITB, 2003). What provision and facilities were available for more 'routine' training and development? All of the construction companies reported a general lack of interest in training and development by their employees. Where, for example, a training need had been identified in an employee appraisal, as Interviewee 6B explained, employees invariably expected the training to be arranged and provided for them, and for them to be 'sent' on a course. It was noted that in almost all cases employees had yet to take ownership of their own training and development, and generally the commitment to completing any course provided was low. Interviewee 2 identified one of the barriers to training and development in that company as a problem with the company culture:

"... what they [the barriers] are is guilt and apathy. One is the guilt side of people – they feel guilty if they've come away from their day-job, their desk, or the site or the project to learn and study. [They] think "I should be at work, I should be back there doing it" ... feeling as if "I'm not doing my job if I'm spending an hour learning a new skill", even though that new skill might help them do their job twice as quick. And then apathy is like I couldn't give £5 notes away"

referring to the little or no response often received to advertised in-company courses. Interviewees 4 and 6B had also reported similar problems with a lack of ownership by staff for their own training and development although they did note that this culture was just beginning to change, with sometimes the largest changes occurring in the least expected places, in particular the older 'dyed in the wool' 'long in the tooth' site managers with a trade background and few, if any, formal qualifications. An example was cited by Interviewee 6A of such a site manager who, having been through a series of management training courses, had changed from being resistant to any form of training and change, to someone for whom a whole new 'world of

wonders' had been opened, who had developed a real thirst for knowledge and had become transformed in the process.

In contrast to the general attitude amongst the construction companies Interviewee 5 reported a very different culture and approach to training and development. Here going on a training course was seen as an opportunity for development and improvement, an opportunity to gain new skills and expertise, thus enhancing one's standing, not an inconvenience and encumbrance from having to be away from the project. Here the ability to do one's job better, through being more skilful and more knowledgeable was recognised and places on training courses were eagerly sought after.

Interviewee 4 pointed out that one unexpected benefit of the management training they had started to introduce was that communication amongst its managers had started to improve:

“When you bring people together to do training programmes and that kind of thing they'll be talking to each other... a lot of people [hadn't] realised the wealth of experience that might be out there, but gradually we're getting through, senior managers meeting more often, with each other, commercial guts coming together,... so it's getting to be more of a thing that you will ask each other for their input.”

A key facilitator in this process, identified by Interviewee 4, similarly by the other construction employees, has been the introduction of computer-based communication systems, e-mail and the internet, within the companies and network links onto the construction sites. Although the use of the systems on construction sites is a relatively new innovation, the benefits are being immediately recognised. Staff in all companies had access to e-mail and internet and now had access to colleagues, both known and unknown, and could easily seek help and advice.

Interviewee 2 cited an example of a request for information about a technical problem on one project in the UK receiving advice and information from someone on one of their projects in Australia who had encountered and overcome a similar problem. This degree of communication and co-operation would have been

impossible until very recently, and its benefits and impact have still to be fully realised. The construction interviewees noted that this type of facility together with internet access, where information could readily be sought on almost any topic or problem, was beginning to develop a more open culture in their companies as employees were now more readily inclined to seek information and advice about problems, rather than 'muddle through' in ignorance, reinventing the wheel over and over again. Pockets of expertise and experience hitherto unrecognised in the companies were beginning to be identified and utilised. Thus a new knowledge-sharing culture was developing together with new ways of working as highlighted and exemplified by Payne and Montague (2003).

3.5 Research Conclusions

3.5.1 Introduction

This chapter looks at the areas of the research findings and draws conclusions to the research questions from those findings. Recommendations for future research are made in the next chapter.

The conclusions in this chapter are considered under the three principal themes that the research identified, those of:

- Perceived poor image of the construction industry
- Recruitment into the industry
- Education, training and development in the construction industry

It is not the intention of this report to provide solutions, in depth or otherwise, to the many problems that have been identified, although some generalisation of areas in which solutions might be reflected upon and solutions sought in future research work are identified.

The six companies in which interviews took place provided no more than a 'snapshot' of the problems, and the seven interviewees were of course expressing largely their own views, ideas, and opinions, although some corporate perspectives on the issues involved were proffered.

The concept of 'representiveness' of industry is not a significant factor in this study using a positivist and phenomenologist approach. With such a large, diverse and fragmented industry, it could be argued 'what constitutes a representative sample?' and 'how representative are those ideas and views?'. These were not questions for this project to consider as they belong more properly in the quantitative research field.

3.5.2 Industry Image

Turning around the perceived negative image of the construction to a positive image in the public mind will be a long and difficult process, and it may never be achieved. The sheer size and scale of the industry, its high degree of fragmentation, not only into many different market segments but also amongst the professions within it, make this a difficult and daunting task.

The findings suggest that the industry itself, the construction companies, the training bodies, the professions and the educational institutions must come together, abandon their traditional factionalised in-fighting, and present some form of united front in terms of marketing the industry. Whether or not this could be achieved through some form of 'construction marketing board' is an interesting and debatable concept, along with its inherent questions of funding, control and organisation. The effectiveness and functionality of the CITB came in for criticism from the contractors who are statutorily obliged to pay a levy to the board to fund its operation. How then would a pan-industry marketing body function, and would it be welcomed?

This also raises the question of how the negative image that the media present of the construction industry can best be turned around? The negative image the media present is a problem for the industry, yet it has been shown that, for example in the housing sector, the negative image portrayed of poor quality, defective and substandard workmanship and products, the subject of many TV consumer watchdog programmes, does not unfairly portray that sector of industry. Yet the consumer, watching these programmes, is left with a clear impression that is a problem with the whole of the industry. Only when the industry tackles these types of problems and removes the causes of negative portrayal might it then cease, as there will be nothing negative to portray. It must be recognised that removing the negative factors does not mean a positive image will be portrayed.

The media maxim 'bad news sells' within the context of our national culture results in little interest in good news, other than in sporting activities. The industry's best

practice programme to promote high-profile good-practice projects has received little attention and even less publicity outside the construction industry. It is not widely recognised even within the industry.

Image, therefore, is likely to remain a significant problem that the industry faces, but one that ultimately only it can solve.

3.5.3 Recruitment into the Construction Industry

The problems, and potential problems, in recruiting people into the construction industry is clearly a concern to the both the construction industry and government alike.

The issue of recruitment is strongly linked to the image of the construction industry. If the image of the industry is perceived by the public, the potential industry recruits, as negative and therefore unattractive then they are hardly likely to make construction their first choice of career, or even their second. There would also appear to be a considerable lack of awareness of the opportunities available in the industry in the public, and particularly school, arenas. Whilst the CITB undertakes some marketing of craft and trade opportunities, often in conjunction with local FE colleges, there would appear to be little or no marketing of the construction industry, by industry in general, at either trade or higher professional levels.

Some companies have their own marketing campaigns, usually targeted locally or regionally, advertising career opportunities within their own companies, but there appears to be no concerted co-ordinated effort to market the industry nationally. Often the recruitment marketing that is done by contractors is no more than posters sent to local schools and colleges which might or might not display them. Some contractors do give talks to local schools, colleges, and universities for recruitment purposes but this is usually in response to an immediate need to fill vacancies rather than any long term strategic marketing initiative.

The government, recognising the potential national skills shortfall, can only act on a national basis to promote and encourage skills training generally. It does not see itself, perhaps rightly so, as having any role in solving the problems of a specific industry. Ultimately it is up to each industry to solve its own specific problems.

Raising the profile of the industry, presenting a co-ordinated approach to marketing the industry by including all factions of the industry and promoting its opportunities at all levels will make the industry more appealing to potential recruits.

3.5.4 Education, Training and Development

The genuine need for management education, training and development is really only just beginning to be recognised in the construction industry as having an important role in organisational productivity and hence profitability. It is perhaps regrettable to note that little real progress seems to have been achieved in the almost 20 years since the 'Making of Managers' reports by Handy et al (1987) and Constable and McCormick (1987).

The culture that both academic and professional qualifications are not necessary for the construction process, and that one can learn all one needs to know 'on the job' would still appear to be well entrenched in construction companies, especially amongst SMEs, and still prevalent amongst some areas of larger contractors' organisations. A part of this might still be attributable to the fact that many of the senior managers in construction companies today entered and grew up in a construction environment where the level of provision of higher education available in construction (building) was very limited and thus a culture has developed whereby today's managers, regarding themselves as successful, and not having had the benefit of a higher education themselves simply cannot and do not see any need for it, yet at the same time see the need for it in other professions as a benchmark of competence and ability. Perhaps this incongruous approach will change as today's younger managers with the benefit of a higher education, progress through the ranks of seniority in the industry.

There is a clear case for industry and higher education to work together in partnerships and consortia to deliver the education and training industry needs, particularly in the post-graduate staff development area. There may well be considerable benefits in the undergraduate level provision too.

Technology is beginning to have an impact on the attitudes towards CPD and improving communications amongst managers. Access to information, knowledge, advice and even education through ICT is beginning to produce a move away from the cultural attitude of being absent from their desk or site for education, training and development activities as somehow being 'disloyal' or showing 'a lack of commitment' to their project or work. In other industries the culture is very different, undertaking education, training and development is regarded as loyalty and commitment, showing a willingness to improve oneself, the product and the organisation. Whether such attitudes will ever be engendered in construction is a matter for conjecture, but perhaps the first steps are being taken.

3.6 Future Research

The qualitative research project has identified a number of areas where further research is possible, broadly in line with the three principal themes identified:

- construction industry image,
- recruitment into the industry and
- education, , training and development

The subject of the industry's image and recruitment into the industry cannot be fully divorced from that of education, training and development, their interdependencies and interrelationships having already been discussed.

Both the construction industry's image and recruitment into the construction industry are topic worthy of further in-depth research. These are interesting, complex and dynamic subjects that play an important role in the future of the construction industry and its constituent organisations.

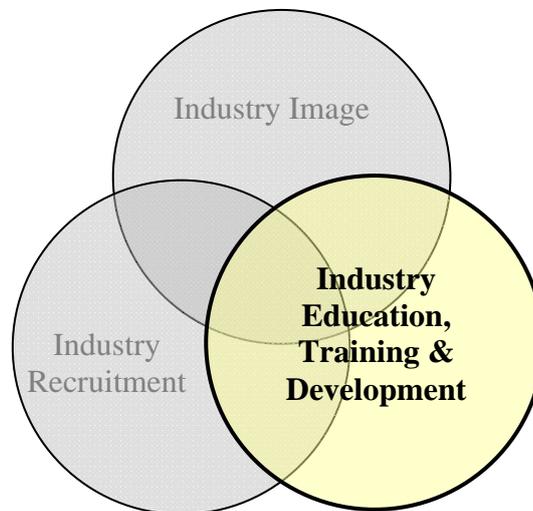


Figure 3.40: Future Research Areas

In line with the original research proposal in document 1, it is the third area, that of education, training and development of managers in the construction industry, that is of primary interest to the author and will be taken forward for further in-depth research.

As has been previously mentioned early in this report the CIOB is sponsoring a Presidential Commission with a remit to report on the alleged mismatch between the needs of industry (construction companies) and the knowledge and skill of construction graduates needed by industry. In response to an advertisement by the CIOB in March 2004 for people interested in this area to come forward and contact them, the author expressed an interest to the Presidential Commission but has yet to receive any formal response, although at the present time it is known that the Presidential Commission has been 'stood down' whilst the research is being carried out. It is hoped that the Presidential Commission will report in time for the findings to be utilised for the final thesis of this research project.

The commissioning of a new series of 'Making of Management' reports by the CMI is also of interest and relevance to the author's research work but regrettably this is unlikely to be published until some time after this research project is completed. The original reports took 3 to 4 years from commissioning to publication (1983 to 1987), considerably more time than is available to the author. In the case of both reports a careful watch will be kept for the publication of interim findings and reports

The author's research for the next stages of this project will investigate some of the themes identified in education, training and development of managers in much greater depth, particularly those relating to the use of technology, industry-education partnerships, and the modes and methods of delivering education, training and development to managers in industry for under-graduate and post-graduate course provision.

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3.8 Appendices

3.8.1 Top 100 Contractors and Housebuilders by Turnover

| | Company | Total turnover £000 | Year end | Contracting £000 | Housing £000 | Property £000 | Services £000 | Other £000 |
|----|-----------------------|------------------------|----------|---------------------|-----------------|------------------|------------------|---------------|
| 1 | Amec | 4,381,100 | Dec-02 | 2,410,700 | | 156,700 | 1,781,100 | 32,600 |
| 2 | Balfour Beatty* | 3,441,000 | Dec-02 | 3,308,000 | | | | 133,000 |
| 3 | Wimpey | 2,600,100 | Dec-02 | | 2,600,100 | | | |
| 4 | Taylor Woodrow | 2,215,800 | Dec-02 | 371,100 | 1,751,800 | 92,900 | | |
| 5 | Carillion | 2,008,700 | Dec-02 | 1,125,400 | | | 821,700 | 61,600 |
| 6 | Mowlem | 1,936,000 | Dec-02 | 1,540,000 | | 1,000 | 389,000 | 6,000 |
| 7 | Barratt Developments | 1,799,400 | Jun-02 | | 1,799,400 | | | |
| 8 | Persimmon | 1,711,100 | Dec-02 | | 1,711,100 | | | |
| 9 | Kier | 1,382,700 | Jun-02 | 1,218,400 | 158,800 | | | 5,500 |
| 10 | Skanska Construction* | 1,350,000 | Dec-02 | 1,350,000 | | | | |
| 11 | Jarvis | 1,217,200 | Mar-03 | | | | 1,217,200 | |
| 12 | Interserve | 1,122,900 | Dec-02 | 467,900 | | | 544,500 | 110,500 |
| 13 | Berkeley Group | 1,085,098 | Apr-02 | | 1,025,859 | 59,239 | | |
| 14 | Morgan Sindall 1 | 1,038,387 | Dec-02 | 617,592 | 223,558 | | | 197,237 |
| 15 | Wilson Bowden | 983,900 | Dec-02 | | 827,000 | 156,900 | | |
| 16 | Amey* | 917,164 | Dec-02 | | | | 917,164 | |
| 17 | Westbury | 790,937 | Feb-03 | | 790,937 | | | |
| 18 | Alfred McAlpine | 783,851 | Dec-02 | 363,786 | | | 381,816 | 38,249 |
| 19 | Bellway | 772,964 | Jul-02 | | 772,964 | | | |
| 20 | Bovis Lend Lease 2 | 761,332 | Jun-02 | 761,332 | | | | |
| 21 | Laing 3 | 755,000 | Dec-02 | | 456,100 | 43,100 | | 255,800 |
| 22 | Wilson Connolly | 714,900 | Dec-02 | | 714,900 | | | |
| 23 | Crest Nicholson | 699,400 | Oct-02 | 183,900 | 515,500 | | | |
| 24 | Miller | 656,700 | Dec-02 | 254,700 | 280,800 | 121,200 | | |
| 25 | HBG Construction | 654,400 | Dec-02 | 575,400 | | 66,200 | | 12,800 |
| 26 | Galliford Try | 649,783 | Jun-02 | 487,296 | 161,959 | | | 528 |
| 27 | Sir Robert McAlpine | 648,332 | Oct-02 | 648,332 | | | | |

| | | | | | | | |
|----|--|---------|------------|---------|---------|---------|---------|
| 28 | Morrison Construction/AWG 4 | 605,547 | Mar- 02 | 372,231 | | 231,656 | 1,660 |
| 29 | MJ Gleeson | 580,634 | Jun-02 | 428,230 | 112,970 | 39,434 | |
| 30 | Redrow Group | 573,300 | Jun-02 | | 543,100 | 30,200 | |
| 31 | Shepherd Building Group* | 557,300 | Jun-02 | 557,300 | | | |
| 32 | Costain | 543,400 | Dec- 02 | 525,500 | | 17,900 | |
| 33 | Mansell* | 528,989 | Dec- 02 | 528,989 | | | |
| 34 | Mitie | 518,852 | Mar- 02 | | | | 518,852 |
| 35 | Keller | 510,971 | Dec- 02 | 510,971 | | | |
| 36 | Wates Group* | 505,000 | Dec- 02 | 505,000 | | | |
| 37 | Bowmer & Kirkland * | 498,148 | Aug- 02 | 498,148 | | | |
| 38 | Birse | 491,641 | Apr-02 | 481,832 | | 1,217 | 8,592 |
| 39 | Bovis Homes | 461,284 | Dec- 02 | | 461,284 | | |
| 40 | Countryside Properties | 456,081 | Sep- 02 | 97,418 | 358,663 | | |
| 41 | Vinci* | 450,740 | Dec- 02 | 450,740 | | | |
| 42 | NG Bailey | 448,894 | Feb- 02 | 448,894 | | | |
| 43 | Montpellier* | 447,856 | Sep- 02 | 447,856 | | | |
| 44 | Peterhouse | 446,500 | Dec- 02 | 136,600 | | 309,900 | |
| 45 | General London Construction Holdings 5 | 435,300 | Dec- 02 | | 435,300 | | |
| 46 | Bloor Holdings | 408,988 | Jun-02 | | 277,109 | | 131,879 |
| 47 | Interior Services Group 6 | 405,654 | Jun-02 | 405,654 | | | |
| 48 | Ballast | 361,344 | Dec- 02 | 361,344 | | | |
| 49 | Emcor Drake & Scully* | 329,971 | Dec- 01 | 329,971 | | | |
| 50 | O'Rourke | 318,939 | Mar- 02 | 318,939 | | | |
| 51 | Willmot Dixon* | 314,585 | Dec- 02 | 314,585 | | | |
| 52 | Enterprise | 282,300 | Dec- 02 | | | 282,300 | |
| 53 | Fitzpatrick | 262,223 | Dec- 02 | 262,223 | | | |
| 54 | Simons* | 254,731 | Mar- 02 | 254,731 | | | |
| 55 | Accord | 239,684 | Dec- 02 | | | 239,684 | |

| | | | | | | | |
|----|-------------------------------|---------|--------|---------|---------|---------|---------|
| 56 | Staveley Industries* | 239,318 | Dec-02 | 239,318 | | | |
| 57 | McNicholas Construction* | 238,917 | Mar-02 | 238,917 | | | |
| 58 | Rok Property Solutions | 234,275 | Dec-02 | 183,786 | 33,512 | 10,088 | 6,889 |
| 59 | Linden | 232,896 | Dec-02 | | 232,896 | | |
| 60 | J Murphy & Sons* | 224,967 | Dec-01 | 224,967 | | | |
| 61 | Ringway | 221,875 | Dec-01 | | | 221,875 | |
| 62 | RG Carter Holdings* | 208,532 | Dec-01 | 208,532 | | | |
| 63 | May Gurney* | 206,905 | Mar-02 | 206,905 | | | |
| 64 | Lorne Stewart* | 192,811 | Dec-02 | 192,811 | | | |
| 65 | McCarthy & Stone | 188,100 | Aug-02 | | 188,100 | | |
| 66 | Henry Boot 7 | 178,990 | Dec-02 | 90,290 | 88,700 | | |
| 67 | Southern Electric Contracting | 176,419 | Mar-02 | 176,419 | | | |
| 68 | Osborne* | 160,304 | Mar-02 | 160,304 | | | |
| 69 | Severfield-Rowen | 157,418 | Dec-02 | 157,418 | | | |
| 70 | Seddon* | 157,033 | Dec-02 | 157,033 | | | |
| 71 | Keepmoat Holdings | 153,315 | Mar-02 | | 153,315 | | |
| 72 | Cala Homes | 150,303 | Jun-02 | | 148,849 | 1454 | |
| 73 | Stewart Milne* | 149,738 | Jun-02 | | 149,738 | | |
| 74 | John Doyle | 148,404 | Dec-01 | 61,726 | | | 86,678 |
| 75 | T Clarke | 143,990 | Dec-02 | 143,990 | | | |
| 76 | McNicholas* | 140,069 | Dec-02 | 140,069 | | | |
| 77 | Dean & Dyball | 140,032 | Sep-02 | 140,032 | | | |
| 78 | John Sisk | 136,461 | Dec-02 | 136,461 | | | |
| 79 | Biwater | 136,100 | Mar-02 | 98,000 | | | 38,100 |
| 80 | Robertson Group (Scotland)* | 134,870 | Nov-02 | 134,870 | | | |
| 81 | PME | 133,587 | Dec-02 | | | 133,587 | |
| 82 | Rydon* | 127,349 | Mar-02 | | 127,349 | | |
| 83 | Tolent | 125,828 | Dec-02 | 125,828 | | | |
| 84 | Styles & Wood | 123,006 | Dec-02 | | | | 123,006 |
| 85 | Haymills | 120,152 | Mar-02 | 96,427 | | | 23,725 |

| | | | | | | | | |
|---------------|-------------------------|-------------------|--------|-------------------|-------------------|----------------|------------------|------------------|
| 86 | Sunley Turriff Holdings | 118,202 | Dec-00 | 117,101 | | | 1,101 | |
| 87 | Clugston* | 116,534 | Jan-02 | 116,534 | | | | |
| 88 | Bett Brothers | 116,280 | Aug-02 | | 106,264 | 10,016 | | |
| 89 | Tulloch* | 114,800 | Dec-02 | 114,800 | | | | |
| 90 | Higgins* | 114,202 | Jul-02 | 89,009 | 25,035 | 158 | | |
| 91 | Midas | 113,725 | Apr-02 | 113,725 | | | | |
| 92 | David McLean | 112,423 | Jun-02 | 53,929 | 45,643 | 12,532 | 319 | |
| 93 | Barr* | 112,060 | Mar-02 | 112,060 | | | | |
| 94 | Dew Pitchmastic | 110,624 | Oct-02 | 99,477 | | | 11,147 | |
| 95 | Clancy* | 109,888 | Mar-02 | | | | 109,888 | |
| 96 | Connaught | 108,343 | Aug-02 | | | | 108,343 | |
| 97 | Benson | 108,200 | Dec-02 | 108,200 | | | | |
| 98 | Marshall Holdings* | 104,933 | Dec-01 | 104,933 | | | | |
| 99 | Wrekin | 101,524 | Dec-02 | 101,524 | | | | |
| 100 | SDC Holdings* | 90,181 | Sep-02 | 90,181 | | | | |
| Totals | | 56,050,887 | | 28,456,570 | 17,245,092 | 843,662 | 8,218,653 | 1,286,910 |

notes

* Full split of activities not provided in reports and accounts, therefore turnover and/or profits assigned to main activity

1- Morgan Sindall's housing refers to affordable housing

2- Bovis data refers to Bovis Lend Lease Ltd

3- Laing sold its homes division to Wimpey in 2002. Laing homes completed/sold 1286 units in 2002

4- Morrison Construction Group was taken over by Anglian Water Group (AWG) in 2000

5- General London Construction Holdings, formerly Fairview Homes

6- Interior Services Group data excludes construction management

7- Henry Boot sold its homes division to Wilson Bowden in early 2003. Boot completed/sold 694 units in 2002

Source: Building magazine, 25th July 2003

3.8.2 Top 50 Contractors by Turnover.

| | Company | Contracting £000 | Year end | Housing £000 | Property £000 | Services £000 | Other £000 | Total turnover £000 |
|----|------------------------------|---------------------|-------------|-----------------|------------------|------------------|---------------|---------------------------|
| 1 | Balfour Beatty* | 3,308,000 | Dec-02 | | | | 133,000 | 3,441,000 |
| 2 | Amec | 2,410,700 | Dec-02 | | 156,700 | 1,781,100 | 32,600 | 4,381,100 |
| 3 | Mowlem | 1,540,000 | Dec-02 | | 1,000 | 389,000 | 6,000 | 1,936,000 |
| 4 | Skanska Construction | 1,350,000 | Dec-02 | | | | | 1,350,000 |
| 5 | Kier | 1,218,400 | Jun-02 | 158,800 | | | 5,500 | 1,382,700 |
| 6 | Carillion | 1,125,400 | Dec-02 | | | 821,700 | 61,600 | 2,008,700 |
| 7 | Bovis Lend Lease | 761,332 | Jun-02 | | | | | 761,332 |
| 8 | Sir Robert McAlpine | 648,332 | Oct-02 | | | | | 648,332 |
| 9 | Morgan Sindall | 617,592 | Dec-02 | 223,558 | | | 197,237 | 1,038,387 |
| 10 | HBG Construction | 575,400 | Dec-02 | | 66,200 | | 12,800 | 654,400 |
| 11 | Shepherd Building Group* | 557,300 | Jun-02 | | | | | 557,300 |
| 12 | Mansell | 528,989 | Dec-02 | | | | | 528,989 |
| 13 | Costain | 525,500 | Dec-02 | | 17,900 | | | 543,400 |
| 14 | Keller | 510,971 | Dec-02 | | | | | 510,971 |
| 15 | Wates Group* | 505,000 | Dec-02 | | | | | 505,000 |
| 16 | Bowmer & Kirkland * | 498,148 | Aug-02 | | | | | 498,148 |
| 17 | Galliford Try | 487,296 | Jun-02 | 161,959 | | | 528 | 649,783 |
| 18 | Birse | 481,832 | Apr-02 | | 1,217 | | 8,592 | 491,641 |
| 19 | Interserve | 467,900 | Dec-02 | | | 544,500 | 110,500 | 1,122,900 |
| 20 | Vinci | 450,740 | Dec-02 | | | | | 450,740 |
| 21 | NG Biley | 448,894 | Feb-02 | | | | | 448,894 |
| 22 | Montpellier | 447,856 | Sep-02 | | | | | 447,856 |
| 23 | MJ Gleeson | 428,230 | Jun-02 | 112,970 | 39,434 | | | 580,634 |
| 24 | Interior Services Group | 405,654 | Jun-02 | | | | | 405,654 |
| 25 | Morrison Construction/AWG | 372,231 | Mar-02 | | | 231,656 | 1,660 | 605,547 |
| 26 | Taylor Woodrow | 371,100 | Dec-02 | 1,751,800 | 92,900 | | | 2,215,800 |
| 27 | Alfred McAlpine | 363,786 | Dec-02 | | | 381,816 | 38,249 | 783,851 |
| 28 | Ballast | 361,344 | Dec-02 | | | | | 361,344 |
| 29 | Emcor Drake & Scull* | 329,971 | Dec-01 | | | | | 329,971 |
| 30 | O'Rourke* | 318,939 | Mar-02 | | | | | 318,939 |

| | | | | | | | | |
|----|-------------------------------|---------|--------|---------|---------|---------|-------|---------|
| 31 | Willmot Dixon | 314,585 | Dec-02 | | | | | 314,585 |
| 32 | Fitzpatrick | 262,223 | Dec-02 | | | | | 262,223 |
| 33 | Simons | 254,731 | Mar-02 | | | | | 254,731 |
| 34 | Miller | 254,700 | Dec-02 | 280,800 | 121,200 | | | 656,700 |
| 35 | Staveley Industries* | 239,318 | Dec-02 | | | | | 239,318 |
| 36 | McNicholas Construction* | 238,917 | Mar-02 | | | | | 238,917 |
| 37 | J Murphy & Sons | 224,967 | Dec-01 | | | | | 224,967 |
| 38 | RG Carter Holdings* | 208,532 | Dec-01 | | | | | 208,532 |
| 39 | May Gurney* | 206,905 | Mar-02 | | | | | 206,905 |
| 40 | Lorne Stewart* | 192,811 | Dec-02 | | | | | 192,811 |
| 41 | Crest Nicholson ¹ | 183,900 | Oct-02 | 515,500 | | | | 699,400 |
| 42 | Rok Property Solutions | 183,786 | Dec-02 | | 33,512 | 10,088 | 6,889 | 234,275 |
| 43 | Southern Electric Contracting | 176,419 | Mar-02 | | | | | 176,419 |
| 44 | Osborne | 160,304 | Mar-02 | | | | | 160,304 |
| 45 | Severfield-Rowen | 157,418 | Dec-02 | | | | | 157,418 |
| 46 | Seddon | 157,033 | Dec-02 | | | | | 157,033 |
| 47 | T Clarke | 143,990 | Dec-02 | | | | | 143,990 |
| 48 | McNicholas* | 140,069 | Dec-02 | | | | | 140,069 |
| 49 | Dean & Dyball | 140,032 | Sep-02 | | | | | 140,032 |
| 50 | Peterhouse ² | 136,600 | Dec-02 | | | 309,900 | | 446,500 |

Notes

*contracting figures are distorted by the inclusion of other activities such as facilities management and property. This applies to rankings of contractors by contracting turnover (above), contracting operating profit (overleaf) and contracting operating margin (page 57)

¹ Crest Nicholson sold its contracting arm, Pearce, in early 2002

² Peterhouse sold its contracting arm, Propensity, in early 2002

Source: Building Magazine 25th July 2003.

3.8.3 The National Qualification Framework

| Level of Qualification | General | Vocationally Related | Own Brand Qualifications from Awarding Bodies | Occupational |
|-------------------------------|---|-------------------------------|--|---------------------|
| Levels 4/5 | Higher Level Qualifications e.g. Professional Development Qualifications | | BTEC Higher Nationals (level 4) | NVQ Levels 4/5 |
| Level 3 (Advanced) | GCE A level AS Levels | VCEs Full, Single, Part | NCFE Advanced Certificates | NVQ Level 3 |
| Level 2 (Intermediate) | GCSEs (grades A* - C) | GNVQ Intermediate | BTEC Firsts | NVQ Level 2 |
| Level 1 (Foundation) | GCSEs (grades D – G) | GNVQ Foundation | OCR Level 1 Certificates | NVQ Level 1 |
| Entry Level | Entry Level Qualifications and Vocational Awards | | | |

The National Qualifications Framework

Source: Edexcel (2003: 18)

3.8.4. Overview of the Major Qualifications Types Available in the United Kingdom (sub-degree level)

The following has been extracted from Edexcel (2003: 19 – 21)

The following provides an overview of the major qualification types available in England, Wales, Scotland, and Northern Ireland. This is not an exhaustive list as awarding bodies and professional associations also offer 'own brand' qualifications.

GCSEs

General Certificates in Secondary Education (GCSEs) are taken by the majority of students at the end of key Stage 4 (covering Years 10 and 11, students aged 14 – 16) although many Further Education and Sixth form colleges also offer GCSEs as part of their post-16 curriculum. They indicate that students have achieved a certain level of general education and give a route into higher level qualifications such as GNVQs, NVQs As and A levels or Modern Apprenticeships.

There are more than 50 different subjects to choose from at GCSE. GCSE results are reported on a scale of A* - G. Those students who did not achieve the required standard for grade G are reported with a 'U'.

GCSEs in vocational subjects (Applied GCSEs)

Applied GCSEs were introduced in September 2002 and have replaced the three unit Part One GNVQ. They are equivalent to two GCSEs and are awarded grades A*A* to GG. There are 8 subjects available.

GCEs

General Certificates in Education (GCEs, commonly known as A levels) are available in over 40 different subject areas.

They are divided into Advanced Subsidiary (AS) and A2 levels. AS qualifications form the first half of a full A level qualification. AS exams are typically taken at the end of the first year of advanced study and lead to a qualification in their own right. Students normally require 5 GCSEs at grade C or above to do a full-time As/A level course although this may be varied by colleges and mature students may be accepted onto an AS/A level course without the normal entry level qualifications.

A levels may be combined into a course of study with Vocational A levels to achieve breadth of study. The level of demand for an AS is that expected of candidates half-way through a full Advanced level course of study. The second half of the A level, the A2, is assessed at a higher standard, thus maintaining the overall standard of the A level.

Awards are made on an A – E grading scale, and students failing to meet the minimum standard for an award will be recorded as 'unclassified'.

GNVQs

General National Vocational Qualifications (GNVQs) have been offered in schools and colleges since 1992 and were originally designed to provide an alternative qualification to students where the traditional 'academic' qualification (GCSE, A level) and the occupationally specific NVQs were not deemed appropriate – hence the use of the word 'general'. These qualifications are usually available to Post 16 students although some schools offer them at Key Stage 4.

They are currently available at Foundation (Level 1) and Intermediate (Level 2). Each unit is graded either Pass, Merit or Distinction and awarded points. The points gained determine the overall result which is also graded Pass, Merit or Distinction. A 6-unit GNVQ is the equivalent of four GCSEs, Foundation at grades D – G, Intermediate at grades A* - C

VCEs

Vocational Certificate of Education (VCE), also known as Vocational A levels, are qualifications which enabled students to develop skills, knowledge and understanding in the vocational area they are studying and preparing them for both the world of work and progression into Higher Education. The programme of study includes work-related assignments, often with local employers.

They were introduced in September 2000 as a replacement for Advanced (Level 3) GNVQ. They have been an accepted entry route into further and higher education since 1994. Vocational A levels are aimed at 16 – 19 year olds but they are also suitable for adults returning to education.

They are available in three ‘sizes’:

Vocational Certificate of Education (VCE) Advanced Subsidiary (3 units)

Vocational Certificate of Education (VCE) Advanced Level (6 units)

Vocational Certificate of Education (VCE) Double Award (12 units)

And are currently available in 14 vocational areas (including construction and the built environment)

The outcome of each individual unit will be reported as a grade, A-E, and the award will be graded A-E overall. Each unit is separately certified so that if students do not complete the full qualification they will still receive a certificate for the units they did achieve. As with other qualifications, there is no requirement for students to pass every unit – although they must enter and attempt every unit – as was the case with the Advanced GNVQ it replaced.

**Nottingham Trent University
The Nottingham Business School**

Doctor of Business Administration Programme

*Management Education, Training and
Development of Construction Managers
- Will They Ever Learn?*

Quantitative Research Project

Document 4

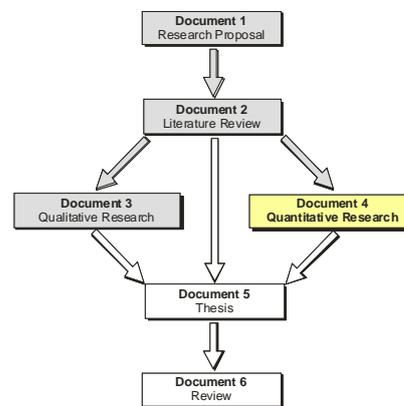
**A.G. Hurst
N0013040
February 2005**

NOTTINGHAM
TRENT UNIVERSITY 

This document is submitted in fulfilment of Document 4, being a partial fulfilment of the Doctor of Business Administration programme.

Title: Management Education, Training and Development of Construction Managers: Will They Ever Learn?

Quantitative Research Project



Supervisors: Professor Alistair Mutch
Professor Myra Hodgkinson

February 2005

A.G. Hurst MSc, MBA, MCIQB, MAPM, MCMI

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4.0.2 List of Abbreviations and Acronyms

| | |
|------|---|
| CITB | Construction Industry Training Board |
| DES | Department of Education and Science |
| DETR | Department for the Environment, Transport and the Regions |
| DfEE | Department for Education and Employment |
| DfES | Department for Education and Science |
| DoE | Department of Education |
| DTI | Department for Trade and Industry |
| FE | Further Education |
| HE | Higher Education |
| HESA | Higher Education Statistics Agency |
| PCAS | Polytechnic Central Admission Service |
| PCFC | Polytechnics Central Funding Council |
| UCAS | Universities Central Admissions Council |
| UCCA | Universities Central Council for Admissions |
| UGC | University Grants Committee |
| USR | Universities Statistical Record |

4.0.3 Acknowledgement of Trademarks.

SPSS is a registered trademark of SPSS Inc.

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4.1 Introduction, Research Question and Hypotheses.

4.1.1 The Research Project

In Document 2, the Literature Review, an apparent association between the level of employment in the construction industry and the level of applications and recruitment to construction industry related courses in universities was identified. This apparent association is shown in Figure 4.1 below taken from Document 2 (Figure 2.11).

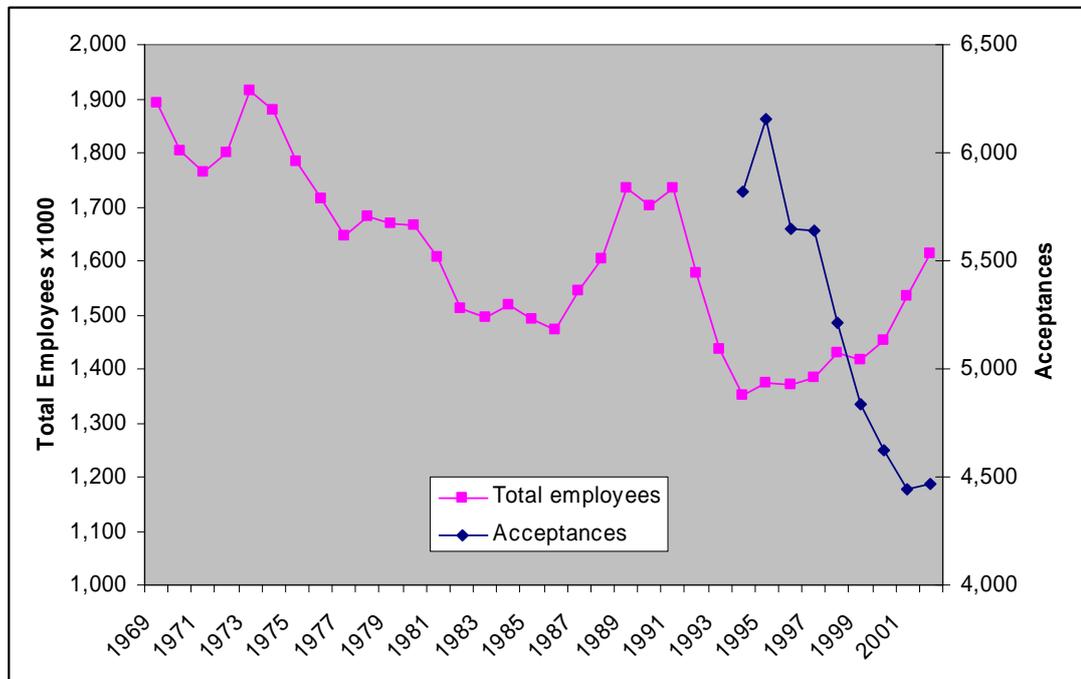


Figure 4.1: Acceptances for Degrees Courses and the Level of Construction Industry Employment.
Source: UCAS & DOE/DTI

Changes in the level of applications and recruitment to universities appeared to reflect the changes that occurred in the level of employment in the construction industry some years earlier. This quantitative research project will therefore seek to investigate this apparent association through the testing of a hypothesis for the existence of an association for validity or invalidity.

If an association between the data is established then consideration will be given to the possibility of using the data to project future levels of applicants/acceptances to

construction industry related higher education courses. However it is not the intention in this project to either attempt to create a model for the prediction of recruitment, or to make any generalised predictions or forecasts in this area.

In carrying out this qualitative research project a model of the process of the qualitative research process given by Bryman and Bell (2003, p.69) shown in Figure 4.2 below will be adopted as the basis of the research process for this project.

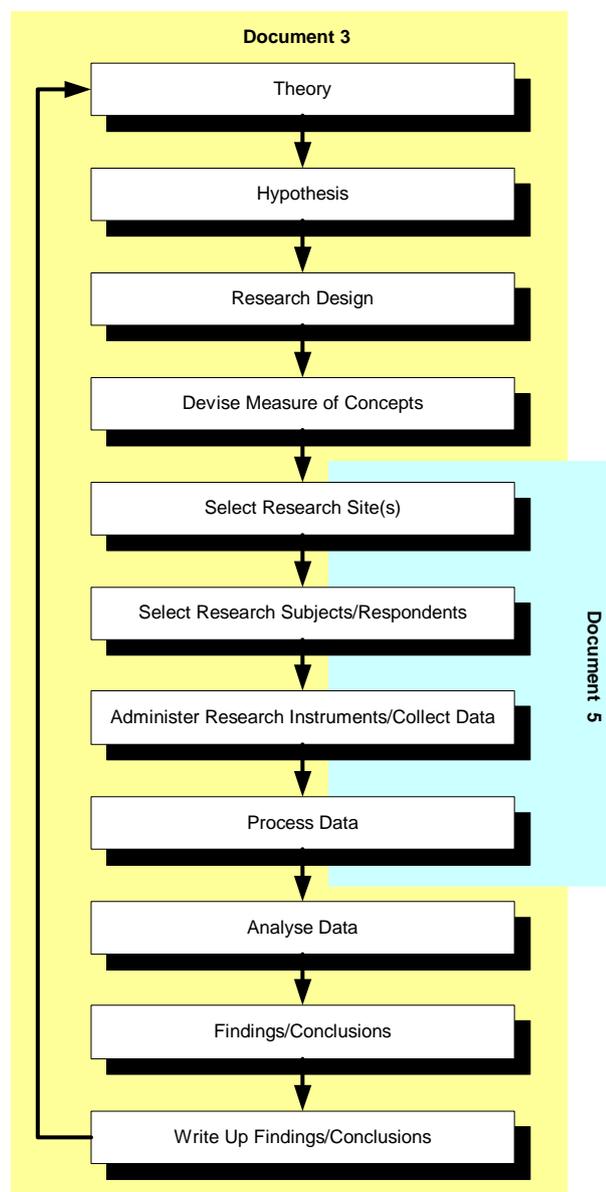


Figure 4.2: The Process of Quantitative Research
Source: Bryman and Bell; (2003, p.69)

The ‘theory’ and ‘hypothesis’ processes of this model will be considered in this introduction, whilst the ‘research design’, ‘devise measures of concepts’, ‘select research sites’ and ‘select research subjects/respondents’ processes will be considered in the next chapter, chapter 4.2, Research Methodology.

Chapter 4.3, Research Methods, will consider the processes of ‘administer research instruments/collect data’ and ‘process data’. The process of ‘Analyse Data and Finding(s)’ will be considered in chapter 4.4, Research Data Analysis; and finally Chapter 4.5, Research Conclusions, will consider the ‘findings/conclusions’ process.

One exception from the model, although not explicitly shown within it, is the exclusion of the literature review, as it has already been included within Document 2, and is consistent with the approach adopted within Document 3. Where new literature has been encountered it has been included within chapters as an integral part of discussions.

4.1.2 The Report Structure

Chapter 4.1, Introduction, Research Question and Hypotheses: Having already introduced the quantitative research model this chapter will introduce the research question and formulate two hypotheses to be tested.

Chapter 4.2, Research Methodology: This chapter considers the research design models and the various research methodologies available to the author for this project. Document 3 considered and adopted the critical realist approach to qualitative research. The critical realist approach is considered here again in the context of quantitative research and adopted, thus providing a consistent methodological approach to both the qualitative and quantitative research projects.

Chapter 4.3, Research Method: Data Collection: Continuing from the previous chapter this chapter considers the research methods used for the collection, collation and assimilation of data from a wide variety of government departments and other

agencies' reports, and other authoritative sources. This chapter therefore discusses the trials and tribulations of collecting time-series from a variety of authoritative sources and the problems encountered both within and external to the data.

The data collected consists of time-series data for the annual employment levels in the construction industry, and the numbers of acceptances (recruits) to construction industry related courses in higher education, i.e. universities, and former polytechnics. Other data collected includes school and further education college data for the numbers of students taking 'A' level and equivalent awards, and the numbers obtaining sufficient 'A' level and equivalent award grades for entry into higher education. Additional data being collected includes details of the total UK population level, population of working age, and the population of seventeen year-olds, i.e. those that would be of an age when 'A' levels or equivalent are normally taken. Although the original intention was to include the analysis of the 'A' levels and population data in this report it has been deferred to Document 5 where it will more appropriately be included in part of a market analysis.

Chapter 4.4, Research Data Analysis and Findings: Whilst the quantitative research model in Figure 4.2 shows these as separate processes they are included together in this chapter. Although it was the author's intention to include the data analysis and the findings as two separate chapters it was found early in the data analysis that a number of statistical analysis techniques (tests) would be needed and that the findings from one test would progressively determine the type of test that would be subsequently employed, thus tests and findings became a dependent sequential process.

This chapter considers the statistical analysis of the construction industry employment levels and the number of acceptances to construction industry related courses in higher education. The data collected will be tested in three phases:

1. To establish the nature of the distribution of the data
2. To establish the nature of the correlation of the data
3. To establish the fitting of any curve form to the data.

Chapter 4.5, Research Conclusions: This chapter considers the findings of the data analysis processes and determines the validity or invalidity of the postulated hypotheses.

Chapter 4.6, Research Recommendations and Future Research Work: This chapter considers the research undertaken and proposes areas for possible future research based on the findings and conclusions of this project. The research areas to be taken forward to the final thesis of the project are proposed, and other areas for possible independent and/or future research are identified.

Chapter 4.7, References: This chapter has been divided into two main sections:

- General References
- Statistical Series References

General references include the normal references for literature, etc., but excludes references to any statistical data published in time-series reports, usually on an annual or quarterly basis.

Statistical series references includes the references for all the statistical series publications used for data collection for this report and those used to collect data to be taken forward to Document 5. The reason for this is that many of the series reviewed have changed publisher and/or titles during their lifespan, e.g. the government reports for the construction industry have been published by three different agencies, the DoE, DfEE and latterly the DTI, and under two titles, 'Housing and Construction Statistics' and latterly 'Construction Statistics Annual', in fact a total of five combinations of publisher and title exist to date for the same statistical report; thus making consistent referencing for statistical series reports in this project report difficult at times.

In order to circumvent this problem where it occurs, each and every time-series report is referenced separately under a generic series/subject heading.

4.1.3 The Research Question and Hypothesis.

It was stated at the start of this introduction that the level of acceptances to higher education courses relating to the construction industry appeared to reflect the changes in the level of employment in the construction industry. However these changes are not effected immediately, but appear to occur a number of years later, thus if there is any association between changes in employment levels and acceptances levels it is not immediate, but subject to a delay period of a number of years.

In order to investigate this apparent association and to establish whether there is any valid claim to the association, and whether or not this apparent association might be used to forecast future levels of recruiting the following hypotheses are proposed and will be tested for validity or invalidity.

Hypothesis 1: There is an association between the level of employment in the construction industry and the level of recruitment to higher education courses in construction industry related topics.

Hypothesis 2: The level of recruitment to higher education construction industry related courses might be predicted from the level of employment in the construction industry.

4.2 Research Methodology

4.2.1 Introduction

In the qualitative research project, Document 3, the adopted research methodology was that of critical realism. However, as this project is quantitative a methodology must be adopted appropriate to the nature of the research. Of the very many published texts on quantitative analysis reviewed few were found to devote much discussion to the methodological philosophies of quantitative research, but instead devote the overwhelming majority of their text to the many statistical and mathematical techniques available to the quantitative researcher, as well as various software tools and packages that can be used to aid analysis. Whilst examination of such techniques and tools is essential in any quantitative analysis, consideration must also be given to the nature of the data collected and the method of its collection, especially in the social science context where there may be advantages in applying both qualitative and quantitative considerations to data analysis, as often the two cannot be realistically separated (Bryman and Cramer, 1990).

The question in terms of the research methodology becomes one of whether the critical realist approach is appropriate and can be successfully adopted for this quantitative research project, in the same manner as the qualitative study in Document 3. Therefore this chapter will consider appropriate research techniques that embrace both qualitative and quantitative philosophies.

4.2.2 Research Design

In Document 3 both the Easterby-Smith, Thorpe and Lowe (2002, p.57) model and the Saunders, Lewis and Thornhill (2003, p.83) model of the research process shown below in Figures 4.3 and 4.4 respectively were considered and the philosophy of the research method adopted was that of critical realism. However this was in respect of the qualitative research project that was undertaken and the question that must now be asked is that in order to maintain a consistency of approach, can the critical realist methodology be applied to a quantitative project?

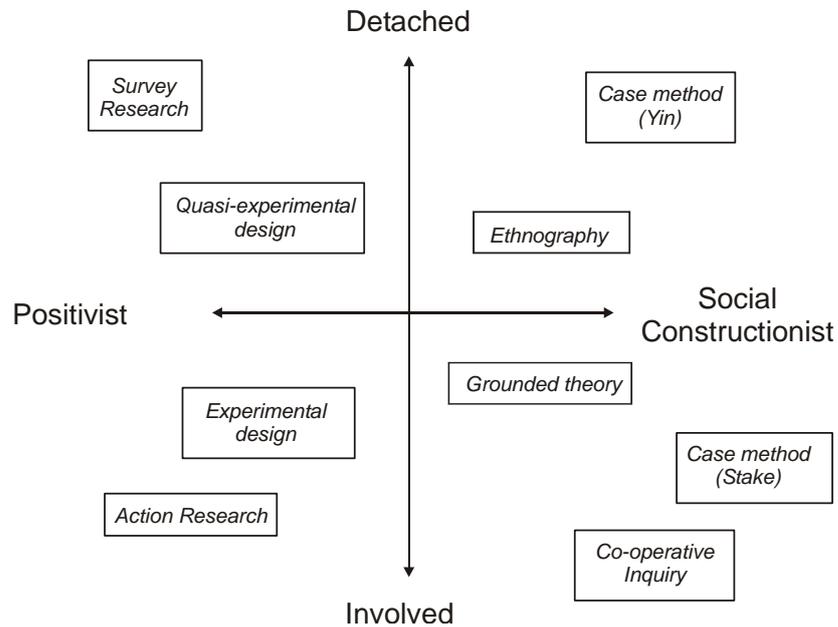


Figure 4.3: Research Designs
 Source: Easterby-Smith, Thorpe and Lowe (2002, p.57)

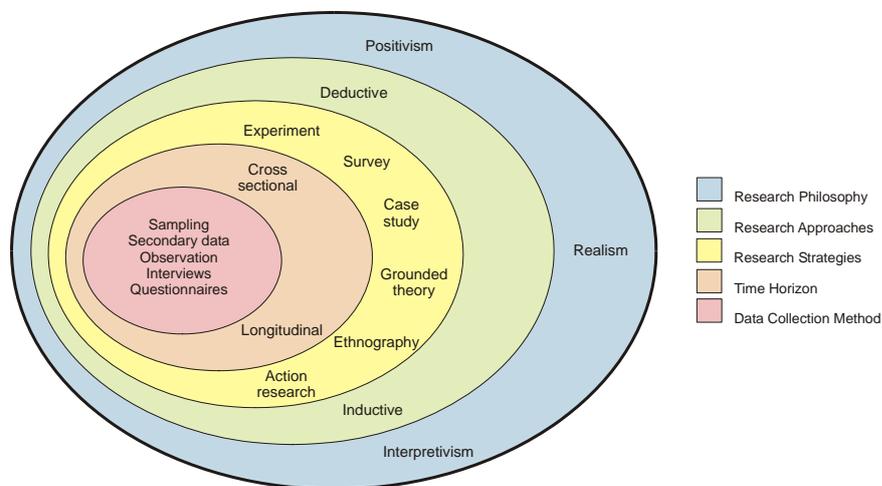


Figure 4.4: The Research Process ‘Onion’
 Source: based on Saunders, Lewis and Thornhill (2003, p.83)

Sayer (2000, p.19) notes:

‘The objects that social scientists study, be they wars, discourses, institutions, economic activities, identities, kinship or whatever are concrete in the sense that they are the product of multiple components and forces. Social systems are always open and usually

messy. Unlike some of the natural sciences we cannot isolate out these components and examine them under controlled conditions.’

This is certainly the case in this project where the two social systems under consideration, the construction industry and university applicants, are very much open systems, of great complexity and certainly ‘messy’. Sayer’s statement is certainly applicable here as the components of these systems cannot be isolated and most certainly cannot be examined under controlled conditions. Evidence of the complexity of the construction industry can be seen in Briscoe and Wilson’s (1993) attempt to produce an employment forecasting model of the construction industry which clearly demonstrates just how difficult and complex a task any attempt to try and model the construction industry is, as indeed is any econometric model. Sayer (1992, ch.6) gives a useful insight into the problems associated with quantitative research in social science.

In this study we must also take into account the nature of the relationship between the data, i.e. employment and acceptances. Sayer (1992, p.87) makes a clear distinction between ‘abstract’ and ‘concrete’ research:

‘an abstract concept, or an abstraction, isolates in thought a *one-sided* or partial aspect of an object. What we abstract *from* are the many other aspects which together constitute *concrete* objects such as people, economics, nations, institutions and activities and so on.’ [Original italics]

but also notes

‘... that not all concrete objects are empirically observable, nor are all abstract aspects of objects unobservable.’

Danermark *et al* (2002, p.42) note that:

‘an abstract concept, or an abstraction, is something which is formed when we - albeit in thought - separate or isolate one particular aspect of a concrete object or phenomenon; and what we abstract from is all the other aspects possessed by the concrete phenomena.’

In this study the concrete phenomena that will be considered are construction industry employment and recruitment (acceptances) to higher education construction

industry related courses, and the nature of the perceived relationship is an abstraction as, according to Danermark *et al* (2002, p.43):

‘conceptual abstraction is used as a kind of social science equivalent to the natural science experiment.’

Sayer (1992, p.177) states

‘...one of the least interesting ways of looking at society is by demographic analysis. This conceptualises individuals as externally related and is therefore ‘blind’ to social structures and their emergent powers.’

Yet in order to begin to understand the societal structures and powers at work that act upon employment levels in the construction industry and recruitment to higher education, quantification is necessary in some form in order to identify and determine these structures and evaluate the causal outcomes of these powers. Sayer continues to argue that the collection and analysis of quantitative data is an essential part of any social science study, as it increases, not decreases the significance of the problems discussed.

4.2.3 Structural Analysis

The structural analysis referred to here is in the social science context, and is the consideration of the nature of the relationship(s) between the data when making abstractions. Sayer (1992, p.88) classifies these relationships as either

‘ ‘substantial’ relations of connection and interaction or ‘formal’ relations of similarity and dissimilarity’.

Danermark (2002, p.45) seeks to clarify this as:

‘*Substantial* relations means there are real connections between the objects, *formal* that there are not, but nevertheless the objects somehow share a common characteristic – they are in some respect similar.’

What therefore is the nature of the relationship between employment and acceptances? At first it might be argued that the relationship is formal and that there are no real connections between the construction industry and higher education applicants and that they only share a common characteristic by way of their

inflationary and deflationary cycles. However a clear link was established in the causal relationships identified in Document 3. There is also much anecdotal evidence to suggest that a considerable proportion of applicants to construction industry related degree courses, and in particular building and civil engineering courses, have immediate or close family members and relations working in the construction industry, thus the relationship between employment and recruitment must be considered as substantial.

Danermark *et al* (2002, p.46) provides a useful diagrammatic breakdown of the taxonomy of social relationships, as shown in Figure 4.5 below.

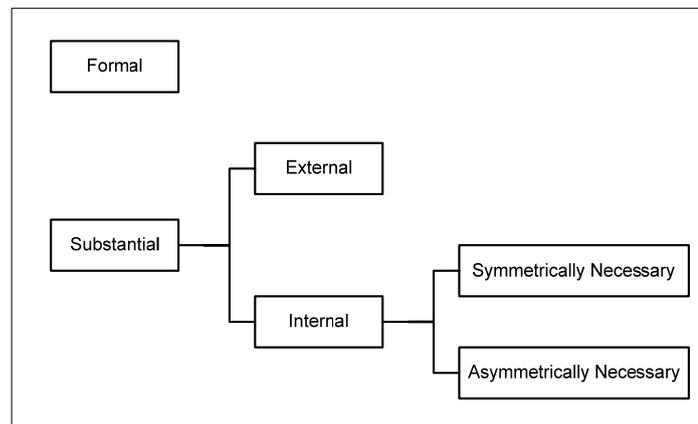


Figure 4.5: Taxonomy of Social Relationships
Source: Danermark *et al* (2002, p.46)

Having established that the relationship of the data is substantial, consideration must now be given to whether or not the data has an external (contingent) relationship or an internal (necessary) relationship (Sayer, 1992).

An external or contingent relationship means that the two objects can exist independently of one another, that is, their relationship is contingent. It might be at first thought the relationship between the construction industry and H.E. construction courses is an external/contingent relationship and that both can exist independently of each other, but this can not be so, for if there were no construction industry then there would not be any H.E. construction courses.

The relationship between the construction industry and H.E. construction courses is therefore internal/necessary. However the relationship is not symmetrical but asymmetrical. If the relationship were symmetrical then the construction industry could not exist without H.E. construction courses and vice-versa. The construction industry has been in existence for many thousands of years and compared to the life-span of the construction industry universities are but a modern social construct. Thus the construction industry can exist without H.E. (graduates), but it must not be forgotten that a very large part of the industry in terms of both employment and economic value is in small projects and undertaken by small businesses, reliant mainly upon the craft and trade skills without the need for 'professional' overheads such as architects, engineers, surveyors, project managers and the like. It must also not be forgotten that many of the current construction industry professions are themselves recent constructs within the industry's history although it must be acknowledged that many of these 'professional' skills have existed in some form or other for almost as long as the industry itself, usually dispersed amongst the tradesmen and craftsmen. The Pyramids, Great Wall of China, and very many other ancient structures did not happen by chance, they were very skilfully designed and constructed projects that required a great range of skills that are embodied amongst today's professions. However if there were no construction industry then there would be no construction industry related degree courses in any university. Thus the relationship between the construction industry and H.E courses is necessary/internally asymmetric.

Danermark *et al* (2002, p.46) warn that:

... whether a relationship is necessary or contingent for a certain research object is ... not a logical question but one that can only be answered through a concrete study. And if we are not clear about which aspect or aspects of a phenomenon we are interested in, we suffer great risk that the abstract structural analysis will only result in confusion and chaotic concepts.

Sayer (1998, p.127) provides a useful explanation of this problem in that:

A bad abstraction or 'chaotic conception' is one which is based on non-necessary relationships, or which divides the indivisible by failing to recognise a necessary

relationship. The same point can be made in a different way by using the distinction between external and internal relationships. ... A rational abstraction is unlike a chaotic conception – taken due account of structures of internal and external relationships.

continuing (p.129)

That is not of course to say that concrete objects are unimportant – far from it, but what theory provides us with is an understanding of the concrete by means of abstract concepts denoting its *determinations*. [Original italics]

4.2.4 A Priori or A Posteriori Research?

Ferguson's approach to the design of research (1981, pp.294 – 295) considers that one of two situations exists:

A priori comparisons are *planned* prior to the conduct of the experiment. They have direct relevance to the theory that gave rise to the conduct of the experiment. They are in effect the questions the investigator is hoping to answer by doing the experiment.

A posteriori comparisons are *unplanned, post hoc, or post-mortem* comparisons. These are comparisons the investigator decides to make after inspection of the data, and may be suggested by such inspection.

[Original italics]

although Ferguson does acknowledge (1981, p.295) that:

Frequently in the analysis of experimental data the investigator may be rather unclear about whether certain comparisons were made on an a priori comparison or not.

This study will be based primarily on the observation of a possible association between the level of employment in the construction industry and applications and admissions to construction courses in universities. Whilst the comparisons to be made and the nature of the study to be made can be classified as unplanned/post hoc as defined by Ferguson above, it was only after the initial comparison of the two datasets was made in Document 2 that the decision to investigate the possible association was made. It is clear then that an a posteriori comparison will be made and thus the research that will be applied will follow from the data to test the validity of the comparison and not an a priori comparison where, following the pronouncement of a hypothesis, experiments are contrived to produce data to

confirm or deny the hypothesis. Indeed Collier (1994) in his discussion of Bhaskar's work questions the appropriateness of a priori research in the critical realist perspective.

4.2.5 The Mode of Inference

In order to undertake an a posteriori comparison it will be helpful to determine the mode of inference, whether an inductive or deductive approach will be undertaken (Curwin and Slater, 2002). However Danermark *et al* (2002, p.73) take issue with this and consider that:

We cannot commit ourselves to a particular research method; we cannot decide which method is the most appropriate without taking into consideration the properties of the object we wish to acquire knowledge about.

They propose as a starting point three fundamental methodological arguments (p.73):

1. All science should have generalizing claims. Methods for acquiring knowledge of the general and for examining the validity of generalizations are fundamental for all social science research. Generalizing may, however, mean different things.
2. Quite essential for scientific methods are various modes of inference. In a science based on critical realism, abduction and retroduction are two indispensable modes of inference besides induction and deduction... The concept of inference [is used] in two different meanings. In the first place as logical inferences treated as formal logic, in the second place as thought apparatus; i.e. different ways of reasoning and thinking in order to proceed from something to something else. To avoid misunderstanding it is important... that we use the word 'inference' in these different ways.
3. An overall aim in social science research is to explain events and processes. To explain something implies (from the perspective of critical realism) first describing and conceptualising the properties and causal mechanisms generating and enabling events, making this happen, and then describing how different mechanisms manifest themselves under specific conditions. This kind of investigation requires a methodological approach based on abduction and retroduction, and breaking the so-called Popper-Hempel model of scientific explanations.

Danermark *et al* (2002) provide a very useful comparison of the four modes of inferences: deduction, induction, abduction and retroduction. The comparative table, Table 4.1, is given overleaf.

The question now becomes one of which (if any) mode of inference best applies to this project? From the hypotheses that have already been promulgated it is readily apparent that the retroductive approach can be discounted as none of the essential criteria for this approach are met in terms of the fundamental structure and thought processes involved. The abductive approach can be similarly discounted; although some aspects of the fundamental structure and thought process involved initially seem applicable they can be quickly discounted as new conceptual framework is not intended at this stage.

Having discounted the reductionist and abductionist modes of inference the problem is now one of deductive or inductive mode of inferences. The differentiation of these two modes in this project is more difficult than that of abduction and retroduction as there appears to be some merit in both of these modes in this project. However careful consideration of the criteria for each of the deductive and inductive modes of inference reveals that this project falls under the heading of induction for reasons outlined below.

This project considers data for both employment and recruitment for a specific number of years, i.e. a number of 'observations'. These 'observations' do not constitute the entire population of data for the data series, but merely a sample, albeit all the data currently available covering the last thirty-five years for employment data and eighteen years for recruitment data. In terms of employment in the construction industry the entire population would consist of, theoretically, many hundreds if not thousands of year's data, and for university recruitment a few hundred years, and around twenty years for polytechnics as they were only established in 1966 under the Government's white paper 'A Plan for Polytechnics and Other Colleges' (Donaldson, 1975), until they finally became universities in 1994.

Table 4.1: Four Modes of Inference

Source: Danermark *et al*; 2002, pp.80-81.

| | Deduction | Induction^a | Abduction | Retroduction |
|---|--|--|--|---|
| Fundamental structure/thought operations | To derive logically valid conclusions from given premises. To derive knowledge of individual phenomena from universal laws | From a number of observations to draw universally valid conclusions about a whole population. To see similarities in a number of observations and draw the conclusion that these similarities also apply to non-studied cases. From observed co-variants to draw conclusions about law-like relations. | To interpret and recontextualize individual phenomena within a conceptual framework or a set of ideas. To be able to understand something in a new way by observing and interpreting this something in a new conceptual framework. | From a description and analysis of concrete phenomena to reconstruct the basic conditions for these phenomena to be what they are. By way of thought operations and counterfactual thinking to argue towards transfactual conditions. |
| Formal logic | Yes | Yes | Yes and no | No |
| Strict logical inference | Yes | No | No | No |
| The central issue | What are the logical conclusions of the premises? | What is the element common for a number of observed entities and is it true also of a larger population? | What meaning is given to something interpreted within a particular conceptual framework? | What qualities must exist for something to be possible? |
| Strength | Provides rules and guidance for logical derivations and investigations of the logical validity in all argument. | Provides guidance in connection with empirical generalizations, and possibilities to calculate, in part, the precision of such generalizations. | Provides guidance for the interpretative processes by which we ascribe meaning to events in relation to a larger context | Provides knowledge of transfactual conditions, structures and mechanisms that cannot be directly observed in the domain of the empirical |
| Limitations | Deduction does not say anything new about reality beyond what is already in the premises. It is strictly analytical. | Inductive inference can never be either analytically or empirically certain = the internal limitations of induction. | There are no fixed criteria from which it is possible to assess in a definite way the validity of an abductive conclusion. | There are no fixed criteria from which it would be possible to assess in a definite way the validity of a retroductive conclusion |
| Important quality on the part of the ability researcher | Logical reasoning | Ability to master statistical analysis | Creativity and imagination | Ability to abstract |
| Examples | If A then B A Thus B | Induction is restricted to conclusions at the empirical level = the external limitations of induction. From an investigation of the attitude of a representative sample of Swedes, draw the conclusion that 30% of the Swedish population is in favour of the EU. | Karl Marx reinterpretation/ redescription of the history of humankind from the historical materialist view. | For a ritual to be just a ritual there must exist, <i>inter alia</i> , emotionally loaded symbols and common notions of inviolable/sacred values |

Note:

^a The concept of induction has been used in partly different ways by different philosophers/theorists and within different disciplines. Here we are talking about induction in the sense of inductive logic. In social science the concept of inductive is also used to describe a certain form of research procedure. We shall return to this research procedure in the next chapter. It is important not to confuse inductive logic with inductive research, since these concepts in part imply totally different things.

Even considering the data for the post-industrial revolution period, around one hundred and fifty years or so (if it were available), or even the post second world war period, sixty years, in which the social and industrial/commercial structures of today first become recognisable, there is only a limited amount of recent data available.

Considering the fundamental structures/thought processes it will be seen that from a (limited) number of observations similarities will be found, and that conclusions will draw law-like relationships from the observed co-variants.

As Sayer (1992, pp.227-228) is at pains to point out

In pure inductive inference, each successful prediction of an event fails to strengthen our theory because there are no logical grounds for inferring that success will not continue.

This just becomes a sequence of events that is known to occur, such as the association between employment and recruitment, there is no logical ground for inferring that this relationship will continue.

With respect to ‘strengths’ of the inductive approach this study will make empirical generalisations about the nature of the relationships between employment and recruitment, and provide guidance in the empiricisms. The possibility of performing calculations, at least in part, will enable the precision of the generalisations to be investigated through the use of statistical analysis, although this project does not seek to build a model or predict future recruitment levels to higher education. It will be seen in terms of ‘limitations’ that the inductive inferences cannot be either analytically or empirically certain for the internal limitations of induction, and that external restriction of induction will lead to restrictions of conclusion at the empirical level.

Finally in terms of the induction mode, note is taken of the ‘important quality on the part of the researcher’ as being ‘*an ability to master statistical analysis*’. As it is some 30 years since the author last studied statistics as part of his HND, this project will introduce the author to some different statistical techniques. In the intervening years the invention of the personal computer and the development of statistical analysis software will be seen to have greatly eased, if not eliminated, the burden of the mechanics of analysis, but problems with conceptualisation and interpretation of results still remain.

4.2.6 Spurious Relationships

One of the potential problems associated with any quantitative study of this nature is that of the ‘spurious correlation’, where causal relationships cannot be distinguished from ‘accidental’ relationships (Curwin and Slater, 2002). Thus in this study the possibility that the fluctuations in recruitment to higher education construction courses appear to be associated with the fluctuations with the levels of employment in the construction industry might well be ‘accidental’. It would certainly be inappropriate, if not wrong, to consider this association as causal, that the fluctuation in employment levels causes the fluctuation in recruitment levels in higher education, but more correctly that the causal factors that act upon, or are determinants, in the construction industry employment levels are themselves also causal factors in recruitment to higher education (see Figure 4.6 below).

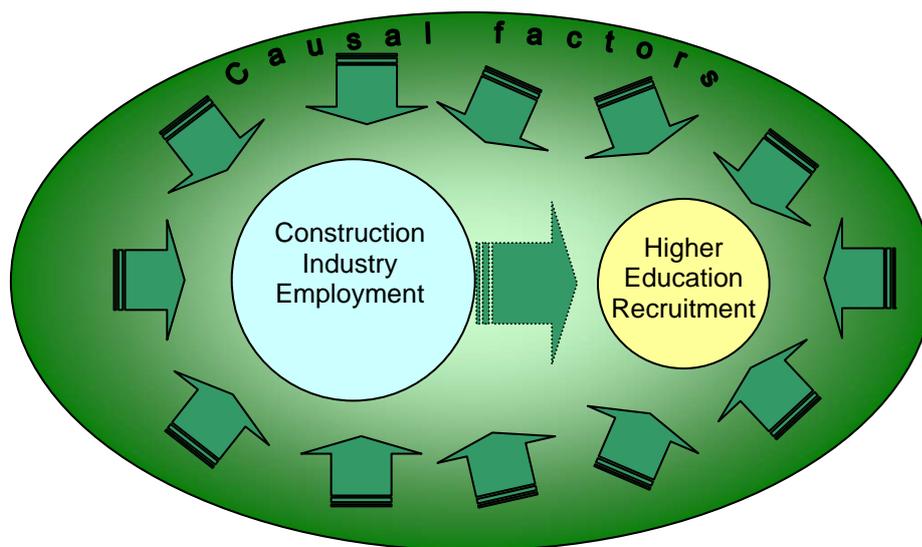


Figure 4.6: Causal relationships.

Curwin and Slater (2002, p.365) propose that whenever considering a possible relationship between sets of data the question should be asked:

Does the relationship make sense?

and later (p.379) warn the researcher that:

With most business-type data there is likely to be some relationship between variables, even if it does not make sense, and this... may lead to spurious correlations being mistaken for useful ones, just because they exist.

In consideration of the apparent association between employment levels and recruitment levels the author considers that the relationship between these two variables does make sense for reasons discussed, not only in this report, but also in Document 3. Furthermore the correlation will be a useful one as it might contribute to either the creation of a model or other predictive tool for likely recruitment levels based on the level of industry employment, although it is not within the remit of this project to create such a model or predictive tool.

The changes that occur in the construction industry environment result in changes through causal relationships to both the level of employment in the construction industry and the level of higher education recruitment. These changes are not necessarily immediate, and can be subject to a time delay or time lag as shown in Figure 4.7 below. The data analysis process in chapter 4.4 seeks to determine the length of the lag between a change in construction employment levels and higher education recruitment levels.

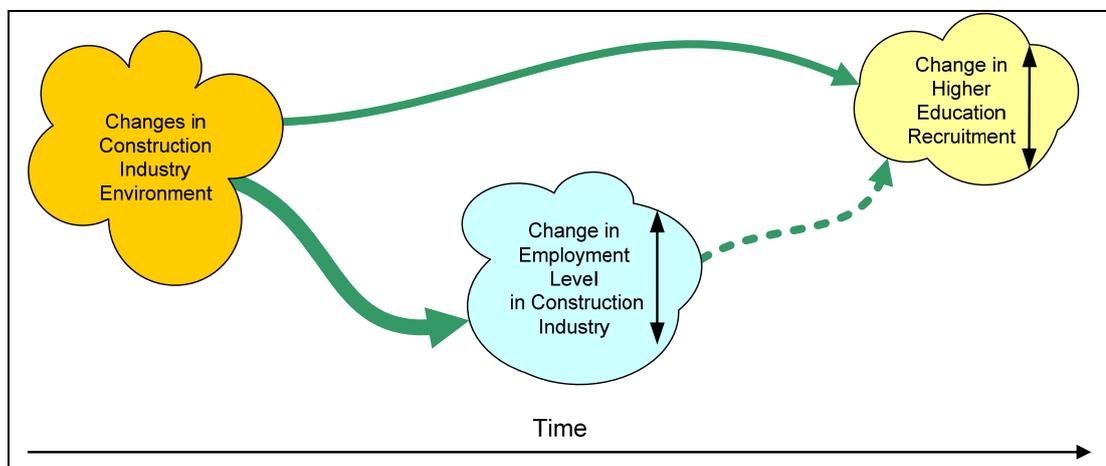


Figure 4.7: The relationship between changes in the construction industry environment, construction industry employment and higher education recruitment

4.2.7 Open and Closed Systems

A final important consideration of the methodology for this project is that of the nature of the system in which the subjects of the research exist. Both the construction industry and higher education are 'open' systems as neither could exist if they were closed systems as the generative and causal mechanisms upon which both depend only exist in open systems (Bhaskar, 1998).

Danermark *et al* (2002, pp.66-67) draw upon Bhaskar's original 1978 work to explain these systems in the social science context:

Generally speaking a closed system is at hand when reality's generative mechanisms can operate in isolation and independently of the other mechanisms – closed systems require non-change: Bhaskar (1978a: ch.2) specifies two criteria for closure:

- 1) There must not be any change of qualitative variation in the objects having causal powers, if the mechanisms are to operate with consistency – as qualitative change in the objects means that we will be dealing with other objects having different powers and mechanisms. This is the *internal condition for closure*.
- 2) The relation between the causal mechanisms in their environment, which influence their mode of operation and their effects, must be constant for the outcome to be regular; this is the *external condition for closure*.

[Original italics]

In Document 2 some of the causal mechanisms operating were found to be subject to considerable qualitative variation; and therefore do not operate consistently; and secondly, the relationships between these causal mechanisms was found to be anything but constant, therefore neither the construction industry nor higher education meets the criteria for a closed system. Collier (1994, p.122) in his consideration of Bhaskar's work (1978b) and open systems draws attention to Bhaskar's RRRE model:

Resolution: the process is analysed into its various causal components;

Redescription: granted that we have a background of theory about the various mechanisms operative in this open system, we can redescribe the causal components in terms of this theory. We will then be in a position to

Retrodict the causes of these components. However since we are in open systems, there may be any number of possible causes that could codetermine these events. We need to

Eliminate such of these as we can, by means of antecedent events.

... the RRRE model is meant to apply in all open-systemic disciplines.

Although it is not the intention of this quantitative project to follow this model as a method of explaining the complex causes for this project, as this project does not seek to establish, at this stage, the causes of the variation in construction industry employment or the variation in higher education recruitment. The principle of open systems in which both the construction industry and higher education exist cannot be overlooked, ignored or forgotten.

4.2.8 Conclusions

This chapter, the research methodology, has considered the methodological approach to be taken to the research. Appropriate research design is crucial to the success of any project and as this quantitative research project is part of a larger research project the research design and methodology should reflect this. The qualitative research project in Document 3 adopted the critical realist methodology and this chapter set considered whether the same methodology could be successfully applied to a quantitative project, giving a consistent research methodology throughout.

Saunders, Lewis and Thornhill's (2003) Research Process 'Onion' (see Figure 4.4) discussed in Document 2 was revisited to consider the position of critical realism in quantitative research. Both Sayer (1992, 2000) and Danermark *et al* (2002) consider that the critical realist methodology is applicable to quantitative research, normally considered the preserve of positivist methodology, and may in the context of social science be able to provide a wider perspective to quantitative research than that given by the positivist methodology. The structure of the relationships between the level of employment in the construction industry and the level of recruitment to construction industry related courses in higher education was considered and it was found that the nature of the relationships between them was substantive and internally asymmetric (Sayer, 1992; Danermark *et al*, 2002) as the construction industry can exist without

related courses in higher education, but the construction industry related courses in higher education cannot exist without the construction industry.

As this project used an a posteriori research concept it was also necessary to consider the mode of inference (Danermark *et al*, 2002) or what Saunders, Lewis and Thornhill (2003) term the research approach. Although the inductive approach was identified as the most appropriate strategy, aspects of other strategies might be considered appropriate at times, for as Saunders, Lewis and Thornhill (2003, p.88) advise:

‘not only is it perfectly possible to combine approaches within the same piece of research, ... in our experience it is often advantageous to do so.’

so where necessary this research project draws upon aspects of the other modes of inference or strategies.

Consideration of the methodology has drawn attention to one of the potential problems that can be encountered in quantitative analysis – that of the ‘spurious correlation’. The correlation tests that are employed with the data in Chapter 4.4 are such that they determine whether or not any relationships found are genuine or spurious. Finally consideration has been given to the nature of the systems within which the data exists. Both the construction industry and higher education are open systems with complex causal and generative mechanisms, thus favouring the critical realist methodology rather than the positivist research methodology requiring closed systems.

Thus it has been shown that the critical realist methodology can be successfully applied to a quantitative study, thus maintaining a consistent methodological approach for both the qualitative and the quantitative research projects undertaken.

The next chapter, Chapter 4.3: Research Method: Data Collection, discusses how the data required for the project was collected and collated for analysis in Chapter 4.4: Research Data Analysis and Findings.

4.3 Research Method: Data Collection

4.3.1 Introduction

This chapter will consider and discuss the data collection processes used for this report, and the method (software) to be adopted for processing the data.

The data collection for this report originally consisted of three main stems:

- Construction industry data
- Education data
- Demographic data

Figure 4.8 below shows the principal data collected and the main reports used for its collection.

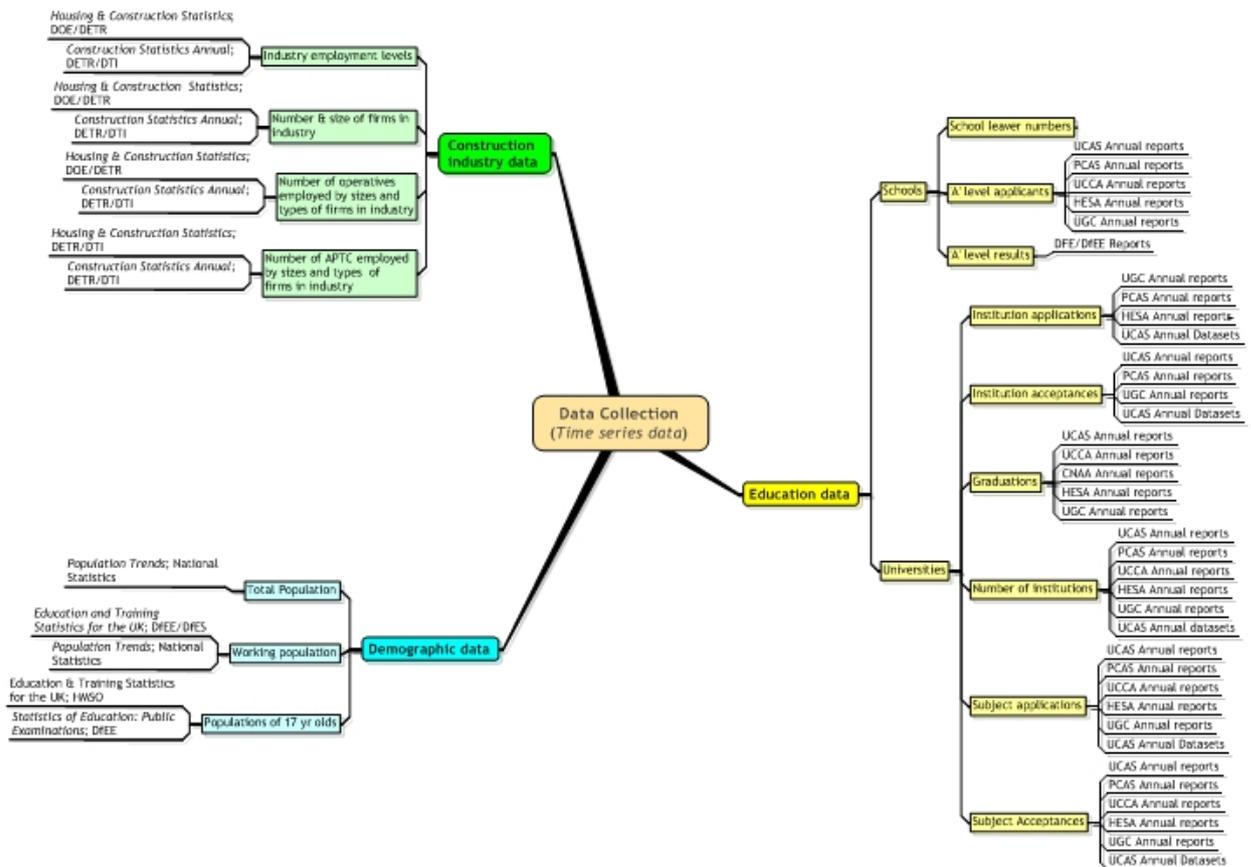


Figure 4.8: Data collection map

The data examined in this report consists of the total employment data for the construction industry and the total acceptances for universities. It is possible to subdivide and subcategorise both data sets into a variety of constituent groups.

The employment data has generally been categorised in a fairly consistent manner throughout its thirty-four year reporting period, and several reorganisations of its publishing bodies, and although occasional amendments to its data collection mechanisms and reporting procedures have taken place a consistent profile of the construction industry and its composition can be established. This will be further examined in Document 5.

The applications and acceptances data was subjected to a major reclassification of its reporting structure in 1995, when various subject groups were reclassified into new headings, with some pre-1995 subjects, e.g. 'Surveying', being divided among two or more categories, some of which are new, e.g. 'Building'. Thus a major discontinuity in the data series occurs. This makes a consistent approach to subject group analysis seem all but impossible as it cannot be established exactly what subjects within the groups were redistributed and what their associated numbers were. To undertake this would require access to the original raw data, and this is no longer available. This has resulted in this report taking a holistic approach to the employment, applications and acceptances data, particularly as with the acceptances data a longer time-series of consistent data cannot be established.

Many research projects rely on the use of either experiments, surveys or other tools for the collection of primary data. In this report the primary data comes from a number of published series of reports from government departments and agencies, which will form the primary data as there is simply no other source of this information. It is not possible, for example, for the author within the scope of this project and the resources available, to carry out a survey the construction industry to determine its composition and the number of employees. This task requires a large section of the DTI with all of its resources and several other organisations with all of

their resources working virtually full-time to collect, collate, process and publish this information.

4.3.2 Construction Industry Data

Given the extensive, fragmented and diverse nature of the construction industry it is perhaps surprising, but very fortunate, that because of the industry's economic significance to the UK economy there is a comprehensive collection of statistical material that has been published on a regular basis by the government through its Department of Trade and Industry, and its previous incarnations, since 1980. Prior to 1980 much of this data was either published in the public domain or supplied to the government for its own consumption and reports, on an ad-hoc basis by a number of bodies such as the CITB, DoEE, etc. This made pan-industry comparisons very difficult, due to the varying circumstances in data collection methods, data periods, and reporting procedures, not to mention the various agendas, political and otherwise, involved.

In 1980 the government of the day drew all the reports together, putting them on a common reporting basis. Since then reports have been published quarterly, with an annual consolidated report originally published under the title 'Housing and Construction Statistics', but since 2000 under the title 'Construction Statistics Annual'.

Each published volume contains industry data for the preceding eleven years, e.g. 1990 – 2000 inclusive, with the latest year's figures being in many instances provisional, whilst the previous ten year's figures are regarded as confirmed, albeit they are very occasionally subject to review and correction. Thus it has been possible to obtain a complete set of data for the construction industry covering the period 1969 to 2003 inclusive despite changes in governments and reorganisations of government departments producing the reports. Since 2001 the Construction Industry reports have been published online through the DTI's website www.dti.gov.uk/construction/stats/index.htm by selecting the menu item

‘Construction Industry Annual’¹. These reports are published annually in October of each year for the preceding year, and can be downloaded and saved, printed, etc., as they are in PDF format. During the period of the research to date the author has obtained copies of the 2002, 2003 and 2004 reports, but had missed the publication of the 2001 report. Surprisingly the DTI, unlike many other government departments, does not maintain an on-line archive facility holding copies of previously published reports. Enquiries to the DTI proved fruitful, and even though the DTI did not have a complete copy of the report for 2001, they did have copies of the individual chapters of the report in electronic format which they duly forwarded for the author to reassemble into a complete report, with the exception of the cover-page which had been ‘misplaced’.

The NTU library had an almost complete collection of the reports, with only two being ‘missing’. Fortunately copies of the two missing reports were quickly obtained through the inter-libraries loan service from the British Library collection, thus giving the author access to a complete set of reports for the construction industry.

In the twenty-six years in which these reports have been published there have from time to time been inevitable changes and improvements in data collection methods and reporting procedures, as well as changes in the constituent bodies that supply the data to the DTI for the report. These changes are well documented and recorded together with corrections and finalisation of provisional data. Thus a comprehensive profile of the industry can be created, notwithstanding the occasional step-change in the data sequence brought about by changes in data collection and reporting (e.g. 1965) when a clear step-change can be seen in employment levels due a change in the data collection method. The author also adopted a policy of using the earliest year’s data in each report to mitigate the effect, so far as possible, of provisional and amended data, thus, for example, the data for the year 1980 was taken from the 1990 report covering the period 1980 – 1990 (see Appendix 4.8.1).

¹ It is not possible to give the precise address for the reports as the URL for the report changes each year. For the 2004 report it is www.dti.gov.uk/construction/stats/csa2004.htm. This will change in October 2005 when the 2005 annual report for the year 2004 is published.

Although these changes were inconvenient in attempting to obtain consistent data they were also completely beyond the author's control, and therefore the decision, based largely on the complete absence of any other published data in this field, was taken to accept the data on an 'as published' basis. Providing that the basis for collection and reporting does not change significantly over the next year or two then future data can be added to that already collected to extend the analysis and either further validate or repudiate the hypotheses.

The collection of the employment data presented few real difficulties due to the completeness of the records, at least back to 1969. This was not the case with other data which often prove difficult to find, the quest for it leading to dead-ends, incomplete or discontinuous data series and, at times, very high levels of frustration. Although most of the data was presented in Document 2 it has been updated to include the data for 2003, and is included in Appendix 4.8.1.

4.3.3 Education Data

Educational data relating to applications and admissions to higher educational establishments (polytechnics and universities) was presented in Document 2 and was a part of the original comparison to construction employment data.

Data collection was sought for two distant areas of education:

- Higher education (H.E.) (universities and polytechnics).
- Secondary education (Schools, sixth form colleges and further education (F.E.) colleges).

4.3.3.1 Higher Education Data

Document 2 presented application and admissions (acceptances) data for universities for the period 1994 to 2002 which had been obtained from UCAS annual reports, UCAS itself only having been formed in 1994 from the amalgamation of PCAS and UCCA.

PCAS was only in existence for a period of eight years (1985 to 1993) publishing a total of eight Annual Reports giving comprehensive data about the applications and admissions to courses in polytechnics.

Prior to 1985 there was no coordinating body for polytechnics and each institution published its own reports. There was no standardised or collective method of publishing information about applications and admissions to polytechnics. The PCFC's reports concentrated on the financial and funding aspects of polytechnics. Thus there is little or no consistent data available on polytechnic applications and admissions prior to 1985.

Only eight PCAS annual reports were ever published, of which four were to be found in the NTU library statistics collection. Of the missing four reports only two were obtained from the inter-libraries loan service of the British Library, as even the British Library did not have a complete collection of these reports. UCAS was contacted by the author to enquire if they maintained an archive of PCAS records as UCAS had been formed from an amalgamation of PCAS and UCCA. The author was very surprised, but highly delighted to be told that they had all of PCAS's records in the UCAS archives and that the author could have free access to the UCAS archives for research purposes. Subsequently a long and exhausting day was spent at UCAS in Cheltenham trawling through the archives to complete the PCAS dataset. Although boxes of the PCAS reports were found in the archives the author was not permitted to remove any of them from the archives, and all the information required had to be entered into spreadsheets in the author's laptop computer.

UCAS's archives revealed many hitherto unknown reports and publications including some that might be of use to the author for Document 5, but it was also noted with some dismay that some of the UCAS record sets were incomplete as some of the report subscriptions held by PCAS and UCCA had been terminated and not renewed on the formation of UCAS. However the UCAS might prove to be a valuable source of data for future work and future visits might be required.

In order to try to extend the data about students in polytechnics prior to 1995 an alternative approach was considered; that of the number of graduates being produced from construction courses in these institutions. Polytechnics, unlike universities, did not award their own degrees, but were overseen by the CNAA which was the awarding body for the polytechnics. If CNAA reports of graduate levels and subjects could be obtained and aligned with the PCAS reports it might be possible to extend the polytechnic data back beyond the start of PCAS, and add it to UCCA data which has been available since the formation of UCCA in 1962, thus creating an HE data time-span at least equalling the length of records available for the construction industry. However on examination of UCCA reports it was found that they did not report graduation levels, but only applications and admissions data. University graduation levels however are reported by the UGC reports which were first published in 1982.

CNAA was disbanded in 1992 when the polytechnics became 'new' universities, and given self-awarding powers for degrees, in line with the 'old' universities. What therefore, had happened to the CNAA records? Enquiries with NTU's registry revealed that CNAA records had passed into the guardianship of the Open University. The OU were contacted with regard to the CNAA records they held, and whether these were accessible to researchers. The OU replied that they did indeed maintain guardianship of the archive of CNAA records, but only individual (personal) records of graduates had been retained, in order that individual awards could be verified or otherwise, but all other CNAA records and reports had not been retained. So far the author has only managed to locate one single copy of a CNAA annual report and that was found in the UCAS archives. It was disappointing to find that it summarised the awards on an annual basis only and that it did not contain a breakdown of awards by subject area, institution or any other category. The quest for CNAA reports has been terminated and this line of enquiry abandoned.

The author has therefore concluded that, at least for the foreseeable future, a comprehensive set of HE data prior to 1986 cannot or will not be established, and

therefore the data series cannot be extended back beyond this time. Thus the hope of matching HE applications and acceptances against earlier construction industry cycles of employment has had to be abandoned.

On a more positive note the HESA annual reports are now being published with an accompanying CD-ROM containing a large number of datasets in spreadsheet format, making location, abstraction and analysis of data easier. Some HESA data is also published on-line via the HESA website (www.hesa.org.uk).

UCAS also publish a number of datasets and data series on their website for public download. The UCAS website also contains limited facilities for users to query the databases and download specific datasets and data series to meet users' needs, but the author found this process rather cumbersome and slow. Useful information about applications and acceptance levels for subject groups can be obtained, but institution data is extremely restricted due to its sensitive commercial nature and the Data Protection Act. One of the problems encountered with some of the datasets was that in last few years these reports have been progressively expanded to include not only the 165 institutions with University status (as at 1993) but now include more than 200 other further education institutes which offer foundation degrees, franchised degrees, etc., that have to be applied for through UCAS. Consequently, for example, the 2003 dataset in spreadsheet format now contains more than 16,500 lines of data for applications and admissions to HE courses by subject category at any institution in the UK, and to exacerbate the problem of data extraction the data is published as a contiguous block. Data sets are currently published for the period 1994 to 2003, and the author estimates that it takes sixteen to twenty hours of work to extract and collate the data in these series, for each subject group such as group K2 (Building). The author however believes that the development of macros for these spreadsheets would dramatically reduce this time by automating the abstraction and collation process.

In all the reports published so far it has not been possible to extract data relating to civil engineering courses (group H2) as these are inevitably embedded within the general group (group H) for engineering courses.

Due to the subject review now being undertaken in the new School of the Built Environment in the new College of Art and Design and Built Environment at NTU there has suddenly become a need for both the College and School to have data about the market composition of HE provision for built environment courses, including the construction industry courses. The College have (December 2004) agreed to purchase data from UCAS which will provide data not previously available to the author, and will provide the applications and admissions data for NTU since the formation of UCAS. UCAS further state that they have paper based records on NTU applications and acceptances available for the PCAS period in their archives. As the author has an open invitation to visit the UCAS archives another visit will be arranged to try and locate and extract this data. The data which has now been received and analysed by the author for the School and College, is not of immediate importance for this report but will be of considerable use in Document 5 as part of an intended market analysis. The author has noted however that he did not come across any of these records for any institution during the original visit to UCAS.

UCAS advised that they cannot, for commercial confidentiality reasons, supply data about applications and admissions to other institutions, other than that they publish in their reports. However they did advise that HESA might be able to supply this data. HESA were contacted and they advised that they were able to supply a breakdown of institutional applications and acceptances for the built environment subject areas, which the College has agreed to purchase. This data had been ordered, but at the time of writing (February 2005) has not yet been received. Like the UCAS data it too is intended to form part of a market analysis in Document 5.

A number of other reports published by the DfES and or in conjunction with the National Statistics Agency were examined, but were found (in terms of gathering primary data) to contain only secondary or tertiary data that they had obtained from

UCAS and or HESA, often as summary reports, which had been subsequently précised and republished.

4.3.3.2 Secondary Education Data

Although the secondary education data and its analysis were originally considered for this report it will now be included in document 5 as part of the market analysis.

The data collected, and still being collected, about secondary education in schools, sixth form colleges and colleges of further education is:

- The numbers of pupils gaining ‘A’ level or equivalent entry qualifications for higher education.
- The numbers (population) of pupils taking ‘A’ levels or equivalent

It was hoped that this data would provide an indication to the potential ‘feed’ into higher education, i.e. the potential intake population. Given the amount of publicity the ‘A’ level results attract each year the author was of the initial opinion that the collection of this data would present few if any problems. Unfortunately it was to prove to be the most frustrating and difficult of the data collection processes.

The time span over which data was required was to be at least equal to the time span of the available data for higher education recruitment, in order that the number of seventeen year olds eligible for HE education could be established and compared to the numbers actually entering higher education each year. Seventeen years of age was the bench mark for ‘A’ level candidates in schools used by many government reports, and was adopted for this study. Other reports giving the entire populations of ‘A’ level or equivalent candidates were also taken into account.

It was found that much of this data was not as readily available as perhaps might be expected. Due to the high profile given to education, and especially ‘A’ levels, in the political arena, the government’s educational agencies have been subject to a number of reforms, reorganisations and renaming during the time-span for which data was

required. It was found that these discontinuities inevitably led to discontinuities in publication of education data, with report series appearing, disappearing, subject to regular changes in reporting methods, and data periods. Although these problems were inconvenient they could mostly be overcome, but one of the largest problems encountered was the changes in the 'A' level grading systems from the traditional grades to a points system in 2000 and also the introduction of the 'AS' levels which are regarded and scored as half an 'A' level in points terms. The introduction of 'A' level equivalents in the form of vocational awards such as GNVQ also complicates the collection and abstraction of education data on a consistent basis.

Of the Statistics for Education series that were required for some of the 'A' level data a total of eight reports were published in the series from 1994 to 2000. This data is now incorporated into other similar reports with similar titles, e.g. *GCE/VCE A/AS Examination results for young people in England 2002/3*. Only six of these reports were to be found in the NTU library statistics collection. The missing two had to be requested through the inter-library loan service. The British Library statistics collection contained one of the missing reports, but not the first report in the series. A copy of this was eventually traced in the Cambridge University library, and obtained through the inter-library loans service; albeit with the caveat that it could not be taken out of NTU's library.

Data collection in this area is ongoing, and reports collected to determine the secondary education profile for use in Document 5.

4.3.4 Demographic Data

The purpose of collecting demographic data was to be able to establish:

- the total population of the UK,
- the working population of the UK,
- the population of 17 years olds in the UK

during the years for which employment and acceptances data had been collected, thus enabling comparisons and adjustments to be made for variations in populations.

Like the secondary education data, demographic time-series data also proved to be difficult to obtain in consistent form, not least because of the difficulty in collecting and collating information on population, and as such any population figures found in various reports always had to be treated with caution as two different reports could give two very different population figures, yet both would quote the same official source.

Whilst it is understandable that population figures are in a constant state of flux due largely to births, deaths, immigration and emigration (both legal and illegal), not only are the reported figures generally estimated, but most reports heavily round off the figures, sometimes to the nearest thousand head of population, others to the nearest five or ten-thousand.

Because of the difficulty government agencies and departments have in collecting and collating the population data the published reports often publish their figures anywhere between two and four years in arrears (e.g. National Statistics: Population Trends 2004) giving estimates or forecasts for the intervening periods.

4.3.5 SPSS Statistical Analysis Package

In order to carry out the statistical analysis the use of computer software was required. A number of packages were readily available to the author including SPSS, MINITAB and Excel. The author had no experience of using either SPSS or MINITAB, but quite a lot of experience of using Excel. It was quickly evident to the author that whilst Excel would be a useful tool for collating a lot of the data, carrying out simple analysis and producing graphs, and creating the spreadsheets necessary for the detailed analysis would be time-consuming and perhaps more complex than the author would wish, or indeed had time for. Additionally all the functions necessary might not be available in Excel.

The SPSS statistical analysis package was selected as the software tool for executing the statistical analysis of the data as all the necessary tests are incorporated into the package, enabling analyses to be easily carried out without the necessity to construct complex Excel spreadsheets, macros and graphs, or use a variety of other statistical packages. SPSS also has the advantage of outputting tabulated and graphical data which can easily be captured through the Windows environment for incorporation into other documents such as Word. Whilst these features are also present in many other statistical packages the deciding factor to use SPSS was its ability to handle gaps in data, i.e. where a data series is incomplete. This was to be invaluable in the initial stages as not all the data series were complete, although gaps in these were eliminated when all data was eventually located and collected. This feature however also made the data processing easier in the final analysis as one large data entry sheet could be created containing all the offset periods for each set of data (see for example Appendix 4.8.3), rather than having to create separate data-entry sheets for each and every iteration of each data set. The package used was SPSS for Windows v.12.0.1.

An additional advantage to the author was that there appeared to be a number of excellent publications on the use of SPSS in business and social science environments, whilst those available for MINITAB seemed to be of a much more basic tutorial nature, and far fewer in number.

4.3.6 Conclusions

The data used for this project is based entirely upon a variety of publications from authoritative sources such as government reports (DTI and predecessors), higher education reports published by UCAS, HESA and their predecessors, and a variety of other reports for secondary education and population data. The problems in collecting the data, which is time series in nature, have been discussed in some detail. The collection of this will not cease with the conclusion of this project but will continue, not only for use with Document 5, but also in the case of the construction industry data through the author's general interest in the development and evolution of the structure and composition of the construction industry.

In the previous chapter, Research Methodology, the critical realist approach was adopted for this project, yet it would initially seem that the data collection method was entirely positivist in its approach. However this does at least have the advantage that such data is generally ‘theory or concept neutral’ (Sayer, 1992) but this is not in itself without risk as Sayer (1992, p.52) points out:

Social scientists who treat ‘data’ literally as ‘given things’ (often those scientists who feel most confident about the objectivity of their knowledge and the ‘hardness’ of their facts) therefore unknowingly take on board and reproduce the interpretations implicit in the data: they think *with* these hidden concepts but not *about* them. [Original italics]

Thus the data, although independently collected and published, may not in itself be value or concept neutral, as it will inherently reflect the values and concepts of those who collected the data and those who published it. The extent of this value and concept bias can never be established due to the remoteness, both in time and proximity, of the collectors and publishers from the author.

4.4 Research Data Analysis and Findings

4.4.1 Introduction

As the focus of this project is the examination of an apparent association between the level of employment in the construction industry and the level of recruitment to construction industry related courses in higher education a number of statistical tests were applied to the data test the association. These were:

- 1 Normality tests
- 2 Correlation tests
- 3 Regression analysis: Curve Fitting

Following the data collection whereby additional employment and acceptances data was obtained it was possible to extend the acceptances dataset back to 1987 (the formation of UCAS) and both datasets had the data for 2003 added. Therefore, the graph of employment and acceptances (see Figure 4.1) was updated and is shown in Figure 4.11 below.

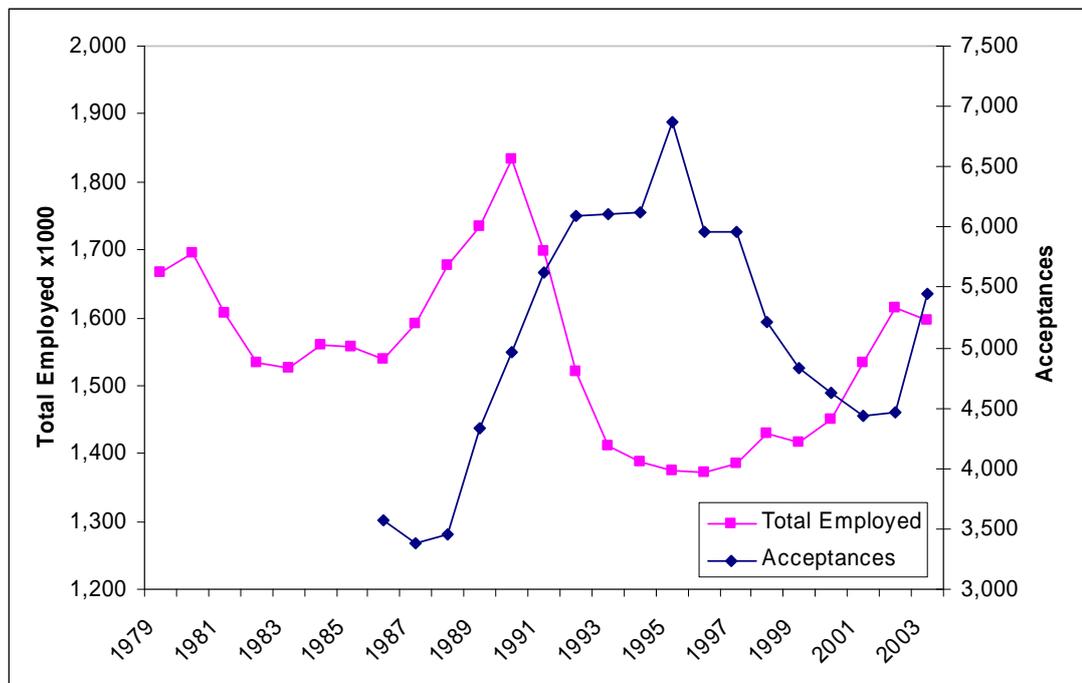


Figure 4.11: Graph of total employment v. Acceptances

It should be noted that employment data levels in Figure 4.11 show only the period 1979-2003, not the full period 1969-2003 for which data is available, (see Appendix 4.8.1).

As the data also exhibits the cyclical characteristics of the construction industry reflecting its 'boom and bust' nature, the data was tested in a manner reflecting these cycles. One of the problems envisaged was that, whilst a good set of data existed for the construction industry over a thirty-five year period from 1969 to 2003 covering a number of cycles of inflationary 'boom' and deflationary 'bust', higher education recruitment data is only available for an eighteen year period from 1986 to 2003. This does however cover one complete cycle of inflation and deflation, as well as the tail-end of the preceding deflationary cycle, and the commencement of what is hoped to be the next inflationary cycle in the construction industry. This will enable tests to be carried out on recruitment using the following employment periods:

- 1 Full data set from 1986 to 2003
- 2 The complete inflationary period 1987 to 1995
- 3 The complete deflationary period 1995 to 2001
- 4 All inflationary periods 1987 to 1995 and 2001 to 2003 combined
- 5 All deflationary periods 1986 to 1987 and 1995 to 2001 combined

In many of the statistical tests carried out, that are discussed later in this chapter, an iterative process of 'stepping back' the acceptances data (offsetting) is undertaken. In these cases the acceptances data is incrementally offset by a period of one year at a time, effectively moving the acceptances curve backwards one year at a time and, with each iteration, comparing the acceptances curve with the corresponding employment curve. The graphs of iterative curves for the five acceptances and employment data sets identified above for testing are shown in Figure 4.12 overleaf, and the datasets are to be found in Appendices 4.8.3, 4.8.10, 4.8.12, 4.8.14 and 4.8.16 respectively.

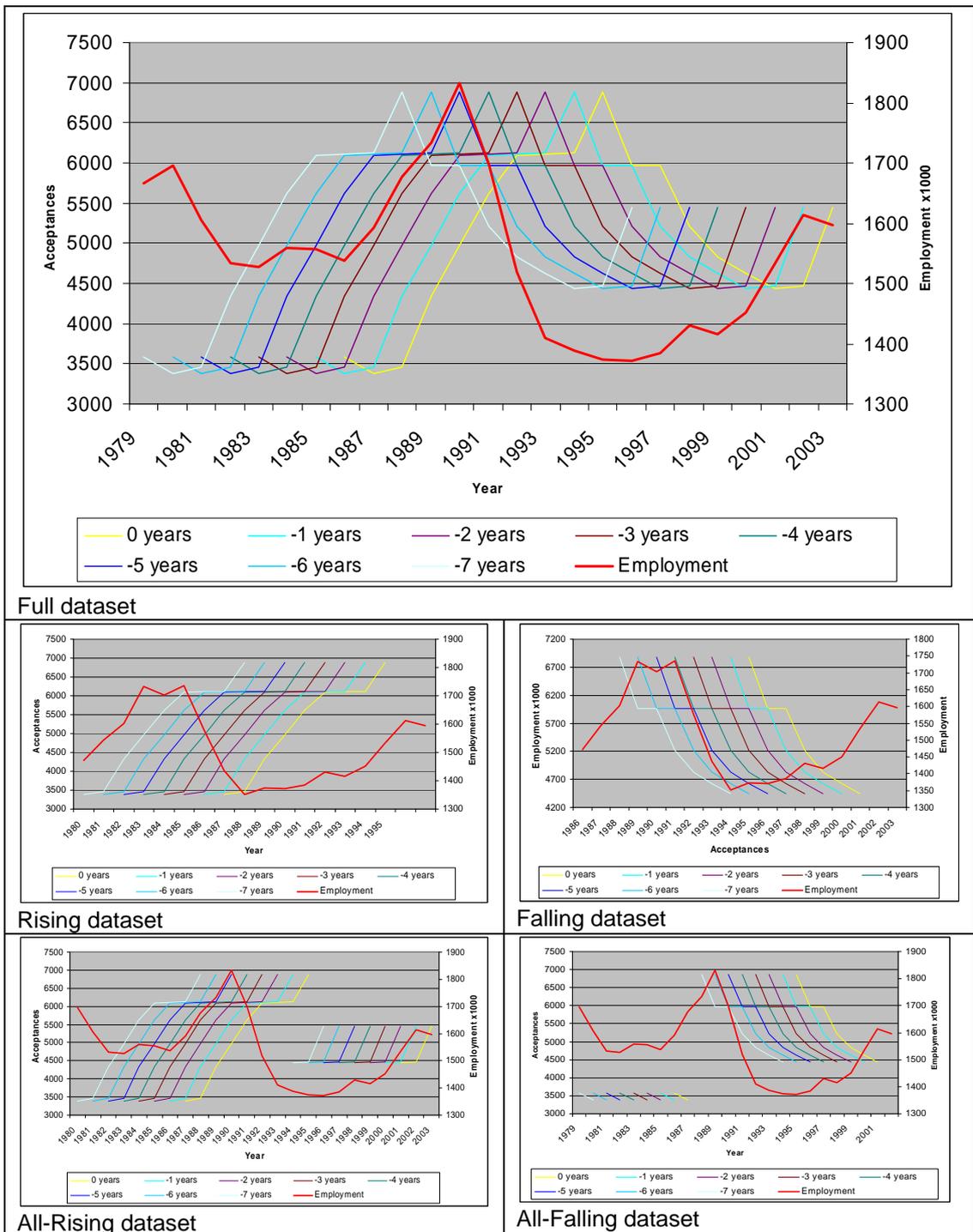


Figure 4.12: Graphs of the incremental offset periods

This also establishes whether or not the inflationary cycle and the deflationary cycle have differing characteristics, i.e. do they cover the same time-span as the normal cycle, or do they possess different characteristics and time spans? As has been mentioned earlier, the two curves (employment and recruitment) appear to be offset

by a number of years, i.e. changes in employment levels are reflected in changes in recruitment levels several years later.

In this analysis acceptances (the dependant variable) have been compared to employment levels (the independent variable), and if a graph of these were to be produced the natural tendency would be to plot acceptances against employment levels (dependent variable against independent variable), thus acceptances on the Y-axis and employment level on the X-axis (shown in Figure 4.13 below)

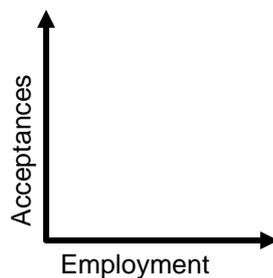


Figure 4.13: Acceptances v. Employment

i.e. acceptances (y) is proportional to some function of employment (x)

$$y \propto f(x) + c$$

However in this analysis this is not the case as employment is compared to acceptances, thus employment is the Y-axis and acceptances the X-axis as shown in Figure 4.14 below.

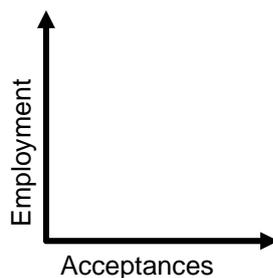


Figure 4.14: Employment v. Acceptances

The reason for this is that the data-series that is to be considered for acceptances, having eighteen year's data, is very much smaller than the data-series for employment which contains thirty-five year's data, and with each of the iterations of the analysis a different set of employment data is compared to a fixed set of acceptances data.

A visual inspection of the graph for the full data set in Figure 4.12 suggests that as the changes in recruitment lagged changes in employment by around five years it would be necessary to retrospect beyond this time by two or three years to test for de-correlation, thus a total of eight iterations were performed, from nil to minus seven years. Appendix 4.8.3 shows the two sets of data to be correlated and the actual data sets correlated for each iteration. Statistical correlation tests were carried out to establish the actual amount of this time lag or offset as part of the data analysis process.

4.4.2 Normality testing.

The first step in carrying out the analysis was to establish the nature of the data in order that the correct tests could be applied, as it was necessary to establish whether the data was parametric i.e. having the characteristics of normal distribution, or non-parametric i.e. not having the characteristics of a normal distribution (Zikmund, 2003). Both the employment and recruitment data are time series, i.e. annual amounts, something not usually associated with normally-distributed (parametric) data. However the data within the time series was known to have some cyclical characteristics, and therefore could exhibit some characteristics associated with parametric data. It was therefore essential to establish whether or not the data was parametric in nature, and therefore which tests could or could not be applied to it.

Field (2000, p.37) gives the assumptions necessary to be true for data to be parametric.

1. Normally Distributed Data: It is assumed that the data are from a normally distributed population.
2. Homogeneity of Variance: The variances should not change systematically throughout the data... In correlations this means that the variance of one variable should be stable at all levels of the other variable.
3. Interval Data. Data should be measured at least at the interval level. This means that the distance between the points on your scale should be equal at all points along the scale.

4. Independence: ...data from different subjects are independent, which means that the behaviour of one participant does not influence the behaviour of the other.

As Field comments, the assumptions of interval data and independence can only be tested by common sense. In the case of the third test, the interval data, this case was valid (true) as the data (number of persons) was consistent throughout. For the purposes of this project for test four, it could not be assumed that employment and recruitment were independent of one another, and that a change in the employment level itself does not generate a change in the level of recruitment. Although they both respond to the same external environmental pressures and changes, albeit at different times, the level of employment was established in Document 3 as one of the weak causal factors in the attractiveness of the industry to potential applicants. Test four is therefore invalid (false).

Testing for normality (normally distributed data) was carried out using two statistical analysis tests for normality:

- The Kolmogorov-Smirnov² test³. (K-S test)
- The Shapiro-Wilk test. (S-W test)

Both Field (2000) and Glass and Hopkins (1996) recommend the use of these tests, but neither of these authors gives much by way of explanation of these techniques other than the Shapiro-Wilk test is generally more accurate than the Kolmogorov-Smirnov test, and that these tests are very much more relevant for testing for normality than the traditional t-test, etc. Both the Kolmogorov-Smirnov test and the Shapiro-Wilk test are available within SPSS that was used to perform the analysis.

4.4.2.1 The Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) Test

The K-S test is referred to by many authors (e.g. Field, 2000; Saunders, Lewis and Thornhill, 2003; Danley and Reidy, 2004) as a reliable way of testing data for

² This is usually abbreviated to the K-S test.

³ Glass & Hopkins also note that this is sometimes referred to as the Lillefors test.

normality. A description of the test can be found in Appendix 4.8.6. The data for employment levels and recruitment levels was entered into SPSS and both sets of data tested for normality using the K-S and S-W tests. The output from SPSS is shown in Table 4.2 below:

Table 4.2: K-S and S-W statistics

| | Kolmogorov-Smirnov test (Lilliefors Significance Correction) | | | Shapiro-Wilk test | | |
|------------------------------|---|----|--------|-------------------|----|-------|
| | Statistic | df | Sig. | Statistic | df | Sig. |
| Employment Offset 0 years | 0.161 | 18 | 0.200* | 0.919 | 18 | 0.124 |
| -1 years | 0.156 | 18 | 0.200* | 0.918 | 18 | 0.117 |
| -2 years | 0.151 | 18 | 0.200* | 0.911 | 18 | 0.089 |
| -3 years | 0.150 | 18 | 0.200* | 0.911 | 18 | 0.088 |
| -4 years | 0.157 | 18 | 0.200* | 0.916 | 18 | 0.109 |
| -5 years | 0.128 | 18 | 0.200* | 0.936 | 18 | 0.243 |
| -6 years | 0.135 | 18 | 0.200* | 0.940 | 18 | 0.290 |
| -7 years | 0.127 | 18 | 0.200* | 0.954 | 18 | 0.500 |
| Acceptances | 0.138 | 18 | 0.200* | 0.952 | 18 | 0.454 |

* Lower bound of significance (SPSS)

For the employment data with an offset of 0 years, it can be seen that the K-S statistic is 0.161 for a sample size of 18 (year's data). The significance is shown as having a lower bound of 0.200, i.e. it has a probability of less than 20% of being normally distributed. By reference to K-S Statistic table in Appendix 4.8.4 it can be seen that a K-S statistic of 0.309 or greater for a sample size of 18 would have been required to obtain a 95% probability of the data being normally distributed. Similarly considering the period 'offset -5 years' when the greatest 'match' seems to appear then a K-S statistic of 0.128 is obtained. This is still significantly outside the 95% probability limit required for normal distribution.

For the acceptances data a K-S statistic of 0.138 was obtained. Again SPSS reports that this is below the lower bound of 0.200 (less than 80% probability). A K-S statistic of 0.309, as above, would have been required for a 95% probability of the data being normally distributed. Foster (2001:101) does give some clues as to the Shapiro-Wilk test, for example that it is best used with sample sizes less than 50, and also gives a caution that:

.... with large sets of data non-perfect distribution is almost certain to occur and so the interpretation of these tests should be treated with caution. The visual displays [graphs] indicate how non-normal the distribution is.

but does not define how large a ‘large’ set of data is. Sprent and Smeeton (2001, p.102) also make mention of the test suggesting a maximum sample size of 30, but do not expand upon this other than to state:

... the Shapiro-Wilk test ... has good power against a range of alternatives, but the rationale is less easy to describe by intuitive argument.

For the Shapiro-Wilk test for the same offset periods as above it can be seen that S-W statistics of 0.919 and 0.936 respectively are obtained, providing significances of 12.4% and 24.3% probabilities of being normally distributed data. By reference to the S-W statistics table in Appendix 4.8.5 it can be seen that an S-W statistic of greater than 0.982 would have been required to give a greater than 95% probability of the data being normally distributed. Again for the acceptances data an S-W statistic of 0.952 was obtained giving only a 45.4% probability of the acceptances data being normally distributed. An S-W statistic of 0.982 would be required for a 95% probability of the acceptances data being normally distributed.

4.4.2.2 ‘Stem and Leaf’ Plots.

Additional output from SPSS in the form of ‘Stem and Leaf’ plots provides further evidence of the data sets not being normally distributed. The output data is shown in Figure 4.15 for the employment data and Figure 4.16 for the acceptances data. Appendix 4.8.7 gives the tabulated data output for employment. Only single output is required for the acceptances data as the dataset remains constant with each iteration, whilst an output is required for each iteration for the employment data. The tabulated data for the ‘stem and leaf’ plots for acceptances is given in Appendix 4.8.8.

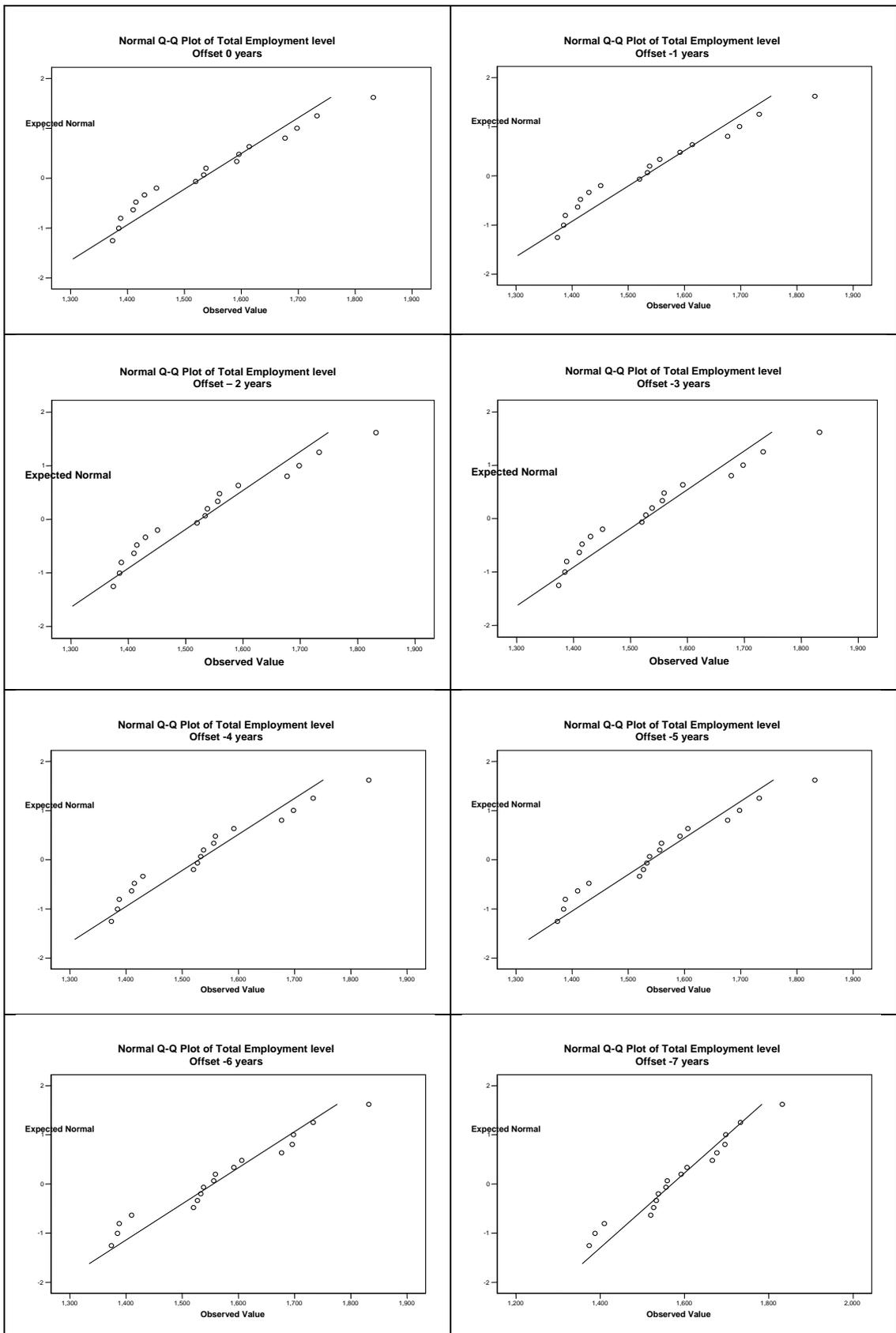


Figure 4.15: ‘Stem and Leaf’ Normal Q-Q Plots for Employment data

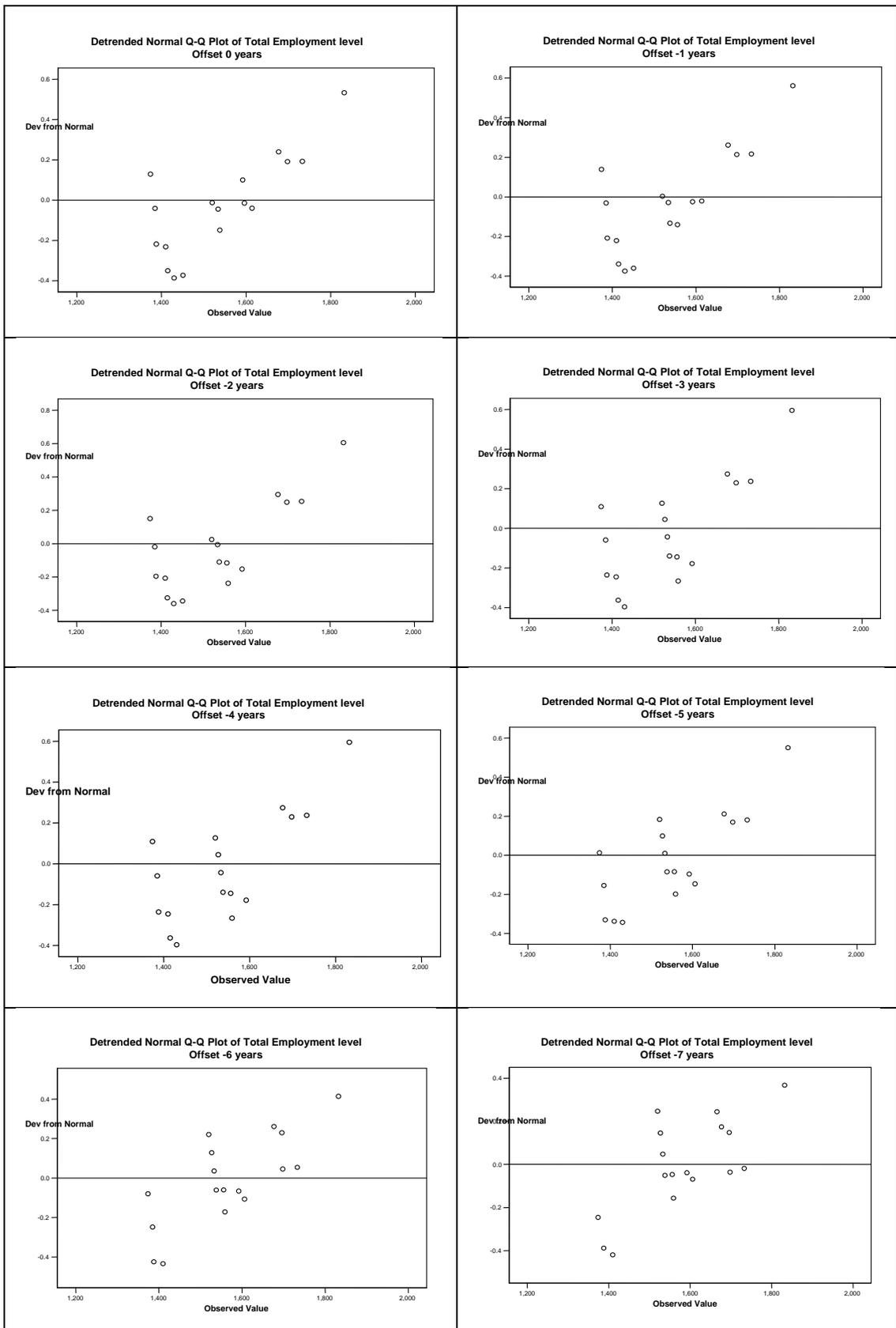


Figure 4.16: 'Stem and Leaf' Detrended Normal Q-Q Plots for Employment data

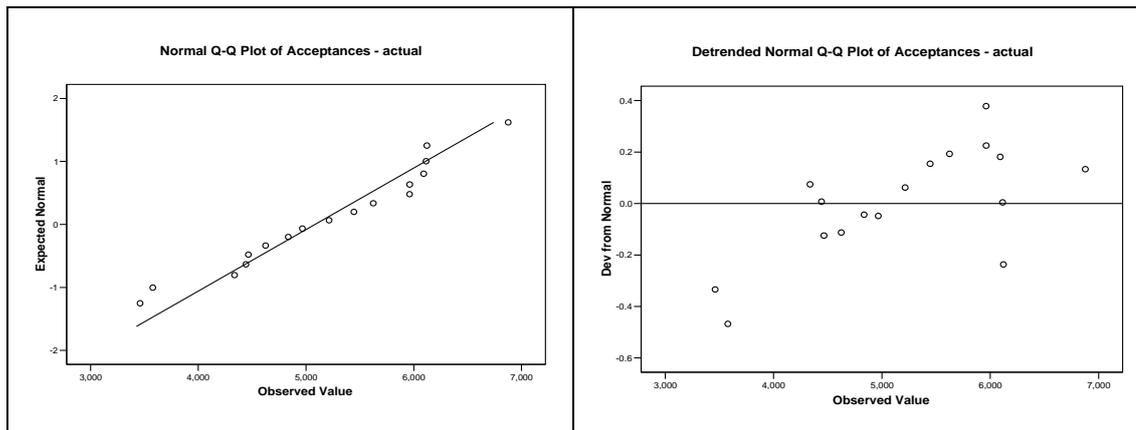


Figure 4.17: ‘Stem and Leaf’ Normal Q-Q Plot, and Detrended Normal Q-Q plot for Acceptances data.

In Normal Q-Q plots the diagonal line represents the line along which the data would be expected to lie if it was normally distributed. If the data does not lie along the line, as can be seen in these plots for employment and acceptances, then the data is not normally distributed. The extent to which the data varies from that which would be expected for normality is given by the Detrended Normal Q-Q plot. Normally distributed data would lie along the horizontal line. Here it can be seen that this is considerable deviation for the normal line and therefore it can be concluded that neither data set is normally distributed.

4.4.2.3 Box-plots⁴.

Bryman and Cramer (1997) provide a useful explanation of the box-plot diagrams:

The box-plot diagram also provides information about the shape and distribution of the data. The more ‘off-centre’ the box is the less normally distributed the data is and the more off-centre the median is, the more skewed the distribution is (see Figure 4.18 overleaf).

⁴ Box-plots are also sometimes known as ‘box and whisker’ diagrams.

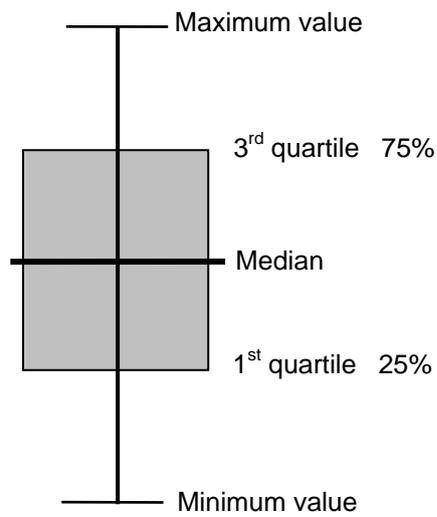


Figure 4.18: The Box-plot output

Figure 4.19 below gives the box-plots for the acceptances data and Figure 4.20 overleaf gives the box-plot for the employment data.

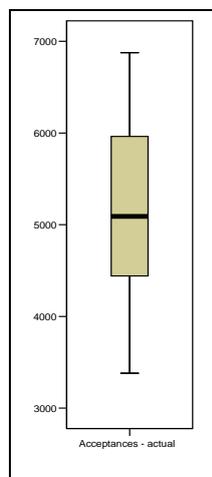


Figure 4.19: Box-plot for Acceptances data.

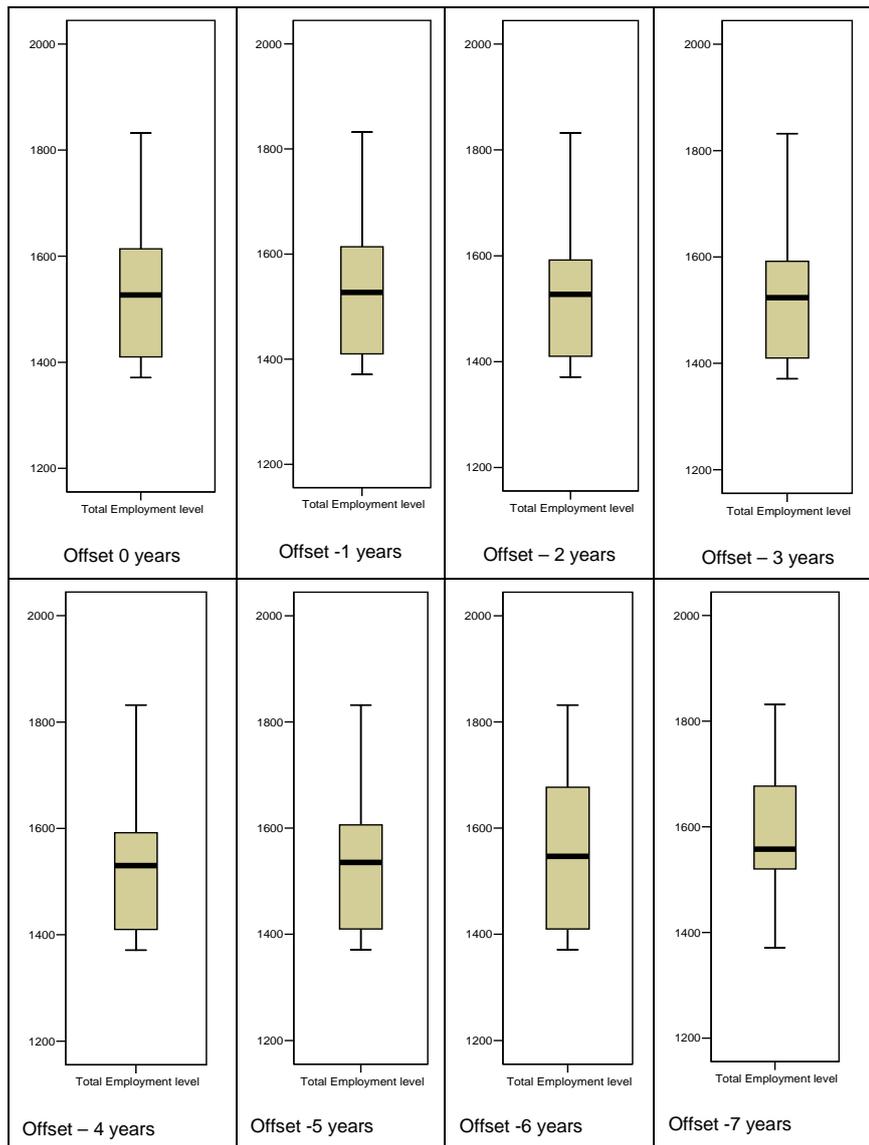


Figure 4.20: Box-plots for Employment data.

In both the employment and acceptance data it can be seen that the data is not normally distributed, and in some instances markedly skewed.

4.4.3 Homogeneity of Variance testing.

To test for homogeneity of variance both Foster (2001) and Field (2000) recommend the use of Levene's Test. Foster also suggests that a visual inspection of the variances might be carried out, but warns against it due to the risk of misinterpretation.

Field (2000, p.238) states:

'Levene's test... is similar to a t-test in that it tests the hypothesis that the variances in two groups are equal ... Therefore if Levene's test is significance at $\rho \leq 0.05$ then we can conclude that the null hypothesis is incorrect ... therefore the assumption of homogeneity of variance has been violated. If however Levene's test is significant (i.e. $\rho > 0.05$) then we must accept the null hypothesis is incorrect... the assumption is tenable.'

i.e. in the Levene's test if a statistic of $\rho \leq 0.05$ is obtained then it can be concluded that the variances are significantly different and non-homogenous. A statistic of $\rho > 0.05$ indicates that the variances are not significantly different and therefore homogenous.

Attempts to run the Levene's test in SPSS proved unsuccessful, with SPSS reporting the following '*Test of homogeneity of variance cannot be performed for Total Employment level because the sum of the caseweights is less than the number of groups.*' At the time of writing the author is still trying to obtain an explanation of this. However the variance of the data sets was given in the normality test outputs and these are shown in Table 4.3 below:

Table 4.3: Variances for Employment and Acceptances Data

| Employment variances | | Acceptances variance | |
|----------------------|-----------|----------------------|-----------|
| Offset years 0 | 19549.176 | No Offset | 1047227.5 |
| -1 | 19332.183 | | |
| -2 | 18948.801 | | |
| -3 | 18944.706 | | |
| -4 | 18601.163 | | |
| -5 | 18046.265 | | |
| -6 | 18519.154 | | |
| -7 | 17276.693 | | |

Here it can be seen that the variance for the employment data does not possess homogeneity of variance, therefore the test for homogeneity has shown the variance to be non-homogenous, and thus the second test for parametric data has been found to be false.

4.4.4 Correlation testing.

In order to establish whether or not there is any correlation between the construction industry employment levels and higher education recruitment levels a number of correlation tests would have to be applied to the data. The nature of these depended on the normality of the data as discussed in 4.3.1.

For parametric data the principle correlation test is:

Pearson's Correlation Coefficient

and for non-parametric data the principle correlation tests are:

Spearman's Rank Correlation Coefficient test. (Better known as Spearman's Rho (r_s) test.)

Kendall's Rank Correlation Coefficient test. (Better known as Kendall's Tau (τ) test.)

As three of the four tests have proven false, thus establishing the data as non-parametric, only the latter, Spearman's Rho and Kendall's Tau tests can be carried out. These tests would be carried out for a number of instances or iterations with the recruitment data being incrementally 'stepped-back' one year at a time, thus progressively reducing the apparent offset at each iteration. The data would then be tested for correlation with each iteration.

4.4.5 Scatter-plots.

The first stage in any correlation process is the production of scatter-plots (also known as scatter diagrams) for each of the data sets. Field (2000) draws attention to the importance of this stage in correlation testing in order to look at the general trend of the data and to look for any ‘outliers’, those cases that differ substantially from the general trend of the data as these can severely bias the correlation coefficient.

Only a simple scatter-plot is required as there are only two variables being correlated, employment and recruitment (acceptances).

4.4.5.1 Data Set: Full Period 1986 - 2003: Figure 4.21 overleaf shows the scatter-plots obtained for the full dataset. In these plots employment is plotted on the Y-axis and recruitment on the X-axis. The ‘step’ is the number of years the acceptance have been stepped back against the employment data to test the correlation, thus establishing the period of lag between a change in employment and a change in recruitment levels, i.e. which period provides the best fit.

Here it can be seen that using the full acceptances data set the best correlation is obtained at -5 years, i.e. a change in employment levels will be reflected in a change in acceptance levels 5 years later. It is important to remember that the change in employment level is NOT the cause in change in levels in recruitment, merely that the causal factors that cause a change in level in employment are reflected in a change in acceptances 5 years later.

4.4.5.2 Data Set: Inflationary Period 1987 to 1995: Figure 4.22 overleaf shows the scatter-plots for the inflationary period of the cycle from 1987 to 1995.

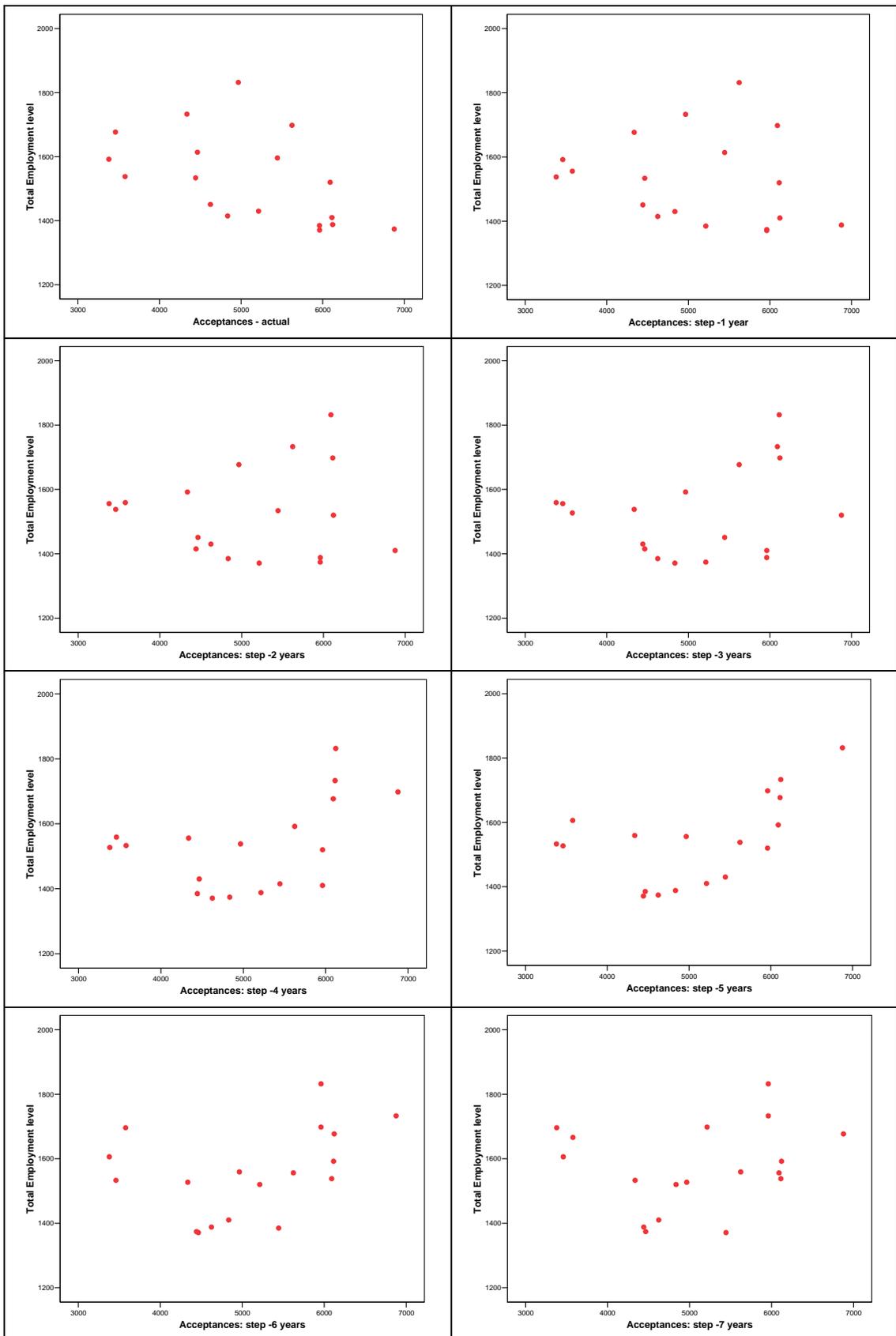


Figure 4.21: Scatter-plots for full data set.

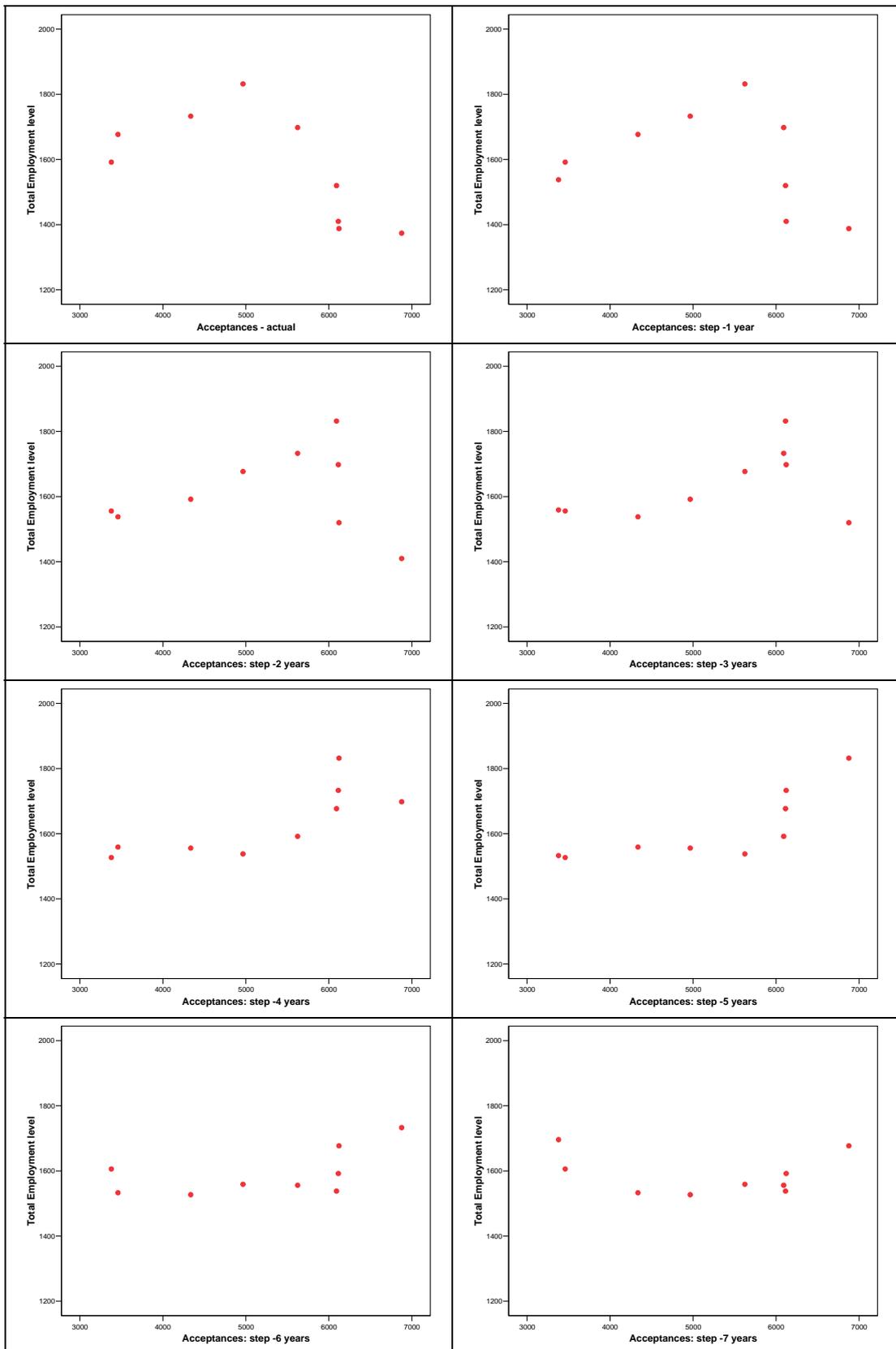


Figure 4.22: Scatter-plots for inflationary period 1987 to 1995

Here it is not easy to determine where the best correlation lies, offsets of -4, -5, -6 and -7 years all exhibit characteristics of good correlation, therefore further statistical testing is needed to establish which, if any, offset has the best correlation.

4.4.5.3 Data Set: Deflationary period 1995 to 2001: Figure 4.23 shows the scatter-plots for the deflationary cycle period 1995 to 2001. Again there is some difficulty in determining the best correlation with offsets of -4, -5 and -6 years exhibiting good correlation characteristics. Again statistical testing needed to be employed to determine the best correlation(s).

4.4.5.4 Data set: Inflationary periods 1987 to 1995 and 2001 to 2003: The scatter-plots for this data set are shown in Figure 4.24 overleaf covering the inflationary periods of 1987 to 1995 and 2001 to 2003, thus one full inflationary cycle already examined is included to which has been added the start of the current inflationary cycle.

The addition of three additional years' data can be seen to make a significant difference to the scatter-plots, with offsets of -5 (and -6) years having the clearest correlation. Once again statistical tests will be needed to determine the strongest correlation.

4.4.5.5 Data set: Deflationary Periods 1986 to 1987 and 1995 to 2001:

Conversely to the above, Figure 4.25 shown overleaf, shows the scatter-plots produced for the deflationary cycle period of 1995 to 2001, as previously, with the addition of the tail-end of the previous deflationary cycle data for 1986 to 1987.

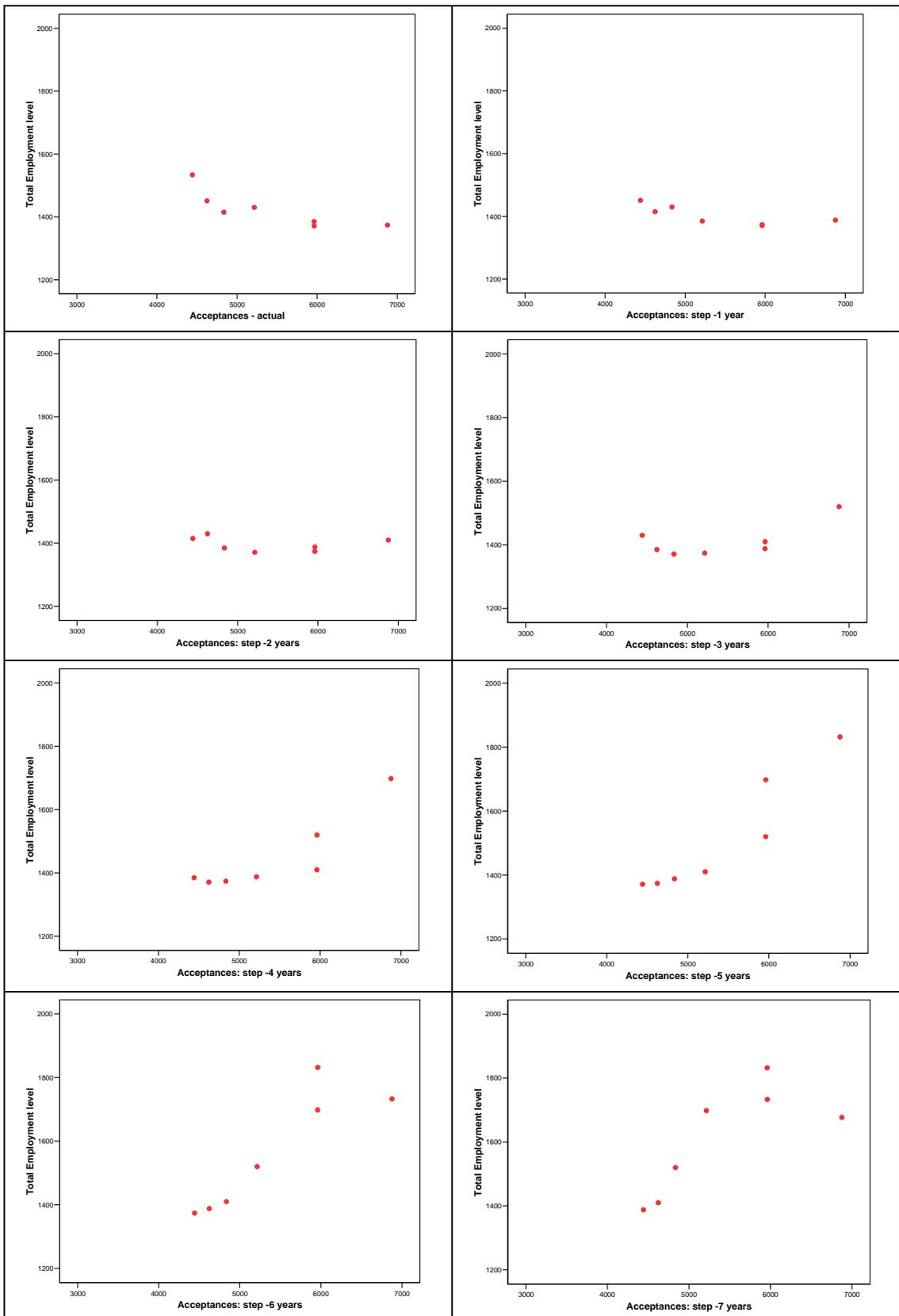


Figure 4.23: Scatter-plots for Deflationary Period 1995 to 2001.

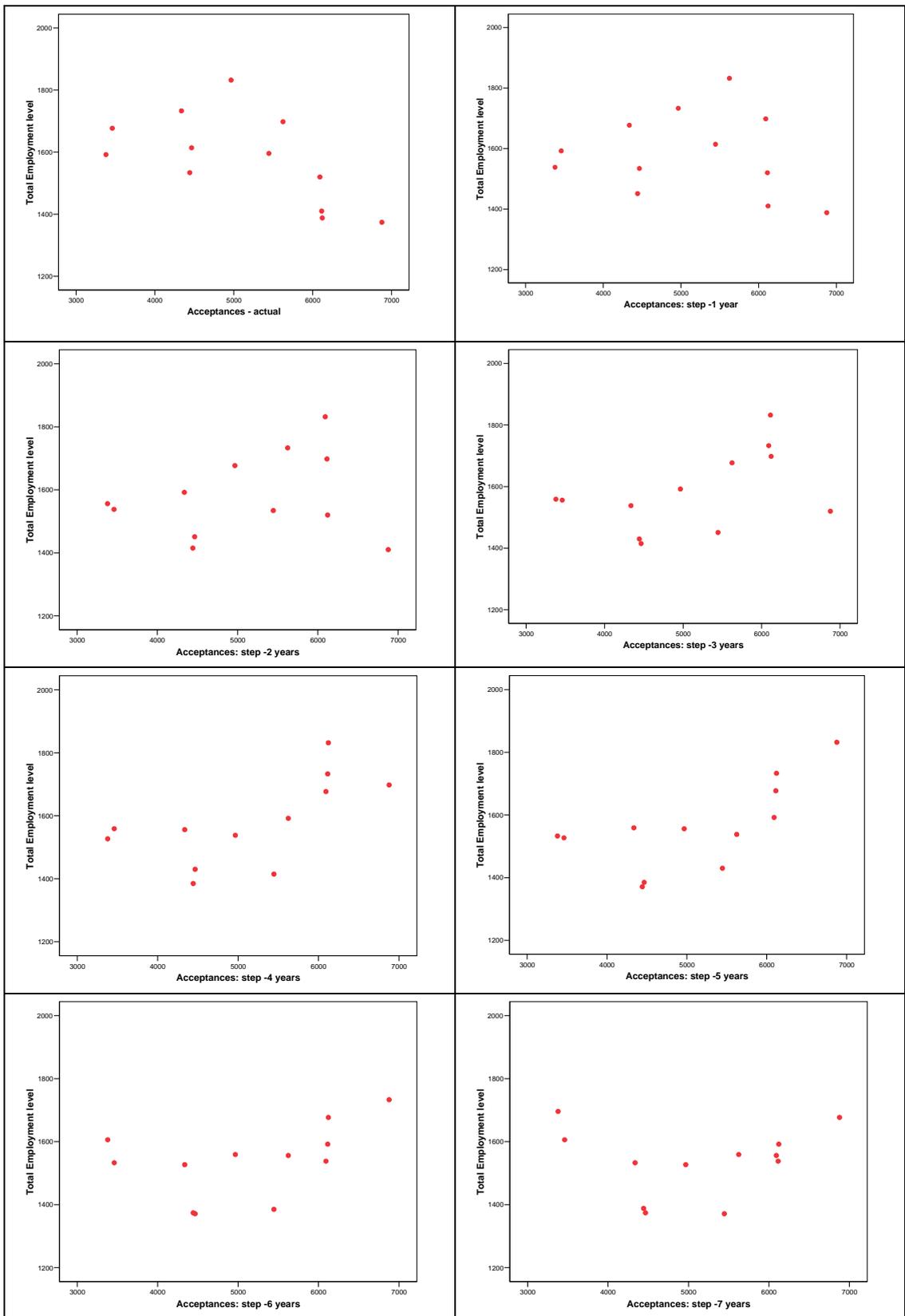


Figure 4.24: Scatter-plots for Inflationary periods 1987 to 1995 and 2001 to 2003

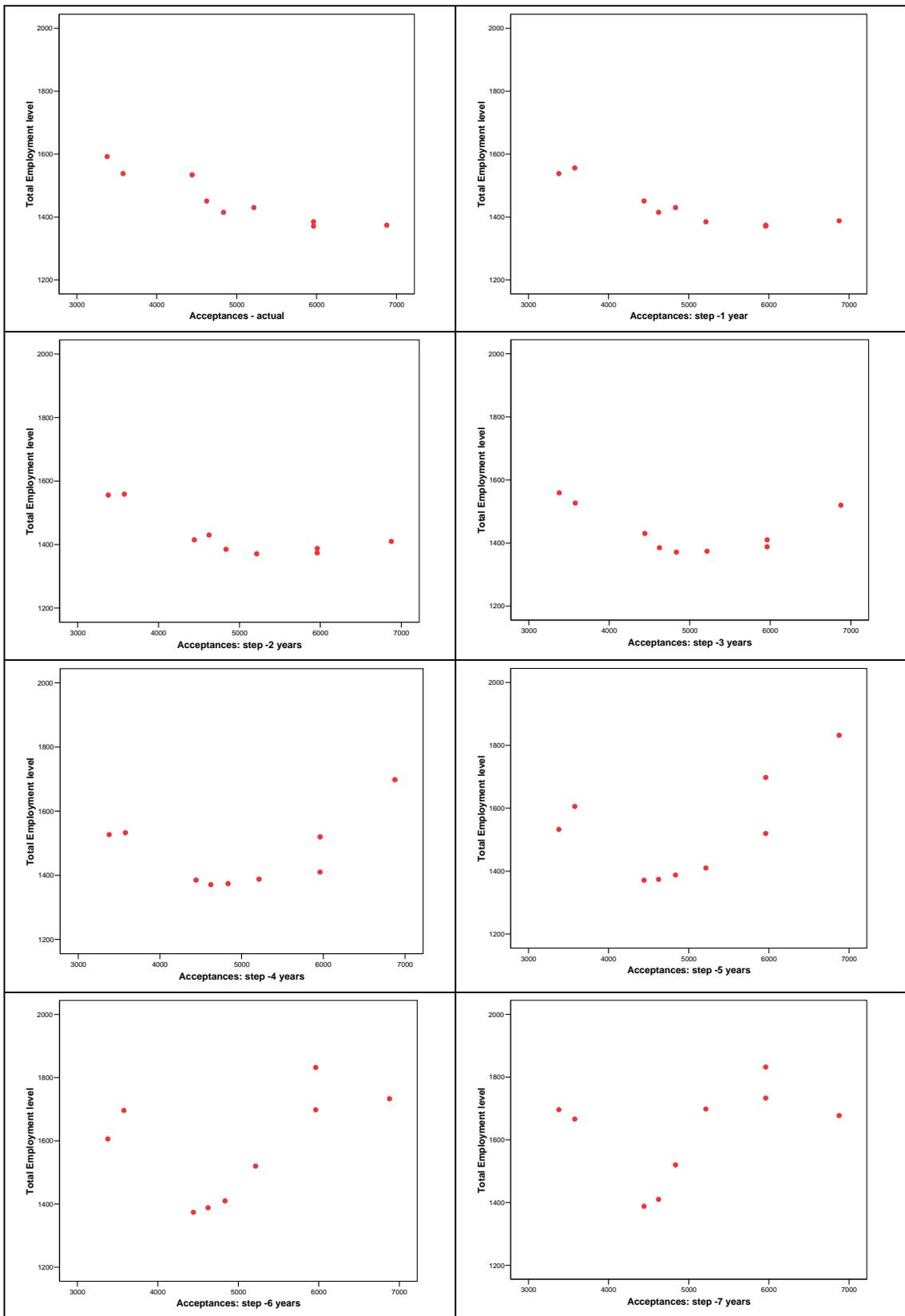


Figure 4.25: Scatter-plots for Deflationary periods 1986 to 1987 and 1995 to 2001.

The importance of adding these two earlier years is immediately obvious as the correlations becomes less apparent. The two additional year's data clearly show as a pair of 'outliers'. Further statistical analysis is required to test the effect of the two additional years.

4.4.6 Nonparametric Tests

The employment and acceptances data was then to be tested for correlation using Spearman's Rho test and Kendall's Tau test. Spearman's Rho test was the first to be developed and is the most widely and commonly used of the correlation tests, whilst the 'newer' (1938) Kendall's Tau test is gaining popularity and is credited with a greater accuracy (Field, 2000). Both of these tests produces a correlation coefficient of between -1 and +1, with a positive coefficient indicating that when one variable increases or decreases the other variable increases or decreases correspondingly, i.e. when the employment level rises, acceptances rise, and when employment falls, acceptances fall. Conversely, a negative coefficient indicates that when one variable increases or decreases the other variable will decrease or increase correspondingly, i.e. when employment rises acceptances fall, and when employment falls, acceptances rise.

A correlation coefficient of +1 or -1 indicates that there is perfect correlation, whilst a correlation coefficient of 0 (zero) indicates perfect non-correlation. (Bryman and Cramer, 1994). Bryman and Cramer (1999) observe that in general Kendall's Tau test produces a slightly lower correlation coefficient than Spearman's Rho, but Sprent and Smeeton (2001) assure that this difference is very small and in practice is unlikely to lead to any difference in interpretation of results.

As SPSS allows for both 1-tailed testing and 2-tailed testing of data and it must be determined which is the most appropriate for the employment and acceptances data. Field (2000, p.87) advises:

... that 1-tailed tests should be used when there is a specific direction to the hypothesis being tested, and 2-tailed tests should be used when a relationship is expected, but that the direction of the relationship is not predicted.

and as a relationship is expected the 2-tailed test will be adopted. Brace, Kemp and Snelgar (2003) adopt the same approach that the use of 2-tailed test of significance would be appropriate as $\rho < 0.05$ gives a $> 95\%$ confidence limit of correlation. A statistical significance of $\rho = 0.00$ represents a 100% confidence limit, i.e. certainty, whilst a statistical significance of $\rho = 1.00$ represent a 0.00% confidence limit, i.e. no probability. Appendices 4.8.11 to 4.8.17 inclusive give the tabulated results of the SPSS output for the Spearman's Rho test and the Kendall's Tau test. The tests were carried out using the same iterative process as before of incrementally stepping back the data from 0 to -7 years and recording the test results.

In the correlation tests carried out a high negative correlation will often be seen during the offset periods 0 to -3 years offset. These negative correlations have been ignored because they suggest that an increase in employment is reflected by a decrease in acceptances. It can be clearly seen in Figure 4.26 that this assumption is incorrect and, as will be shown in the following tests, this effect is generated as a result of the cyclical nature of the data and time-lag between changes in employment and changes in acceptances.

4.4.6.1 Full dataset

Using the full data set of increasing and decreasing employment and acceptances the Spearman's test produced a statistical significance of $\rho = 0.023$, a 97.7% chance of there being a correlation, but with a correlation coefficient of $r_s = 0.531$ the correlation is not particularly strong. Figure 4.26 overleaf shows the graphs of the Spearman's Rho test and Kendall's Tau test.

Kendall's Tau test gives a statistical significance of $\rho = 0.011$ (98.9% probability) at 5 years of a correlation, together with a correlation coefficient of $\tau = 0.438$. The offset period of -5 years is the only period to achieve significance at the 0.05 level (SPSS). This therefore tends to suggest that any changes in the level of employment

are reflected in the level of acceptances 5 years later, although from the graphs above the period 4 to 6 appear to be the period of greatest effect.

The tests below which consider the rising and falling data patterns separately might reveal a better insight into the correlation of the sets of data.

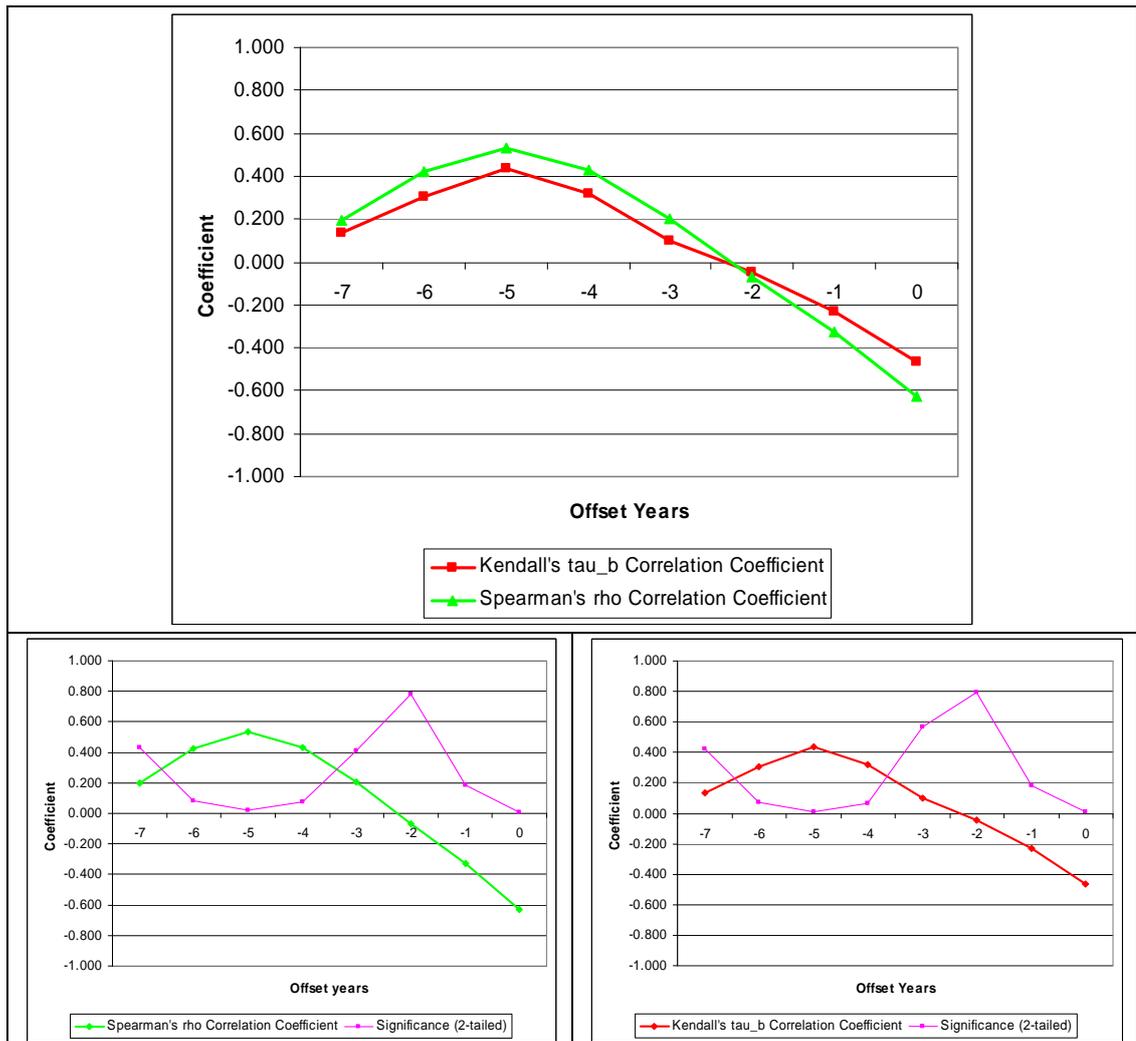


Figure 4.26: Spearman's Rho test & Kendall's Tau test using the full dataset.

4.4.6.2 Rising Dataset

For the rising dataset Spearman's test produces a statistical significance of $p = 0.001$ is achieved at -5 years, which SPSS reports the correlation is significant at the 0.01 level, therefore there is a 99% probability of the data being correlated, and with a

correlation coefficient of $r_s = 0.917$ this suggests a very high match between the employment and acceptances data at the -5 year offset. A high correlation $\rho = 0.002$ is also achieved for an offset of -4 years, where a correlation coefficient of $r_s = 0.883$ is obtained at the 0.01 significance level (SPSS), indicating a strong match still exists between the datasets. This can be seen in Figure 4.27 below.

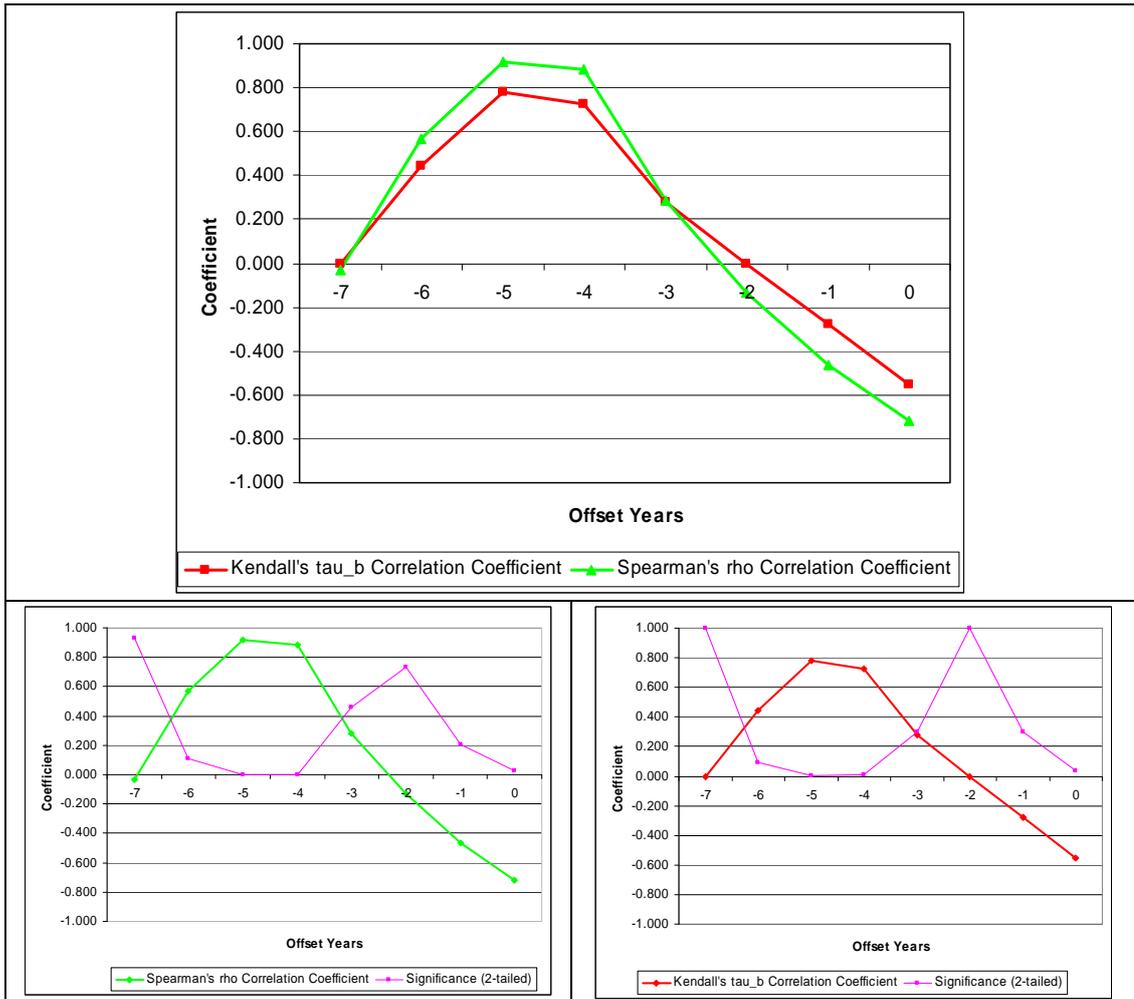


Figure 4.27: Spearman’s Rho test & Kendall’s Tau test using Rising dataset.

Kendall’s Tau test produces a statistical significance of $\rho = 0.004$ (99.6% probability), with a correlation coefficient of $\tau = 0.778$, thus a good correlation occurs at the -5 years offset period as this is at the 0.01 significance level (SPSS). Similarly Kendall’s test reveals a statistical significance of $\rho = 0.007$ (99.3% probability) with a correlation coefficient of $\tau = 0.722$ for the -4 year offset period, being at the 0.05 significance level (SPSS).

It is not possible to make claims that the actual offset is between these periods, e.g. 4½ years, whilst employment level in the construction industry does vary constantly, from day to day albeit with a reporting period of 3 months (quarterly), acceptances occur at only one specific time each year, normally October. It would therefore be incorrect to make claims that the causal factors that result in a change in employment levels are reflected in acceptance levels 4½ years later; however it might perhaps be reasonable to claim that, for this dataset, increases in employment levels are reflected in increases in acceptance levels 4 to 5 years later.

4.4.6.3 Falling dataset

For the falling dataset Spearman's Rho test produced a statistical significance of $\rho = 0.000$, i.e. there is a > 99.9% probability that the data is correlated at -5 years. This is reinforced by the correlation coefficient of $r_s = 1.000$ indicating there is an extremely good match between the datasets. A very significant match also occurs at an offset of -4 years ($\rho = 0.893$, significance $r_s = 0.003$) and -6 years ($\rho = 0.964$, significance $r_s = 0.000$). This is illustrated in Figure 4.28 overleaf.

Kendall's Tau test shows a greater differentiation between the two sets of data, but again SPSS reports a statistical significance of $\rho = 0.000$ (> 99.9% probability) correlation for an offset of -5 years, with a correlation with a coefficient of $\tau = 1.000$. Significant correlations also occur at -4 years and -6 years, however Kendall's Tau test gives a slightly lower correlation at -6 years with a statistical significance of $\rho = 0.004$ (99.6%), compared to -4 years with a significance $\rho = 0.011$ (98.9%). The correlation coefficients are $\tau = 0.905$ and $\tau = 0.810$ respectively. Although a very strong correlation is obtained for -5 years, the strength of the correlations at -4 years and -6 years cannot be ignored as all three periods have significance at the 0.01 level (SPSS). It would therefore be reasonable to claim, for this set of data, that a decrease in the employment level is reflected in a decrease in the acceptances during a period of 4 to 6 years later, with the greatest effect occurring 5 years later.

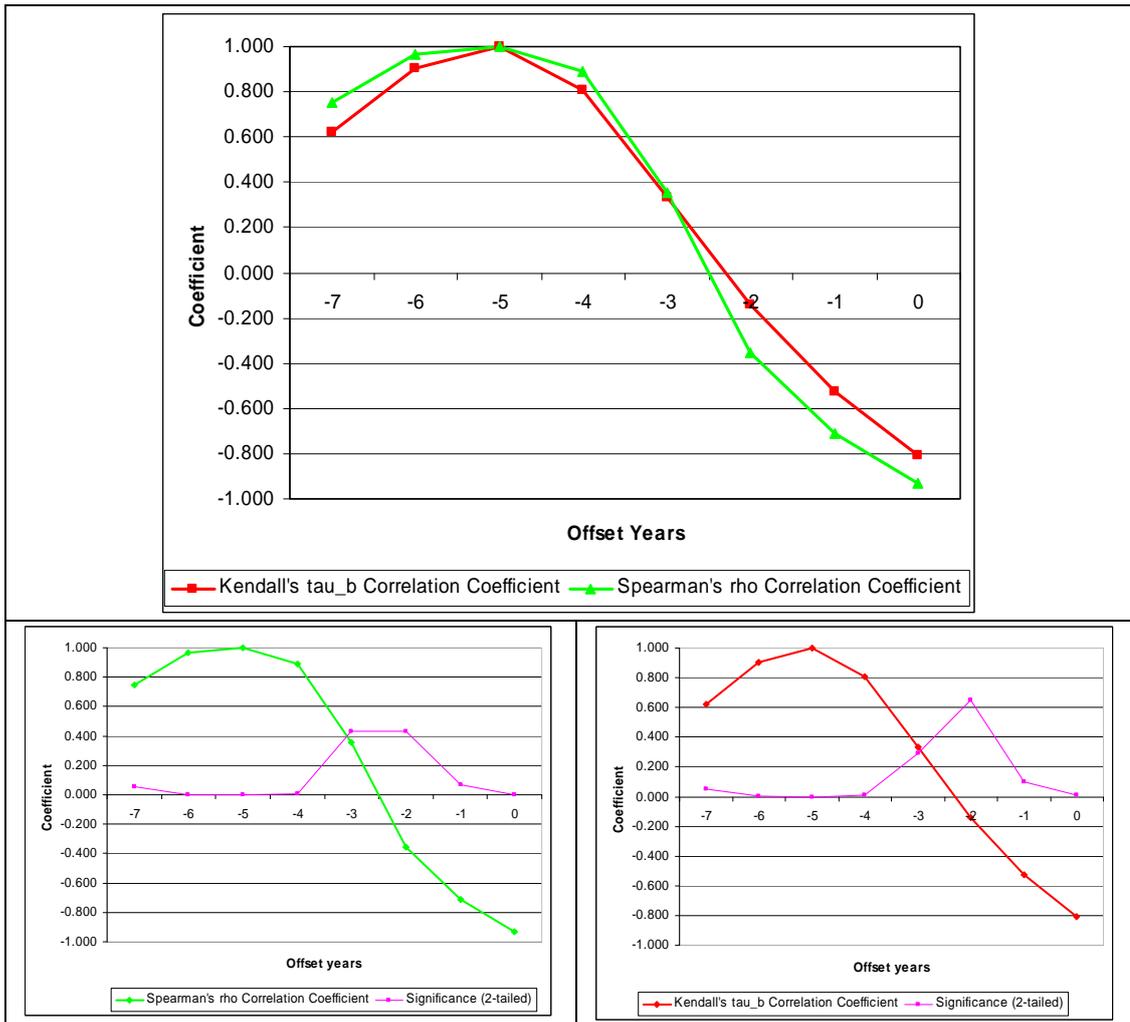


Figure 4.28: Spearman’s Rho test & Kendall’s Tau test using Falling dataset.

4.4.6.4 All-rising dataset

Using the all-rising dataset Spearman’s Rho test produces a significant correlation of $\rho = 0.010$ (99%) and a correlation coefficient of $r_s = 0.706$ at an offset of -5 years. A significant correlation can also be seen (see Figure 4.29 overleaf) at -4 years where a significance of $\rho = 0.013$ is obtained with a correlation coefficient of $r_s = 0.692$.

Kendall’s Tau test produces a significance of $\rho = 0.020$ with a correlation coefficient of $\tau = 0.515$. Both tests provide correlations at the 95% confidence limit (SPSS 0.05 level), but here it can be seen that whilst the significance is high, the correlations are not as strong as those found in the rising and falling data sets for a single cycle.

However this continues to emphasise that the greatest effect of any increase in employment levels is reflected 4 to 5 years later in the increasing level of acceptances.

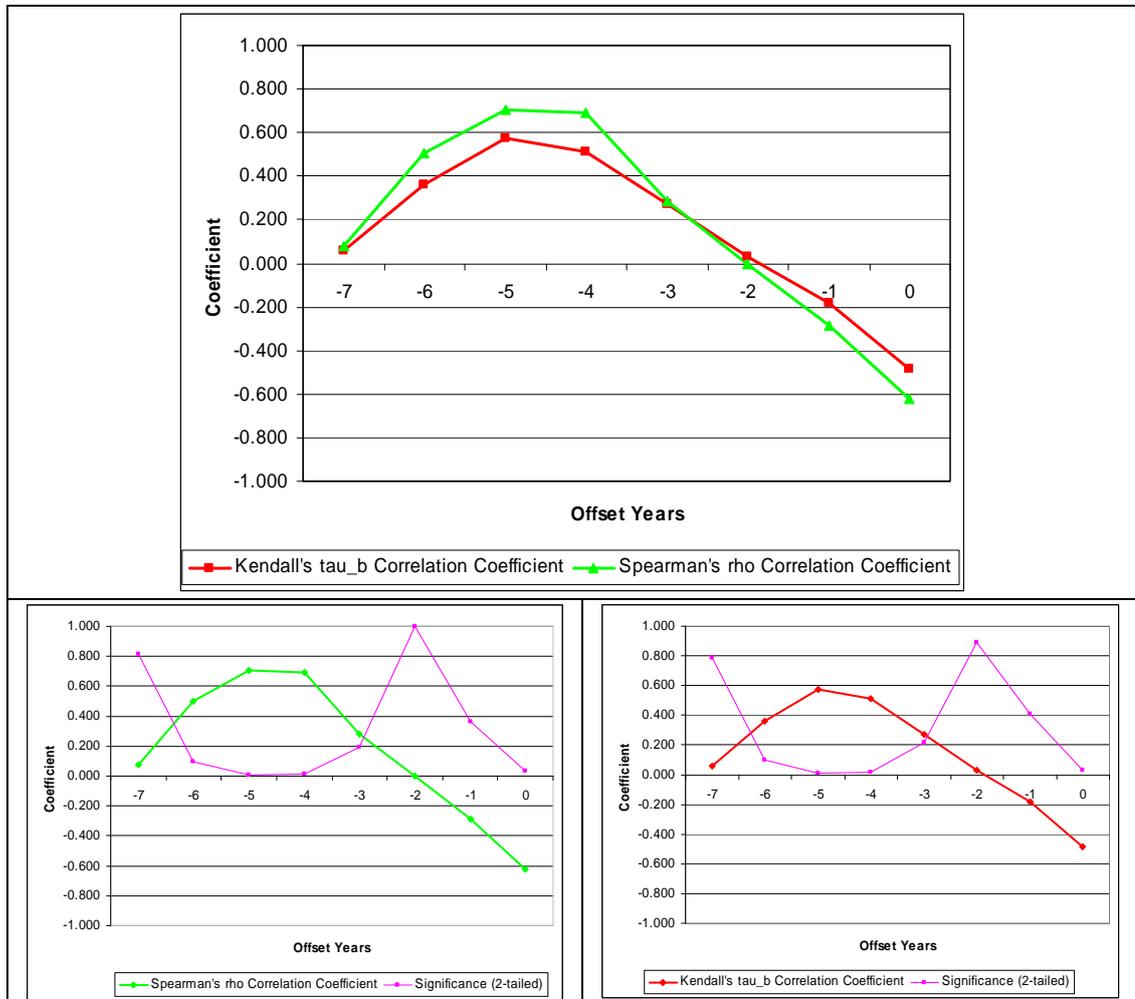


Figure 4.29: Spearman's Rho test & Kendall's Tau test using All-rising dataset.

4.4.6.5 All-falling dataset

In this final dataset Spearman's Rho test produced a least significance of $\rho = 0.099$ (91.9%) below the recognised 95% confidence limit at -6 years. The corresponding correlation coefficient was $r_s = 0.583$ illustrated in Figure 4.30 below. This suggests that the correlation at -6 years is not particularly strong, but neither can it be ignored.

Kendall's Tau test produces a significance of $\rho = 0.061$ and a correlation coefficient of $\tau = 0.500$. Therefore it is reasonable to claim that with the all-falling dataset any decrease in employment levels is reflected 6 years later in a decrease in acceptances, although the correlation is not particularly strong.

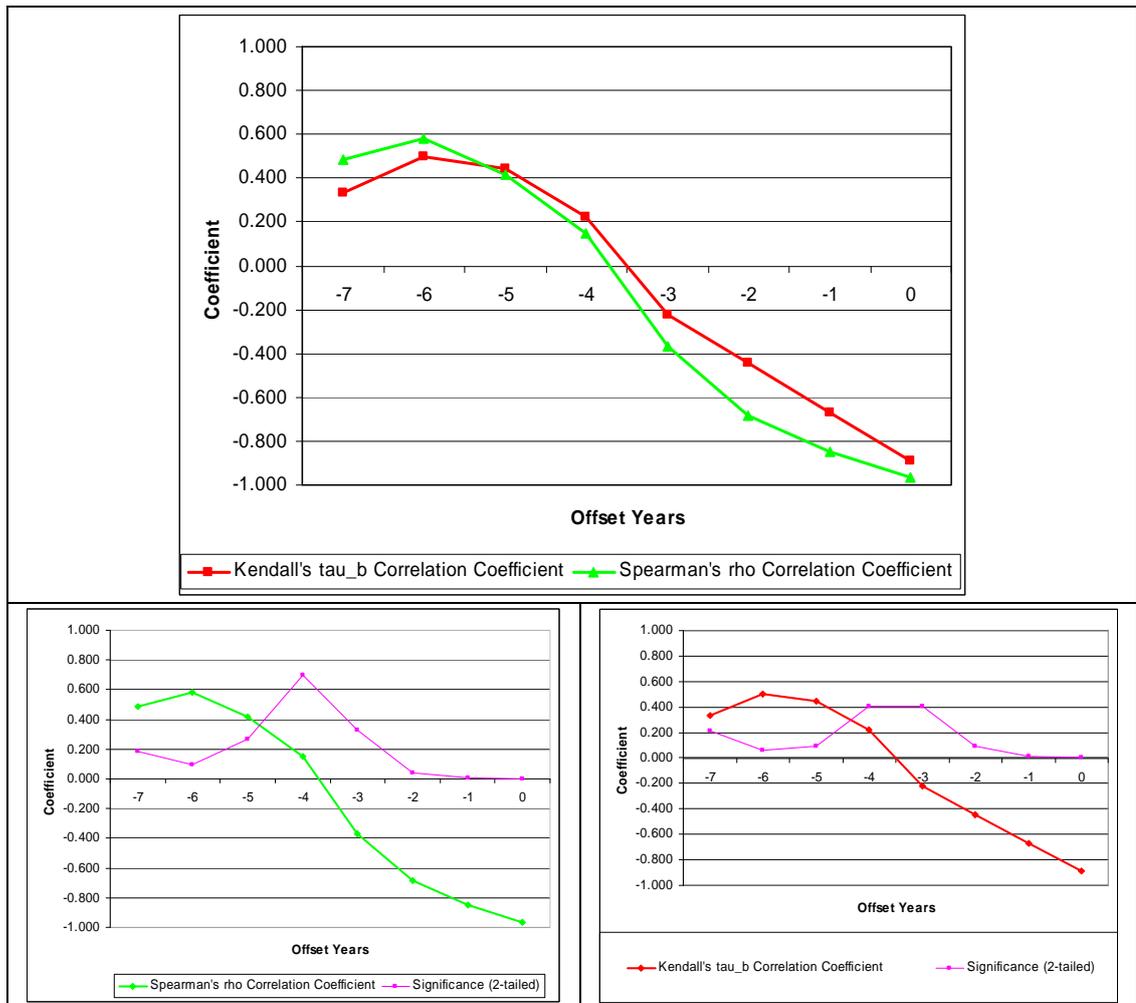


Figure 4.30: Spearman's Rho test & Kendall's Tau test using All-falling dataset.

4.4.6.6 Outcome of Nonparametric Testing

Table 4.4 below shows the outcome of the nonparametric tests using Spearman's Rho test and Kendall's Tau test. Results are shown only where a statistical significance at or below the 0.05 level. Here it can be seen that the offset of -5 years is the predominant period overall.

Table 4.4: Summary of non-parametric tests

| Dataset | | -7 yrs | -6 yrs | -5 yrs | -4 yrs | -3 yrs | -2 yrs | -1 yrs | 0 yrs |
|-------------------------|----------|--------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Full | Spearman | 0.433 | 0.081 | 0.023 | 0.073 | 0.414 | <i>0.779</i> | <i>0.185</i> | 0.005 |
| | Kendall | 0.426 | 0.075 | 0.011 | 0.063 | 0.570 | <i>0.791</i> | <i>0.185</i> | 0.007 |
| Rising acceptances | Spearman | 0.932 | 0.112 | 0.001 | 0.002 | 0.460 | 0.732 | <i>0.205</i> | <i>0.030</i> |
| | Kendall | 1.000 | 0.095 | 0.004 | 0.007 | 0.297 | 1.000 | <i>0.297</i> | <i>0.037</i> |
| All-rising Acceptances | Spearman | 0.812 | 0.095 | 0.010 | 0.013 | 0.191 | 1.000 | <i>0.366</i> | <i>0.031</i> |
| | Kendall | 0.784 | 0.100 | 0.009 | 0.020 | 0.217 | 0.891 | <i>0.411</i> | <i>0.028</i> |
| Falling acceptances | Spearman | 0.052 | 0.000 | 0.000 | 0.007 | 0.432 | <i>0.432</i> | <i>0.071</i> | 0.003 |
| | Kendall | 0.051 | 0.004 | 0.000 | 0.011 | 0.293 | <i>0.652</i> | <i>0.099</i> | <i>0.011</i> |
| All-falling Acceptances | Spearman | 0.187 | 0.099 | 0.265 | 0.700 | <i>0.332</i> | <i>0.042</i> | 0.004 | 0.000 |
| | Kendall | 0.211 | 0.061 | 0.095 | 0.404 | <i>0.404</i> | <i>0.095</i> | <i>0.012</i> | 0.001 |

| | | | | |
|----------------------------|---------------|---------------|---------------|----------------|
| Statistical significance p | <0.01 >99% | <0.05 >95% | <0.10 >90% | □0.10 ≤ 90% |
|----------------------------|---------------|---------------|---------------|----------------|

Significance figure in italics have negative correlations.

Significances in bold type are at the 0.01 level; those in standard type are at the 0.05 level.

4.4.7 Curve Estimation.

In order to try and establish more information about the nature of the relationship between employment and acceptances a curve estimation exercise was undertaken. Curve estimation is more commonly known as curve fitting. Each of the data sets was tested against the curve forms for goodness of fit, with the curve(s) with the best fit being subject to further investigation.

It is interesting to note that of the SPSS statistics books referred to only one, Danley and Reidy (2004), makes any references to the curve estimation process, and even then not in any detail. Consultation of the SPSS 'help' file suggests that if data is of a non-linear nature, as in this project, a 'trial and error' approach is adopted to curve estimation using the non-linear regression models provided to establish the best 'fit'.

SPSS v.12 provides a total of eleven curve estimation models, one linear and ten non-linear. These are shown in Table 4.5 below. The formulae used by SPSS for each of the curves are given in Appendix 4.8.23.

Table 4.5: SPSS v12 Curve Estimation Models.

| Linear | | |
|-------------------|----------|-------------|
| Linear | | |
| Non-linear | | |
| Logarithmic | Power | Logistic |
| Inverse | Compound | Growth |
| Quadratic | S | Exponential |
| Cubic | | |

Curve estimation will be applied to all those instances where in the correlation tests a statistical significance of $\rho < 0.05$ was obtained together with a positive correlation coefficient for either Spearman's Rho test and/or Kendall's Tau test (see Table 4.4).

4.4.7.1 Full dataset.

The initial test was run for the offset of -5 years using all the non-linear curve forms to provide a comparative graph (see Figure 4.31 below) as the offset of -5 years had a $\rho < 0.05$.

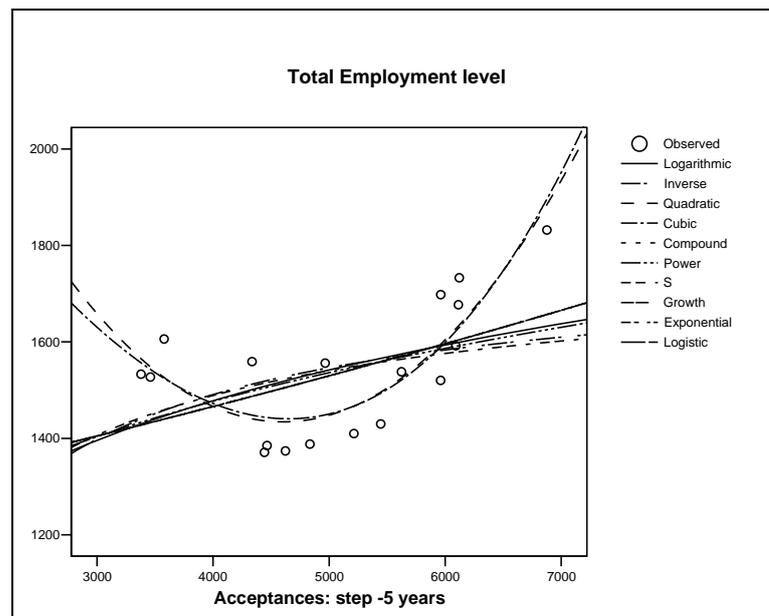


Figure 4.31: Curve fit for full dataset at offset -5 years.

From the tabular output from SPSS for each of the curves, (see Appendix 4.8.19) only two curve forms had a statistical significance of $\rho < 0.05$, these being the quadratic curve and the cubic curve. SPSS reported with the cubic curve form the tolerance limits were reached and that not all variables were entered, thus the curve-fit was not carried out using the full dataset.

Having established that the quadratic and cubic curve forms have the best fit at an offset of -5 years the curve estimation exercise was rerun and extended using the offsets of -4, -5 and -6 years, all having a statistical significance of < 0.05 . In addition, confidence limits of 95% (the default SPSS setting), and 10% (the minimum permitted in SPSS) were added to the scatter-plots. The curve estimation diagrams are shown in Figure 4.32 overleaf. The tabulated data for R^2 and significance are given in Table 4.6.

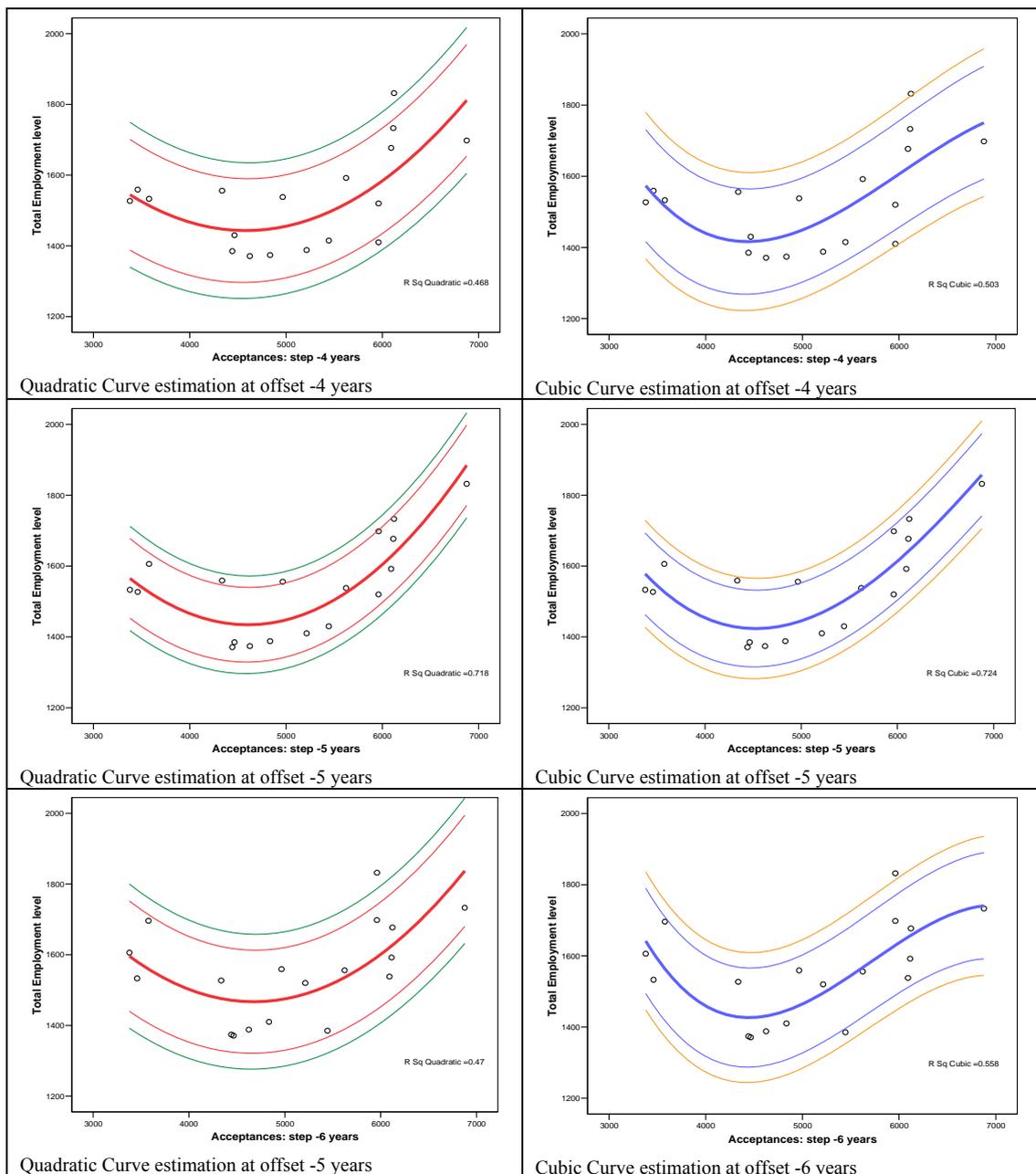


Figure 4.32: Curve estimations for full dataset

In the above and following curve fitting graphs the 'best fit' curve is the centre heavier line. The 10% confidence limit lines (SPSS) are the inner pair of lines shown in the same colour as the 'best-fit' line, and the 95% confident limit lines (SPSS) are the outer pair of lines shown in a contrasting colour.

Of these two forms the quadratic curve has the best fit at -5 years with an $R^2 = 0.718$ and a statistical significance $p = 0.000$ (SPSS). This does not indicate a perfect fit

due to rounding by the software to three decimal places. What is certain, however, is that with $p < 0.0005$ an extremely high level of fit is found. The cubic curve had an $R^2 = 0.708$, and a statistical significance of $p = 0.000$ (SPSS), with the same comment applying as for the quadratic data. Thus the quadratic curve is only very marginally a better fit than the cubic curve due to the very small difference in R^2 .

Table 4.6: Best fit data for Quadratic and Cubic Curve estimation: Full dataset

| Full dataset | | Quadratic | | | | Cubic | | | |
|--------------|-------------------------------|--------------|-----------|--------------|--------------|--------------|-----------|--------------|--------------|
| Year offset | ρ Spearman Kendall | R^2 | d.f. | F. | Sigf | R^2 | d.f. | F | Sigf |
| -4 | 0.073 0.063 | 0.468 | 15 | 6.60 | 0.009 | 0.454 | 15 | 6.24 | 0.011 |
| -5 | 0.023 0.011 | 0.718 | 15 | 19.05 | 0.000 | 0.708 | 15 | 18.20 | 0.000 |
| -6 | 0.081 0.075 | 0.470 | 15 | 6.66 | 0.009 | 0.446 | 15 | 6.05 | 0.012 |

4.4.7.2 Rising data

In the case of the rising dataset three curve estimations were run, those for -4 and -5 years offset both of which have $p < 0.01$, and for -6 years offset having $p < 0.05$.

The curve estimation graphs are shown in Figures 4.33 and 4.34 overleaf where it can be seen that both the quadratic curve form and the cubic curve form have a good fit to the data. The individual plots for the quadratic curves and the cubic curves are shown in Figure 4.35. Here it can be seen that for -5 years offset the quadratic and cubic curve forms are significantly different and better fitting than the other curve forms. At -4 years offset the difference is less marked and less easy to detect.

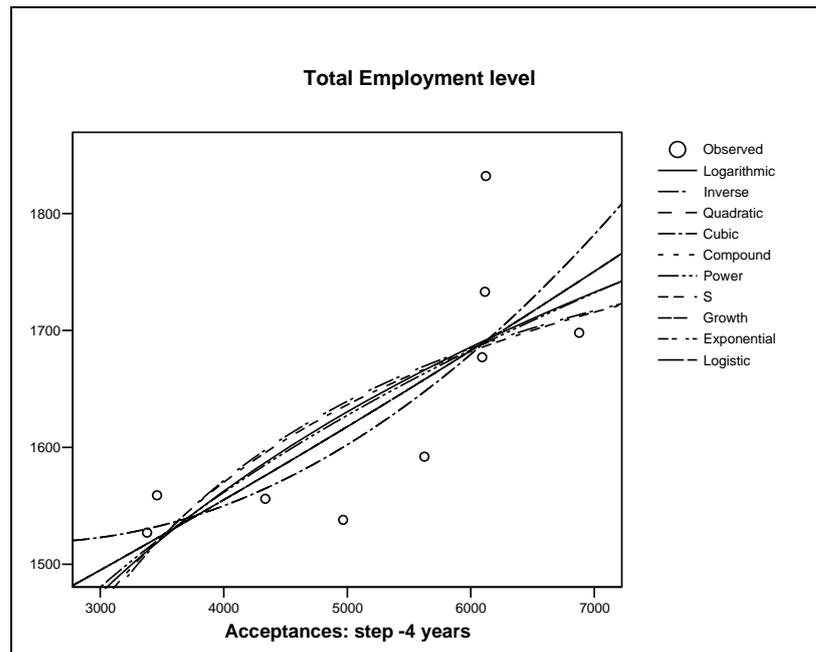


Figure 4.33: Curve fitting for Rising dataset at offset -4 years



Figure 4.34: Curve fitting for Rising dataset at offset -5 years

The tabulated output is given in Table 4.7 and reveals just how similar the two curve forms are in fitting the data. The data with the least statistical significance is that of the -5 years offset. Here the cubic curve with an R^2 of 0.848 and statistical

significance of 0.004 has a marginally better fit than the quadratic curve with an R^2 of 0.828 and significance of 0.005.

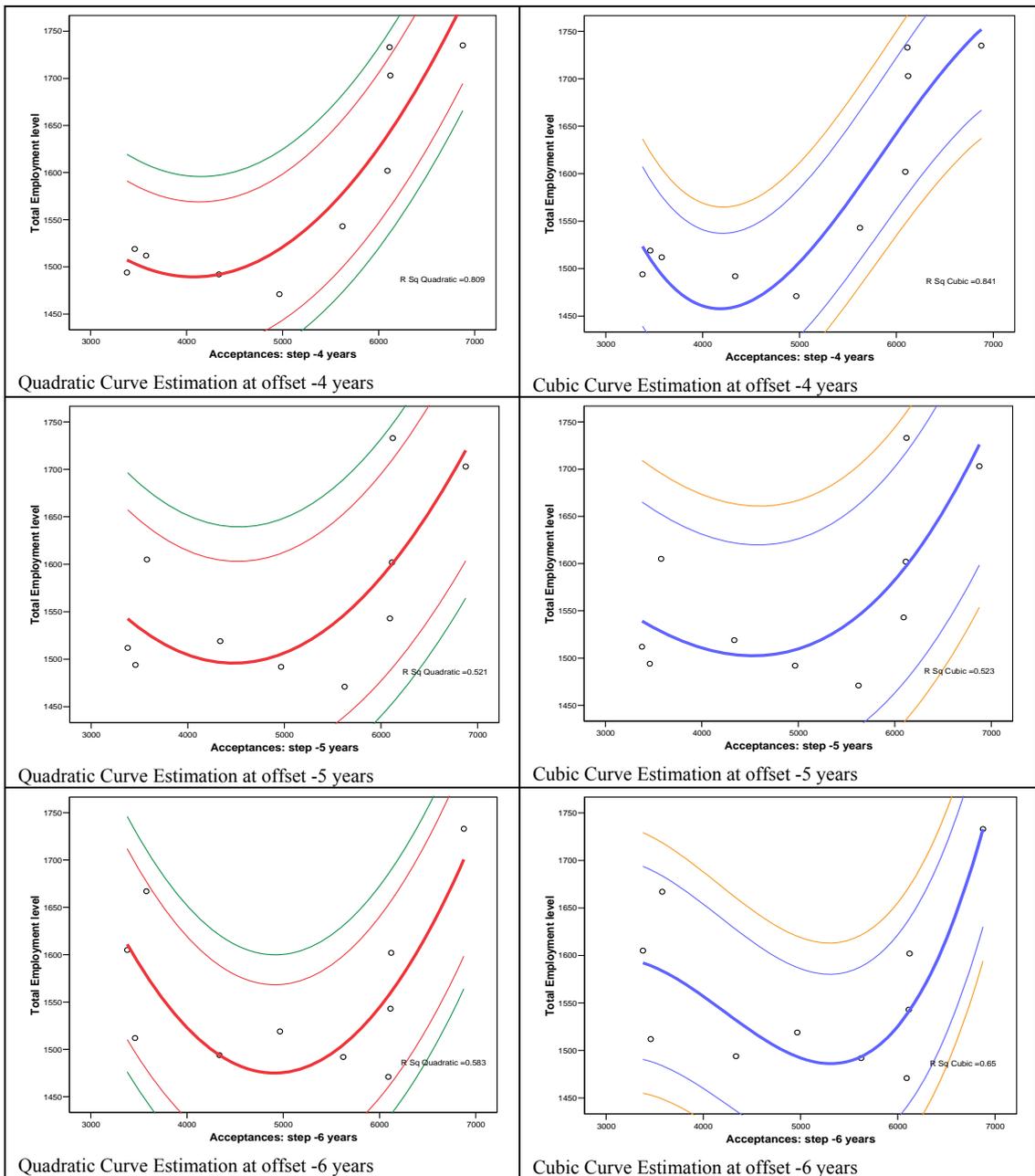


Figure 4.35: Curve estimations for Rising dataset

Table 4.7: Best fit data for Quadratic and Cubic Curve estimation: Rising dataset

| Rising dataset | | Quadratic | | | | Cubic | | | |
|----------------|-------------------------------|----------------|----------|--------------|--------------|----------------|----------|--------------|--------------|
| Year offset | ρ Spearman Kendall | R ² | d.f. | F. | Sigf | R ² | d.f. | F | Sigf |
| -4 | 0.002 0.007 | 0.612 | 6 | 4.73 | 0.058 | 0.612 | 6 | 4.73 | 0.058 |
| -5 | 0.001 0.004 | 0.828 | 6 | 14.49 | 0.005 | 0.844 | 6 | 16.19 | 0.004 |
| -6 | 0.112 0.095 | 0.679 | 6 | 6.36 | 0.033 | 0.689 | 6 | 6.64 | 0.030 |

At the offset of -4 years where $\rho < 0.01$, both the quadratic and cubic curves forms are given an identical fit pattern by SPSS, with there being no discernable difference between the two. Even at the -6 years offset with a $\rho < 0.05$ the cubic curve form is still shown as being marginally better fit than the quadratic form. It must however be remembered that these curve fits are based on relatively small sets of data.

4.4.7.3 Falling Dataset

With the falling dataset statistical significances of $\rho < 0.001$ were achieved at -4, and -5 years offset, and $\rho < 0.05$ at -6 years offset. Figures 4.36, 4.37 and 4.38 below show the curve fitting for each of these datasets. In each of these graphs the similarity of the quadratic and cubic curve forms can be seen, although perhaps not quite as distinctly at the offset of -5 years, the separation of these two curve forms from the others is clearly visible. The individual plots for each of these curve forms are shown in Figures 4.39 and 4.40.

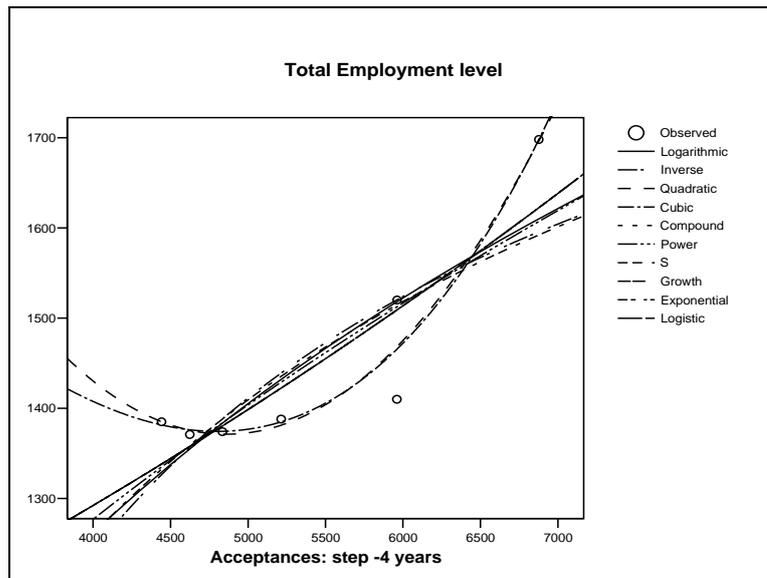


Figure 4.36: Curve fitting for Falling dataset at offset -4 years

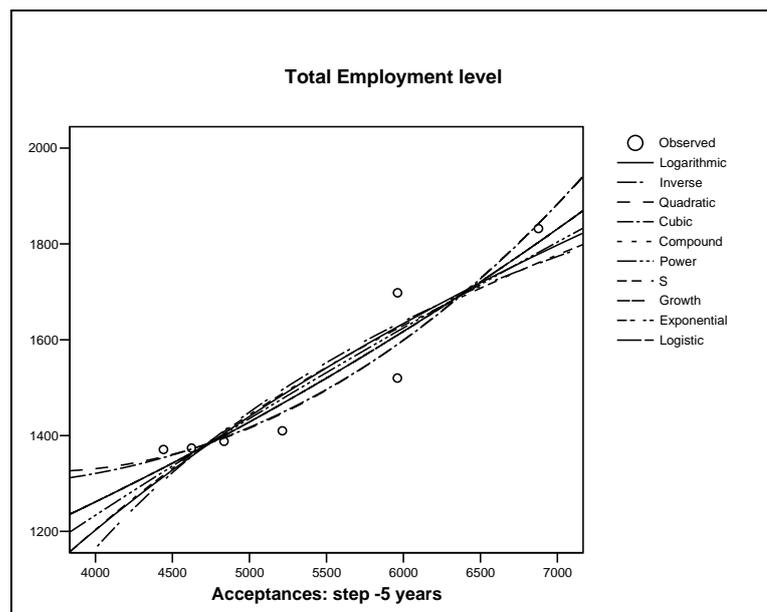


Figure 4.37: Curve fitting for Falling dataset at offset -5 years

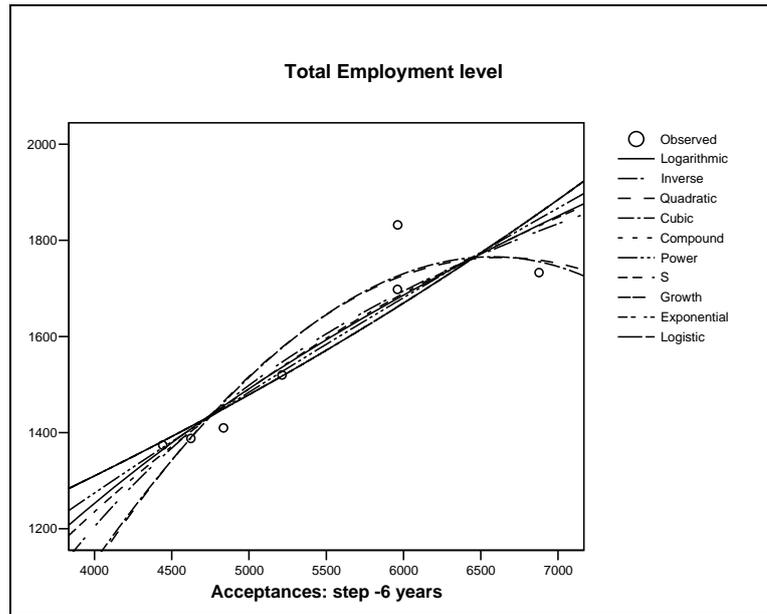


Figure 4.38: Curve fitting for Falling dataset at offset -6 years

The tabulated data in Table 4.8 overleaf shows that at the offset period with the greatest correlation, -5 years offset, the quadratic curve has a greater R^2 than the cubic curve by 0.001. The two curve forms are perhaps, in reality, indistinguishable from each another due to the small dataset, and no real conclusion can be made about which has the better fit as the statistical significance for each is almost identical and the R^2 values are also at the 0.001 level.

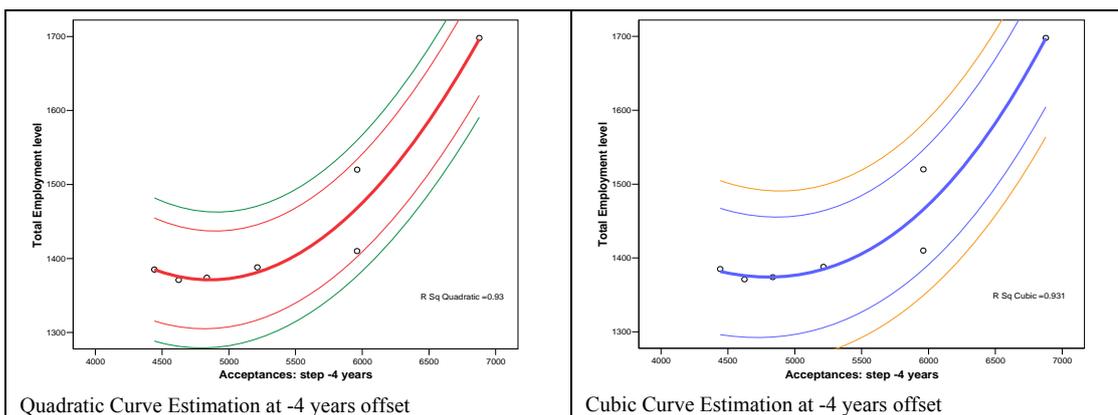


Figure 4.39: Curve estimations for Falling dataset, 4 years offset

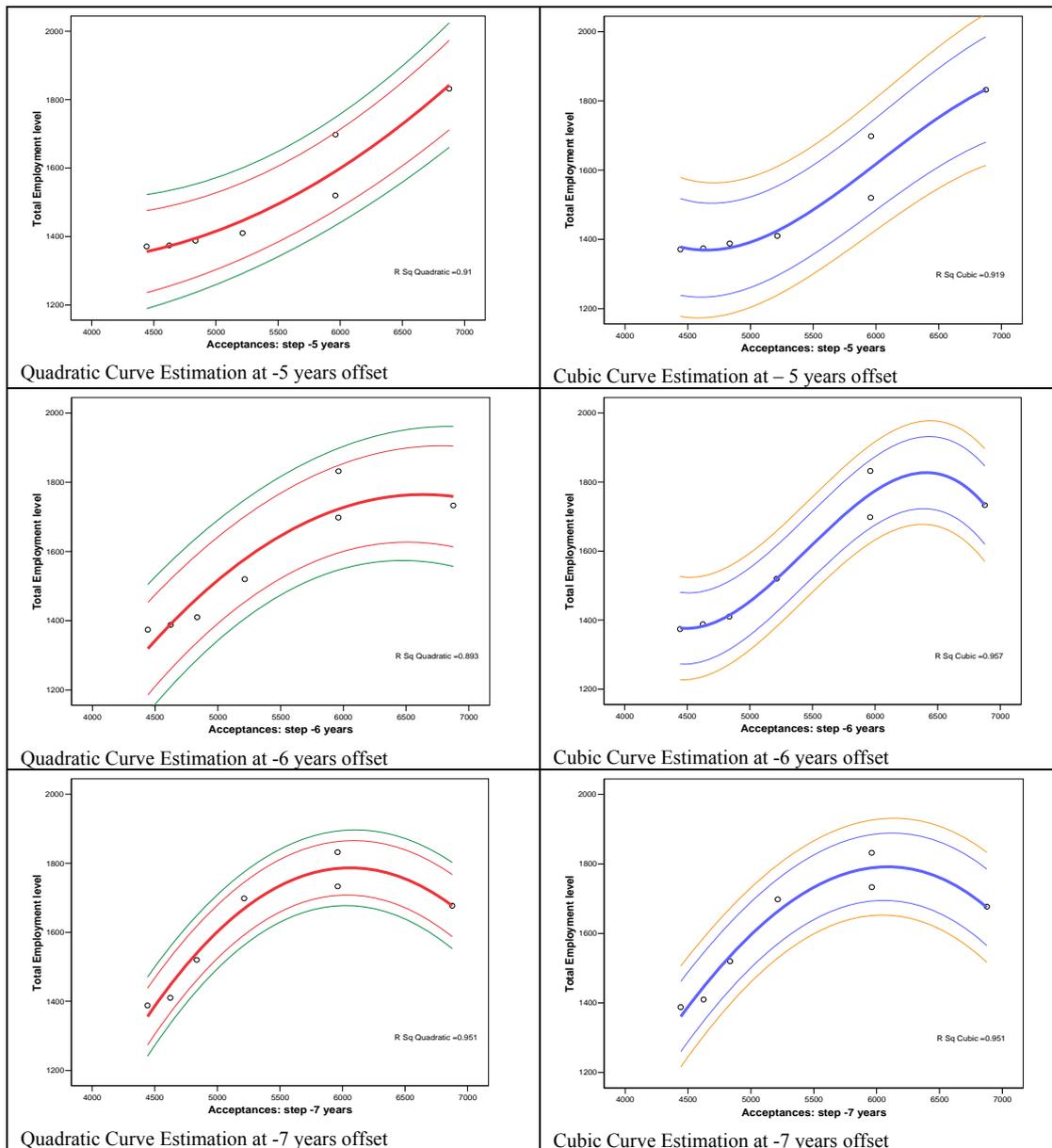


Figure 4.40: Curve estimations for Falling dataset, 5 years offset

Table 4.8: Best fit data for Quadratic and Cubic Curve estimation: Falling dataset

| Falling dataset | | Quadratic | | | | Cubic | | | |
|-----------------|-------------------------------|--------------|----------|--------------|--------------|--------------|----------|--------------|--------------|
| Year offset | ρ Spearman Kendall | R^2 | d.f. | F. | Sigf | R^2 | d.f. | F. | Sigf |
| -4 | 0.007 0.011 | 0.930 | 4 | 26.97 | 0.005 | 0.931 | 4 | 26.97 | 0.005 |
| -5 | 0.000 0.000 | 0.910 | 4 | 19.88 | 0.008 | 0.909 | 4 | 19.88 | 0.008 |
| -6 | 0.000 0.004 | 0.893 | 4 | 16.73 | 0.011 | 0.899 | 4 | 17.72 | 0.010 |
| -7 | 0.052 0.051 | 0.951 | 4 | 38.57 | 0.002 | 0.951 | 4 | 39.09 | 0.002 |

If however a decision was required to be made here about which curve form is to be applied then of the two forms the quadratic has the simpler equation. It is more widely understood and easier to manipulate for modelling and prediction purposes even though this is not a part of this project.

4.4.7.4 All-Rising Dataset

In the all-rising dataset only one offset period, that of -5 years, had a statistical significance of $\rho < 0.01$ in the correlation tests, with -4 years and -6 years offsets having a statistical significance $\rho < 0.05$. The curve fitting graphs for the offset period of -5 years is shown in Figure 4.41 below.



Figure 4.41: Curve fitting for All-rising dataset at offset -5 years

The quadratic and cubic curve fitting graphs for -4, -5 and -6 years offset are shown in Figure 4.42 overleaf.

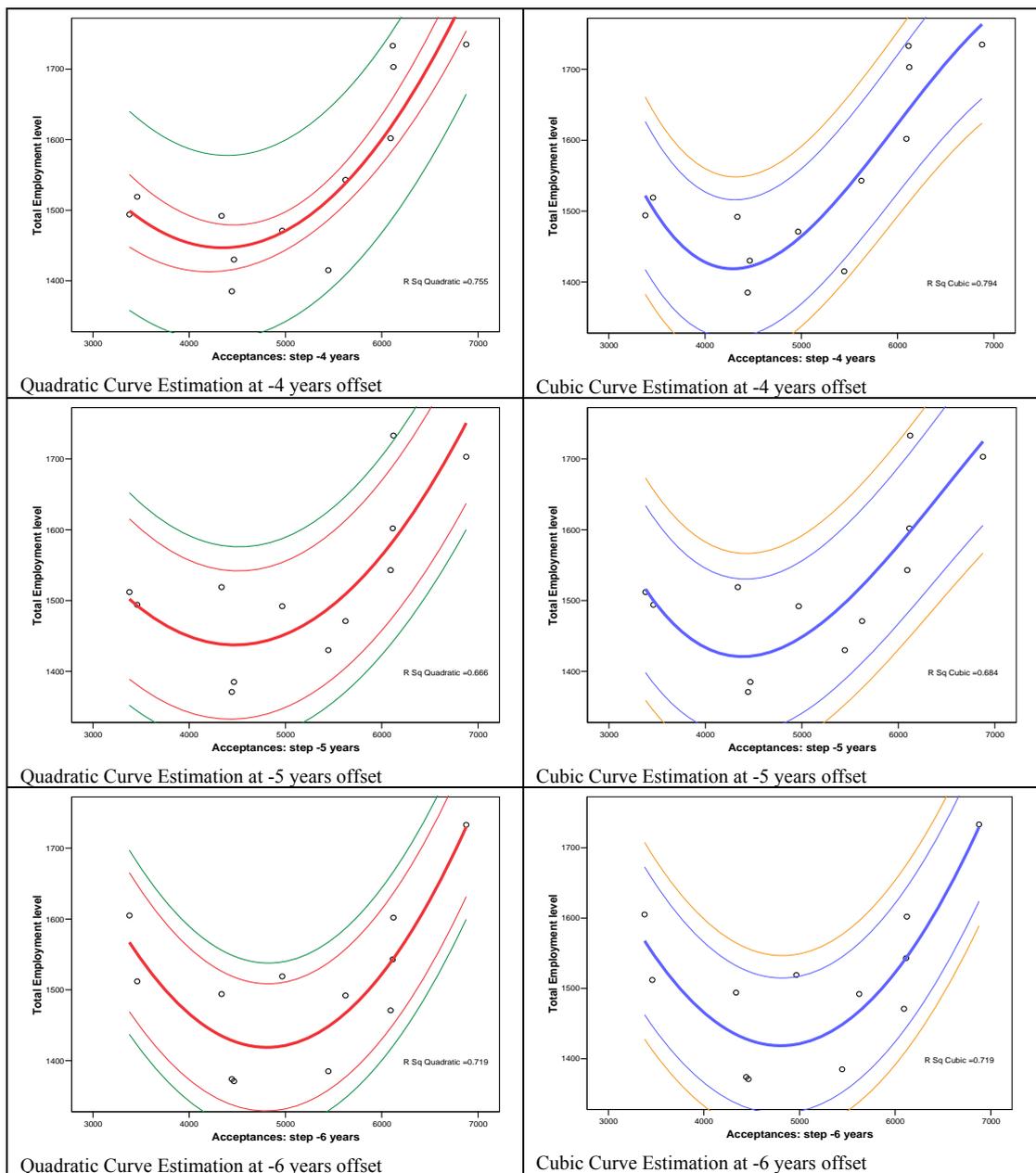


Figure 4.42: Curve estimations for All-Rising dataset

From the tabulated data shown in Table 4.9 overleaf it can be seen that the quadratic curve form has a marginally better fit than the cubic curve form in both the R^2 and significances for each of the three years under consideration. Again, however, this difference is not great but with a larger data set than that of the rising data the quadratic curve form has superseded that of the cubic form that had a marginally better fit with the smaller dataset.

Table 4.9: Best fit data for Quadratic and Cubic Curve estimation: All-Rising dataset

| All-Rising dataset | | Quadratic | | | | Cubic | | | |
|--------------------|-------------------------------|----------------|----------|--------------|--------------|----------------|----------|--------------|--------------|
| Year offset | ρ Spearman Kendall | R ² | d.f. | F. | Sigf | R ² | d.f. | F | Sigf |
| -4 | 0.013 0.020 | 0.538 | 9 | 5.24 | 0.031 | 0.520 | 9 | 4.88 | 0.037 |
| -5 | 0.010 0.009 | 0.757 | 9 | 14.01 | 0.002 | 0.752 | 9 | 13.62 | 0.002 |
| -6 | 0.095 0.100 | 0.618 | 9 | 7.29 | 0.013 | 0.604 | 9 | 6.86 | 0.016 |

4.4.7.5 All-Falling dataset

In the final set of curve fitting exercises the all-falling dataset did not have any correlations with a statistical significance better than $\rho < 0.10$ for both Spearman’s Rho and Kendall’s Tau test for the offset of -6 years. The curve fitting for this period is shown in Figure 4.43 below.

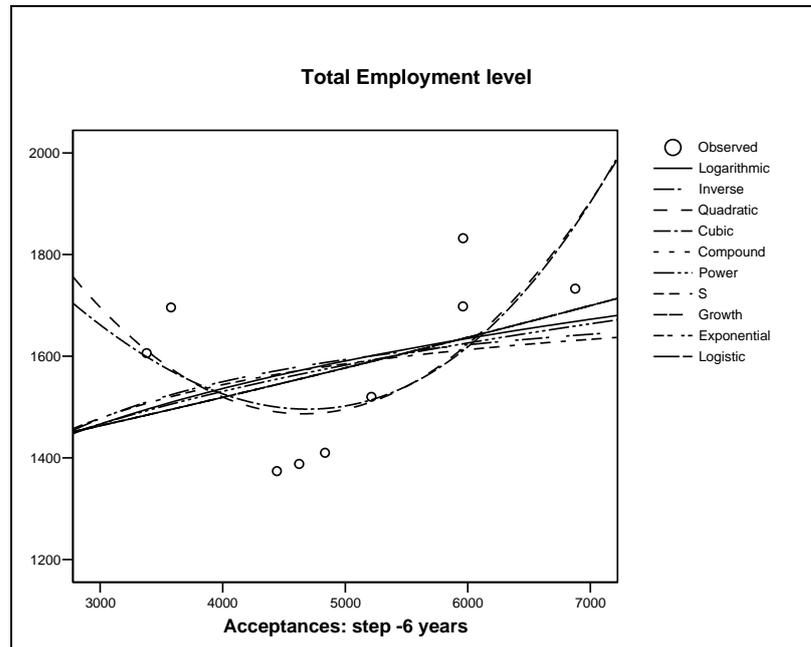


Figure 4.43: Curve fitting for All-falling dataset at offset -6 years

Again it can be seen that both the quadratic and cubic curve forms produced the best fits. Although due to the more widespread distribution of the data this is not as easy to detect as in some previous examples. As the offset period of -5 years had a

statistical significance of $\rho = 0.095$, i.e. < 0.010 for Kendall's Tau test this was considered 'second best' and a curve fitting exercise was also run for this period; see Figure 4.44 below

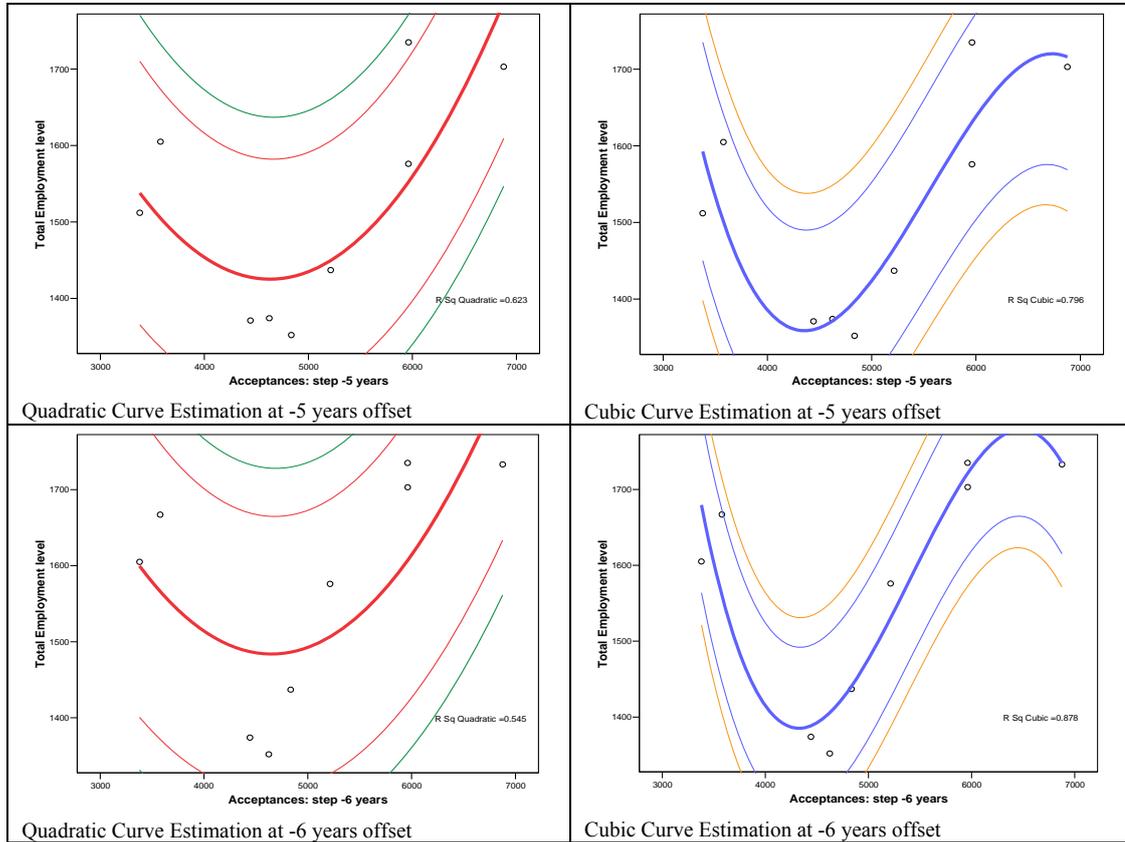


Figure 4.44: Curve estimations for All-Falling dataset

The tabulated data for the curve fitting above is shown in Table 4.10 below.

Table 4.10: Best fit data for Quadratic and Cubic Curve estimation: All-Falling dataset

| All-Falling dataset | | Quadratic | | | | Cubic | | | |
|---------------------|-------------------------------|----------------|------|-------|-------|----------------|------|-------|-------|
| | | R ² | d.f. | F. | Sigf | R ² | d.f. | F | Sigf |
| Year offset | ρ Spearman Kendall | | | | | | | | |
| -5 | 0.265 0.095 | 0.842 | 6 | 15.99 | 0.004 | 0.826 | 6 | 14.27 | 0.005 |
| -6 | 0.099 0.061 | 0.497 | 6 | 2.96 | 0.127 | 0.458 | 6 | 2.54 | 0.159 |

4.4.8 Conclusions

The analysis of the data set out to determine whether or not there is any real relationship between the level and employment in the construction industry and the level of acceptances for construction industry related courses in higher education.

Five datasets were prepared for analysis; the full data set 1986 to 2003, data applicable to the inflationary (rising) period 1987 to 1995, the deflationary (falling) period 1995 to 2001, all inflationary (all-rising) periods 1987 to 1995 and 2001 to 2003 combined, and finally all deflationary (all-falling) periods 1986 to 1987 and 1995 to 2001 combined.

In order to begin to examine the relationship between employment and acceptances it was first necessary to determine the methods of testing, either parametric or nonparametric, that would have to be employed. Following Field (2000), four tests were employed to establish whether or not the data was parametric or non-parametric. The first was to test the data for normality, i.e. did the data have a normal distribution? Time-series datasets with a curvilinear pattern would not normally be expected to have a normal distribution. Using the Kolmogorov-Smirnov test and Shapiro-Wilk tests in SPSS the data was, as expected, found not to have a normal distribution and the test was therefore declared false.

The second test was to establish the homogeneity of variance. An attempt to use the Levene's test in SPSS failed as the data did not meet the requirements for the test to be carried out. However the variance for each dataset was determined and was established to be non-homogenous and therefore this test was also declared false. Having failed the first two critical tests the data could not be considered parametric but the remaining two tests, those of interval and independence, were carried out for completeness. The criterion for the interval test was valid (true), but the independence of the two sets of data could not be established: although the link between two sets of data is not strong, it does however exist, and therefore this fourth test was also failed.

Having established that the data was not parametric Spearman's Rank Correlation Coefficient test (Spearman's Rho test) and Kendall's Rank Correlation Coefficient test (Kendall's Tau test) were applied to establish the correlation of the datasets. Each of the five datasets was tested in an iterative manner by offsetting the acceptances data incrementally backwards against the employment data. In four of the datasets very strong correlations were established at around -5 years, i.e. around a 5 year lag occurs between a change in the level of employment in the construction industry and an apparent change in the level of acceptances to higher education construction industry related courses. Although in some cases this was found to be in the range of -4 to -6 years, -5 years was taken as being the most consistent period identified. In the fifth instance a weak correlation was established at the same period.

Once the correlation had been established the nature of the relationship was established by using SPSS to use a regression analysis curve estimation process. All the possible curve forms apart from linear were tested against the datasets at their strongest and near strongest correlations. In all instances both the quadratic and cubic curve forms were found to have the best fit against the datasets, in some instances whether the quadratic or cubic curve form was the better fit was difficult to determine as the two were extremely close. However the quadratic curve was adopted as the most appropriate, having the simpler form of equation, thus making the potential for modelling and forecasting easier.

4.5 Research Conclusions

4.5.1 The Methodology

This project set out to investigate, through the use of quantitative analysis techniques, an apparent association between the level of employment in the construction industry and the level of recruitment to construction industry related courses in higher education. As a result of an observation made in Document 2: Literature Review, of an apparent association, two hypotheses were postulated that are set out in Chapter 1: Introduction and Research Question, of this report.

Document 3: Qualitative Research Project adopted the critical realist methodology and Chapter 4.2: Research Methodology of this report addressed the issue of whether critical realism would provide an appropriate research methodology for the project in order that a methodology common to both the qualitative and quantitative research projects might be adopted and provide a consistent approach and common base for future work in Document 5. It was duly established that critical realism would be an appropriate methodology.

4.5.2 The Nature of the Data

The critical realist approach adopted in this study enabled a broader perspective on the issues, including causal mechanisms, to be considered, rather than just a narrow statistics based interpretation that might have stemmed from a positivist approach.

Sayer (1992, p.196) argues that:

The usefulness of statistical methods depends upon the type of objects to which they are applied and the type of research design in which they are deployed.

In this study the ‘objects’ that Sayer refers to are the time-series datasets for construction industry employment and university recruitment. Yet those objects are themselves social constructs representing complex social structures and causal relationships within and between the objects, some of which were identified in Document 3. The nature of the data, as discussed in Chapter 4.2, limited the statistical methods that were applied.

The analysis that was carried out sought firstly to establish the nature of the data, whether it was parametric or non-parametric. This was determined, as expected, to be non-parametric through the application of the Kolmogorov-Smirnov test and the Shapiro-Wilk test for normality. Secondly, having confirmed that the datasets being examined were non-parametric, non-parametric covariance tests were applied to determine correlation.

4.5.3 Correlation of the Data

The tests that were applied were those of Spearman's Coefficient of Rank Correlation (Spearman's Rho) and Kendall's Tau Correlation. As it had been observed that there was an apparent time-lag between changes in employment levels and changes in recruitment levels the tests were run with the datasets being progressively offset to incrementally reduce the apparent time-lag between the two sets of data to determine the period of the apparent time-lag. This was established as being in the order of five years. The statistical tests also established that, for the given data-sets, there was a significant correlation, i.e. that the respective changes in employment levels and recruitment levels is probably not spurious by way of being 'accidental' or 'coincidental'.

These tests do not reveal how or why a change in employment is reflected in a change in recruitment around five years later. It must however continue to be emphasised that the change in employment level is not the cause of the change in recruitment level, merely that they both reflect changes in the construction environment, their causal and generative factors, in different ways although the level of construction industry employment is in itself one of the causal factors in determining recruitment levels. The importance of this is emphasised by Sayer (1992, p.180):

Mathematical modellers... tend not to be concerned with explaining what it is about social objects which produces certain changes but with representing and calculating the effects of actions. A further reason for this is the inability of mathematics to represent internal relations and hence structures. Moreover when quantified, relationships which are substantial ... internal and/or causal become indistinguishable from purely formal

and contingent relations. These limitations help reinforce the tendency of mathematical modellers in social science to be unaware of the social relations and structures on which the objects represented as 'variables' depend.

Had not the critical realist approach been adopted then the significance and importance of these relationships might have been overlooked or ignored leading to inappropriate conclusions (Willmott; 2000). Furthermore this approach also helps to reinforce the argument that the correlation between the data sets is not a spurious one and is indeed a valid correlation (Curwin and Slater, 2002; Sayer, 1992).

4.5.4 Curve Fitting the Data

Having completed the correlation tests and confirmed the validity of the correlations this project then sought to establish the nature of the correlations thorough a curve fitting exercise. Although it was stated in the introduction to this report that it was not the intention of this project to create either a model or a predictive tool for recruitment levels, this process might be seen as the first step towards the creation of such a model or predictive tool. This would also appear to be in contradiction of the critical realist approach discussed above, but this is not actually so. One of the problems that must be taken into consideration is that both construction industry employment and university recruitment are very much open social systems, where attempting to model or predict social systems is a futile exercise. They are not closed systems that enable the creation of accounting-framework models where the effect of a change in one variable is used to determine the change in another variable, i.e. dependant variables, following strict mathematical 'rules' (Sayer, 1992). Ackroyd and Fleetwood (2000, p.6) also consider that the creation of models and predictions lie within the positive approach, although they argue the realist approach

'That many of these entities are disputed and not directly observable (and hence refractory to quantification) does not rule them out of consideration for analysis.'

Thus such analysis is not incompatible with the critical realist methodology.

4.5.5 Findings from the Data Analysis

The curve fitting exercise found that at the offset period of five years the correlation was generally strongest. It also found that the relationship between changes in employment and changes in recruitment generally exhibits characteristics of a quadratic form, thus establishing that the two objects behave in different, but possibly predictable, ways to changes in their environments, i.e. the change in recruitment relative to the change in employment levels in response to environmental change appears to be quadratic in form.

Sayer (1992, p.181-182) considers other forms of models which he calls 'quasi-causal' models:

Both these 'quasi-causal' models and accounting might use an identified equation form... but instead of merely noting the evident flexibility of the mathematical language we should pay attention to the difference in meaning of the two uses. Particularly in the case of quasi-causal models it is useful to ask in what sense the logical order of the two equations can serve to 'represent' the material, causal order of a process whose independent variables *purport* to be not merely components, but causes and conditions of change in the dependent variable. Variation in the latter is not interpretable as the material sum of changes in the components but rather reflect how variables which might be regarded as causes and conditions *co-vary* with them.' [Original Italics].

but draws attention to the risk of

... plugging in variables into a model... without working out whether they are conditions or mechanisms, and if so, what kind.

To which Archer (1998, p.190) comments:

... [Positivism] can be crudely represented as 'Observation + Correlation = Exploration + Prediction'.

Having established what might be considered as a mathematical relationship (equation) for the two sets of data in a positivist manner which would seemingly allow the prediction of higher education recruitment from the level of construction industry employment is, from a realist perspective, an inappropriate conclusion as the casual and generative mechanisms that bring about the respective changes in employment and recruitment are not considered. An excellent example of this problem is Briscoe and Wilson's attempt (1993) to forecast employment in the

construction industry using entirely econometric data (accounting-framework models), i.e. a positivist deductionist approach, which was largely unsuccessful because it failed not only in part due to problems with reliability of data but also because it failed to take into account any social dimensions about the people who actually comprise the construction industry. The creation of a model or prediction necessitates the existence of a closed system yet the realist approach is that social systems, that includes both construction employment and university recruitment, are open systems, and because these systems are necessarily populated by people this effectively precludes closed system experiments (Archer, 1998).

4.5.7 The Hypotheses

What then of the two hypotheses postulated for this project?

Hypothesis 1: There is an association between the level of employment in the construction industry and the level of recruitment to higher education courses in construction industry related topics.

Had a positivist approach been adopted it might with ease have been reasonably concluded that this hypothesis was valid. But from the critical realist approach the conclusion for this hypothesis has a qualified validity for the given time span and for the given data, as the social systems which the data represent are open systems, and thus dynamic and transient in nature, due to their population by people. Nevertheless in the context of the above, and for the purposes of this report, the hypothesis can be considered valid.

Hypothesis 2: That the level of recruitment to higher education construction industry related courses might be predicted from the level of employment in the construction industry.

Again had the positivist approach been adopted it might reasonably have been concluded that, given that a quadratic relationship form was found to exist between the two sets of data, a model or predictive tool could be created. However from the

critical realist approach it must be concluded that the creation of any such model or prediction will be ill-founded and deemed to failure. Therefore the hypothesis must be considered invalid.

4.5.7 The Original Proposal

Having now established that one hypothesis is valid and the other invalid, consideration must be given to the impact that this has on the original proposal.

Document 1, the Research Proposal, set out that this research project seeks to investigate the future needs of management education, training and development for the construction industry in higher education. In furtherance of this objective hypothesis one has established that recruitment to higher education construction industry related courses would appear to be influenced by both the same causal and generative mechanisms that influence construction industry employment levels, and that the level of employment is in itself a casual and generative mechanism in higher education recruitment.

Hypothesis two has established that any attempt to predict future demand (recruitment) based upon levels of employment will most likely be a futile exercise as neither the construction industry nor higher education is a closed system, an essential prerequisite for modelling and predictive tools.

The next chapter, chapter 4.6: Further and Future work, will consider ways in which the work undertaken in this project might be continued in the future, in directions in pursuance of the aims and objectives of this research proposal, and in ways beyond these aims and objectives.

4.6 Further and Future Work

4.6.1 Introduction

This chapter considers the various directions this project could take for further and future work. These not only include lengthening and broadening the study by extending data collection and adding in new dimensions to that already considered, but also considering new related areas of study. Those identified for possible inclusion in Document 5 will be identified.

4.6.2 Lengthening the study

There are many ways in which this project could be extended. Not least of which is the continued collection, collation and analysis of the data for construction employment and university recruitment to continue the study of their trends and patterns. It has already been established that it is unlikely that it will be possible to obtain further data to extend the study backwards to earlier times, but the author will continue to collect employment and recruitment data as and when it is published and will continue to update the comparative study and correlations. For example, at the time of writing, February 2005, UCAS have just published the applications and acceptances data for the 2004 to 2005 academic year, and although the author has obtained the UCAS data for this period a conscious decision was made not to include this data in this study due to the amount of work that would be required to re-work all the statistical analysis. Other UCAS data required for Document 5 has not yet been made available, but it is expected to be received by the end of February 2005.

4.6.3 Broadening the study

An alternative criteria that can be used for the construction industry is its level of economic activity, in effect, the industry's turnover. This information is also published in the same reports, the Housing and Construction Statistics / Construction Statistics Annual, as the employment data. Thus the level of university recruitment could be correlated with the level of turnover, however due regard will have to be paid to inflation over the decades, and the effect that this has on the value of the

turnover. Adjustment of turnover will need to be made to negate the effects of inflation by establishing a base-date for the data and its corresponding index levels for inflation.

This project has taken a holistic approach to both employment and recruitment, the latter due mainly to discontinuities in the reporting through reclassification of some subject areas when the JACS codes were introduced in 1985. Notwithstanding this it would be an interesting exercise to establish the trends in the various subject groups as there is anecdotal evidence to suggest that different sectors of the industry respond differently to the changes in the industry's environment, typically the 'small works' sector responds far quicker to changes than that of civil engineering; the former for example undertaking domestic alterations and extensions work has a project life cycle of just a few months, whereas large civil engineering works can have a project life-cycle of many years, even decades at times.

4.6.4 Deepening the study

Another dimension that might be considered in terms of its effect on both employment and recruitment levels is that of demographic changes, in this case the population level. The importance of the construction industry to the UK's economy is well understood and documented (e.g. Morton, 2002; Hillebrandt, 2000; Harvey and Ashworth, 1993; Powell, 1982) and indeed the construction industry is used by governments as an economic regulator through government spending levels on both social and infrastructure projects such as housing and road building programmes, and school and hospital building programmes. Consideration should therefore be given to the numbers of working population that are employed in the construction industry. Further consideration might also be given to where in the construction industry those people are employed (which market sectors), and whether or how this changes with the level of economic activity.

Another dynamic of population to be considered is that of school/college students and the population level of those of 'A' level age, nominally seventeen years of age, who constitute the overwhelming majority of university applicants. Thus it should

be determined what the population of seventeen years olds is, what proportion/percentage take 'A' levels and obtain H.E. entry level qualifications, and what proportion/percentage enter the construction industry. This will enable the potential 'supply' element to H.E. to be established.

4.6.5 Changes to Industry Structure

Another area for study is that of the internal structure of the construction industry, and the nature of the employment within it. Reference has already been made to different market segments within the industry but how does employment vary within these segments, and how is employment structured throughout the industry in terms of the numbers and sizes of companies in terms of both turnover and employment? How do these vary in response to environmental changes?

4.6.6 Industry Cycles

Reference has already been made to the cyclical nature of the industry, often in terms of 'boom and bust' periods. The perspective adopted in this study is that there is a single cycle consisting of inflationary (boom) periods and deflationary (bust) periods. However the 'ups and downs' in employment in the construction industry may not be the result of a single cycle, but the result of the coexistence of several cycles all impacting upon employment. Additionally these cycles could have different wavelengths thus when not coincident, periods of relative stability can ensue but when coincident, become reinforcing, resulting in sudden large 'booms' in an inflationary cycle, or when in a deflationary cycle extremely deep recessions in the industry.

Houldsworth⁵ suggests the existence of a long cycle of inflation and deflation in the construction industry in both economic output and employment resulting from reparations work following the Second World War. This work peaked around the

⁵ From a series of discussions in the 1990s between the author and Harry Houldsworth, Director of Studies (retired) Department of Building and Environmental Health, Nottingham Trent University.

mid to late 1960s following the lifting of building licences (in effect a rationing of building materials) in the early 1950s (Powell, 1982), and since the late 1960s the industry has been slowly returning to a more normal level of activity, i.e. the reparations work was complete (see Figure 4.45 below). However a surge in redevelopment work can be expected thirty to fifty years after the reparations work as it reaches the end of its working life and redevelopment takes place. The ripple effects of the reparations work will become dissipated over time and effectively die down.

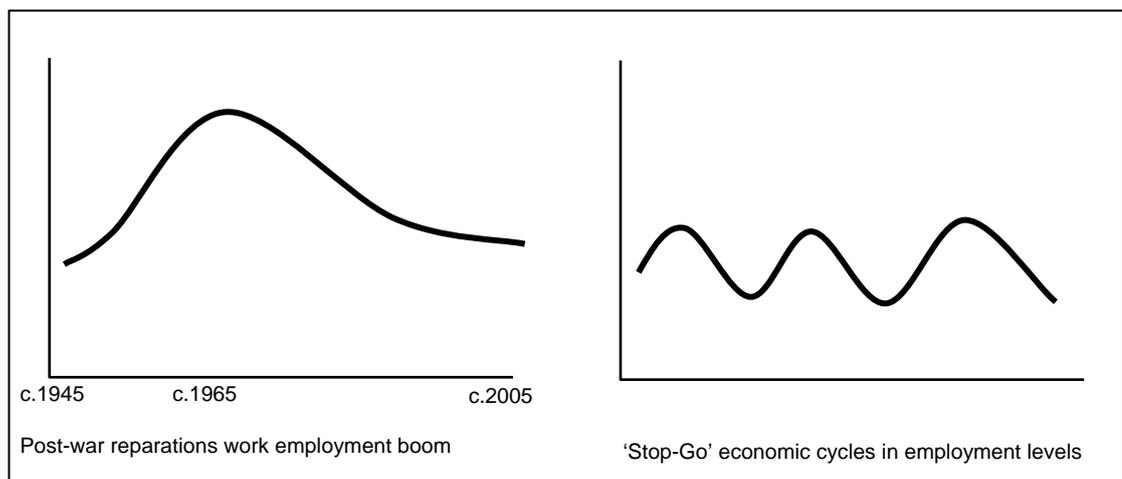


Figure 4.45: Economic Cycles in the Construction Industry

In addition to this is the existence of another inflationary/deflationary cycle caused by the 'stop – go' policies of various governments (Powell, 1982) attempting to heat up or cool down the economy.

4.6.7 Document 5

The author's principle interest, as stated in Document 1, lies in management education, training and development for the construction industry,

The data gathered during this project and analysed within this report will be taken forward to Document 5 to contribute towards an analysis of the market(s) in which higher education takes place in the construction industry. It is hoped to establish

within this market context what the nature of the provision of higher education for the construction industry should be. In order to undertake this, a study of the needs of construction industry employers will be undertaken through a series of interviews and questionnaire surveys to attempt to establish employers' current and future requirements. This study will focus on the needs of construction companies, i.e. those undertaking construction (building) work.

Additionally it is intended that a market analysis of construction industry education will be undertaken to establish NTU's position in the market and market share of undergraduate recruitment. This will be undertaken using data obtained (purchased) from UCAS and HESA, as mentioned earlier in this report. Whilst data appertaining to NTU has been obtained from UCAS enabling a breakdown of applications and acceptances for subject groups and courses, more detailed data from HESA appertaining to other providers (competitors) is in the process of being obtained. Latest indications from HESA are that this data will be available mid to late March 2005.

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Quantitative Research Project

Document 4 - Appendices

**A.G. Hurst
N0013040
February 2005**

**NOTTINGHAM
TRENT UNIVERSITY** 

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Appendix 4.8.1: Construction Industry Employment

| | 1000's Contractors | | | Public Authorities | | | Operatives total | APTC total | Total registered employees | Estimated employees not on register | Self Employed | Total Employed | |
|-------------|--------------------|------|------------------|--------------------|------|-----------------|------------------|------------|----------------------------|-------------------------------------|---------------|----------------|----------------------------|
| | Operatives | APTC | Contractor Total | Operatives | APTC | Public A. Total | | | | | | | |
| 1969 | 995 | 239 | 1,234 | 266 | 99 | 365 | 1,261 | 338 | 1,599 | | 293 | 1,892 | H&CS 1969 - 1979 table 13 |
| 1970 | 912 | 230 | 1,142 | 258 | 103 | 361 | 1,170 | 333 | 1,503 | | 300 | 1,802 | H&CS 1970 - 1980 |
| 1971 | 856 | 222 | 1,078 | 250 | 108 | 358 | 1,106 | 330 | 1,435 | | 328 | 1,764 | H&CS 1971 - 1981 |
| 1972 | 846 | 214 | 1,060 | 243 | 111 | 354 | 1,089 | 325 | 1,417 | | 377 | 1,794 | H&CS 1972 - 1982 |
| 1973 | 886 | 227 | 1,113 | 243 | 113 | 356 | 1,129 | 340 | 1,469 | | 442 | 1,911 | H&CS 1973 - 1983 |
| 1974 | 859 | 237 | 1,096 | 228 | 108 | 336 | 1,087 | 345 | 1,432 | | 423 | 1,855 | H&CS 1974 - 1984 |
| 1975 | 806 | 234 | 1,040 | 232 | 112 | 344 | 1,038 | 346 | 1,384 | | 362 | 1,746 | H&CS 1975 - 1985 table 2.1 |
| 1976 | 774 | 231 | 1,005 | 232 | 110 | 342 | 1,006 | 341 | 1,350 | | 291 | 1,713 | H&CS 1976 - 1986 table 2.1 |
| 1977 | 743 | 224 | 967 | 224 | 110 | 334 | 967 | 334 | 1,300 | | 291 | 1,592 | H&CS 1977 - 1987 table 2.1 |
| 1978 | 737 | 231 | 968 | 221 | 109 | 330 | 958 | 340 | 1,294 | | 291 | 1,680 | H&CS 1978 - 1988 table 2.1 |
| 1979 | 770 | 232 | 1,002 | 217 | 113 | 330 | 987 | 345 | 1,324 | | 343 | 1,666 | H&CS 1979 - 1989 table 2.1 |
| 1980 | 760 | 235 | 995 | 212 | 105 | 317 | 972 | 340 | 1,325 | | 343 | 1,696 | H&CS 1980 - 1990 table 2.1 |
| 1981 | 679 | 230 | 909 | 205 | 104 | 309 | 884 | 334 | 1,221 | | 385 | 1,606 | H&CS 1981 - 1991 table 2.1 |
| 1982 | 619 | 223 | 842 | 187 | 95 | 282 | 806 | 318 | 1,123 | | 388 | 1,533 | H&CS 1982 - 1992 |
| 1983 | 600 | 214 | 814 | 183 | 88 | 271 | 783 | 302 | 1,084 | 33 | 411 | 1,527 | H&CS 1983 - 1993 |
| 1984 | 585 | 214 | 799 | 172 | 85 | 257 | 757 | 299 | 1,055 | 51 | 454 | 1,559 | H&CS 1984 - 1994 |
| 1985 | 556 | 213 | 769 | 169 | 84 | 253 | 725 | 297 | 1,020 | 64 | 470 | 1,556 | H&CS 1985 - 1995 |
| 1986 | 531 | 212 | 743 | 160 | 82 | 242 | 691 | 294 | 985 | 66 | 488 | 1,538 | H&CS 1986 - 1996 |
| 1987 | 549 | 222 | 771 | 156 | 77 | 233 | 705 | 299 | 1,005 | 53 | 535 | 1,592 | H&CS 1987 - 1997 |
| 1988 | 562 | 235 | 797 | 147 | 74 | 221 | 709 | 309 | 1,017 | 69 | 592 | 1,677 | H&CS 1988 - 1998 |
| 1989 | 552 | 242 | 794 | 140 | 77 | 217 | 692 | 319 | 1,011 | 67 | 722 | 1,733 | H&CS 1989 - 1999 |
| 1990 | 583 | 266 | 849 | 127 | 66 | 193 | 710 | 332 | 985 | 76 | 718 | 1,832 | CSA 2001 table 12.2 |

Employment Source data used

| | 1000's Contractors | | | Public Authorities | | | Operatives total | APTC total | Total registered employees | Estimated employees not on register | Self Employed | Total Employed |
|-------------|--------------------|------|------------------|--------------------|------|-----------------|------------------|------------|----------------------------|-------------------------------------|---------------|----------------|
| | Operatives | APTC | Contractor Total | Operatives | APTC | Public A. Total | | | | | | |
| 1991 | 516 | 251 | 767 | 120 | 63 | 183 | 636 | 314 | 962 | 91 | 657 | 1,698 |
| 1992 | 437 | 221 | 658 | 112 | 56 | 168 | 549 | 277 | 825 | 98 | 597 | 1,520 |
| 1993 | 390 | 204 | 594 | 102 | 50 | 152 | 492 | 254 | 745 | 94 | 571 | 1,410 |
| 1994 | 361 | 198 | 559 | 90 | 42 | 132 | 451 | 240 | 691 | 89 | 604 | 1,388 |
| 1995 | 350 | 199 | 549 | 86 | 38 | 124 | 436 | 237 | 673 | 80 | 621 | 1,374 |
| 1996 | 350 | 201 | 551 | 76 | 32 | 108 | 426 | 233 | 659 | 87 | 625 | 1,371 |
| 1997 | 384 | 200 | 584 | 70 | 26 | 96 | 454 | 226 | 680 | 112 | 593 | 1,385 |
| 1998 | 431 | 205 | 636 | 68 | 25 | 93 | 499 | 230 | 729 | 183 | 518 | 1,430 |
| 1999 | 484 | 206 | 690 | 60 | 23 | 83 | 544 | 229 | 773 | 131 | 511 | 1,415 |
| 2000 | 520 | 225 | 745 | 57 | 23 | 80 | 577 | 248 | 825 | 128 | 498 | 1,451 |
| 2001 | 534 | 250 | 784 | 51 | 21 | 72 | 585 | 271 | 856 | 106 | 572 | 1,534 |
| 2002 | 544 | 251 | 795 | 45 | 19 | 64 | 589 | 270 | 859 | 169 | 586 | 1,614 |
| 2003 | 563 | 253 | 816 | 39 | 18 | 57 | 602 | 271 | 873 | 120 | 603 | 1,596 |

Employment Source data used

CSA 2002 table 12.2

CSA 2003 table 12.2

CSA 2004 table 12.2

Appendix 4.8.2: Acceptances to Construction Industry Degree Courses

| Acceptances to degree courses | | | | | | | | | | | Source data used | |
|-------------------------------|----------------------|------------------------------|-----------------|----------------------------|-------------------------------|----------------------------|-----------------|------------------------|--------------------------------|---------------------|------------------------|-------------------------|
| | H2 Civil Engineering | K0 Arch, Building & Planning | K1 Architecture | K2 Building / construction | K3 Environmental technologies | K4 Town & country planning | KK Combinations | z No preferred subject | K9 other architectural studies | Total Section K + H | Total sections H2 + K2 | |
| 1986 | 2,226 | | 1,240 | 1,352 | 100 | 454 | 43 | | | 5,415 | 3,578 | UCG 1986 + PCAS 1985-86 |
| 1987 | 1,996 | | 1,286 | 1,383 | 107 | 549 | 45 | | | 5,366 | 3,379 | UCG 1987 + PCAS 1986-87 |
| 1988 | 1,947 | | 1,381 | 1,513 | 103 | 540 | 40 | | | 5,524 | 3,460 | UCG 1988 + PCAS 1988-88 |
| 1989 | 2,473 | | 1,511 | 1,863 | 117 | 867 | 52 | | | 6,883 | 4,336 | UCG 1989 + PCAS 1988-89 |
| 1990 | 2,755 | | 1,684 | 2,211 | 185 | 838 | 15 | | | 7,688 | 4,966 | UCG 1990 + PCAS 1989-90 |
| 1991 | 3,259 | | 1,773 | 2,365 | 267 | 973 | 38 | | | 8,675 | 5,624 | UCG 1991 + PCAS 1990-91 |
| 1992 | 3,532 | | 2,098 | 2,560 | 367 | 1,069 | 34 | | | 9,660 | 6,092 | UCG 1992 + PCAS 1991-92 |
| 1993 | 3,463 | | 2,002 | 2,651 | 284 | 1,146 | 24 | | | 9,570 | 6,114 | UCG 1993 + PCAS 1992-93 |
| 1994 | 3,755 | | 1,972 | 2,367 | 373 | 1,036 | | | | 9,503 | 6,122 | HESA 1994 |
| 1995 | 4,159 | | 2,159 | 2,718 | 306 | 1,056 | 4 | | | 10,402 | 6,877 | HESA 1995 |
| 1996 | 3,532 | | 2,174 | 2,430 | 297 | 1,057 | 41 | | | 9,531 | 5,962 | HESA 1996 |
| 1997 | 3,463 | | 2,368 | 2,498 | 258 | 1,092 | 102 | | | 9,781 | 5,961 | HESA 1997 |
| 1998 | 2,869 | | 2,311 | 2,345 | 236 | 964 | 95 | | | 8,820 | 5,214 | HESA 1998 |
| 1999 | 2,624 | | 2,333 | 2,211 | 267 | 895 | 107 | | 1 | 8,438 | 4,835 | HESA 1999 |
| 2000 | 2,493 | | 2,340 | 2,131 | 230 | 877 | 139 | | 6 | 8,216 | 4,624 | HESA 2000 |

| Acceptances to degree courses | | | | | | | | | | | | Source data used |
|-------------------------------|----------------------|------------------------------|-----------------|----------------------------|-------------------------------|----------------------------|-----------------|------------------------|--------------------------------|---------------------|------------------------|------------------|
| Source: HESA/UCCA/PCAS | | | | | | | | | | | | |
| | H2 Civil Engineering | K0 Arch, Building & Planning | K1 Architecture | K2 Building / construction | K3 Environmental technologies | K4 Town & country planning | KK Combinations | z No preferred subject | K9 other architectural studies | Total Section K + H | Total sections H2 + K2 | |
| 2001 | 2,362 | | 2,535 | 2,080 | 246 | 784 | 127 | | 9 | 8,143 | 4,442 | HESA 2001 |
| 2002 | 2,452 | 10 | 2,754 | 2,013 | 221 | 689 | 1 | | 27 | 8,167 | 4,465 | HESA 2002 |
| 2003 | 2,779 | 12 | 3,067 | 2,665 | 191 | 868 | 156 | | 27 | 9,765 | 5,444 | HESA 2003 |

Appendix 4.8.3: Industry Employment and University Acceptances: Full Dataset

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1969 | 1892 | | | | | | | | |
| 1970 | 1802 | | | | | | | | |
| 1971 | 1764 | | | | | | | | |
| 1972 | 1794 | | | | | | | | |
| 1973 | 1911 | | | | | | | | |
| 1974 | 1855 | | | | | | | | |
| 1975 | 1746 | | | | | | | | |
| 1976 | 1713 | | | | | | | | |
| 1977 | 1592 | | | | | | | | |
| 1978 | 1680 | | | | | | | | |
| 1979 | 1666 | | | | | | | | 3578 |
| 1980 | 1696 | | | | | | | 3578 | 3379 |
| 1981 | 1606 | | | | | | 3578 | 3379 | 3460 |
| 1982 | 1533 | | | | | 3578 | 3379 | 3460 | 4336 |
| 1983 | 1527 | | | | 3578 | 3379 | 3460 | 4336 | 4966 |
| 1984 | 1559 | | | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 |
| 1985 | 1556 | | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 |
| 1986 | 1538 | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 |
| 1987 | 1592 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 |
| 1988 | 1677 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 |
| 1989 | 1733 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 |
| 1990 | 1832 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 |

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1991 | 1698 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 |
| 1992 | 1520 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 |
| 1993 | 1410 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 |
| 1994 | 1388 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 |
| 1995 | 1374 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 |
| 1996 | 1371 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 |
| 1997 | 1385 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 | |
| 1998 | 1430 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 | | |
| 1999 | 1415 | 4835 | 4624 | 4442 | 4465 | 5445 | | | |
| 2000 | 1451 | 4624 | 4442 | 4465 | 5445 | | | | |
| 2001 | 1534 | 4442 | 4465 | 5445 | | | | | |
| 2002 | 1614 | 4465 | 5445 | | | | | | |
| 2003 | 1596 | 5445 | | | | | | | |

Appendix 4.8.4: Kolmogorov-Smirnov Statistic and Significance

| Significance α | 0.20 | 0.15 | 0.10 | 0.05 | 0.01 |
|--------------------------|-------|-------|-------|-------|-------|
| n | | | | | |
| 1 | 0.900 | 0.925 | 0.950 | 0.975 | 0.995 |
| 2 | 0.684 | 0.726 | 0.776 | 0.842 | 0.929 |
| 3 | 0.565 | 0.597 | 0.642 | 0.708 | 0.828 |
| 4 | 0.494 | 0.525 | 0.564 | 0.624 | 0.733 |
| 5 | 0.446 | 0.474 | 0.510 | 0.565 | 0.669 |
| 6 | 0.410 | 0.436 | 0.470 | 0.521 | 0.618 |
| 7 | 0.381 | 0.405 | 0.438 | 0.486 | 0.577 |
| 8 | 0.358 | 0.381 | 0.411 | 0.457 | 0.543 |
| 9 | 0.339 | 0.360 | 0.388 | 0.432 | 0.514 |
| 10 | 0.332 | 0.342 | 0.368 | 0.410 | 0.490 |
| 11 | 0.307 | 0.326 | 0.352 | 0.391 | 0.468 |
| 12 | 0.295 | 0.313 | 0.338 | 0.375 | 0.450 |
| 13 | 0.284 | 0.302 | 0.325 | 0.361 | 0.433 |
| 14 | 0.274 | 0.292 | 0.314 | 0.349 | 0.418 |
| 15 | 0.266 | 0.283 | 0.304 | 0.338 | 0.404 |

| Significance α | 0.20 | 0.15 | 0.10 | 0.05 | 0.01 |
|--------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|
| n | | | | | |
| 16 | 0.258 | 0.274 | 0.295 | 0.327 | 0.392 |
| 17 | 0.250 | 0.266 | 0.286 | 0.318 | 0.381 |
| 18 | 0.244 | 0.259 | 0.279 | 0.309 | 0.371 |
| 19 | 0.237 | 0.252 | 0.271 | 0.301 | 0.361 |
| 20 | 0.232 | 0.246 | 0.265 | 0.294 | 0.352 |
| 25 | 0.208 | 0.22 | 0.238 | 0.264 | 0.317 |
| 30 | 0.190 | 0.20 | 0.218 | 0.242 | 0.290 |
| 35 | 0.177 | 0.19 | 0.202 | 0.224 | 0.269 |
| 40 | 0.165 | . | 0.189 | 0.210 | 0.252 |
| 45 | 0.16 | . | 0.18 | 0.20 | 0.24 |
| 50 | 0.15 | . | 0.17 | 0.20 | 0.23 |
| >50 | $\frac{1.07}{\sqrt{n}}$ | $\frac{1.14}{\sqrt{n}}$ | $\frac{1.22}{\sqrt{n}}$ | $\frac{1.36}{\sqrt{n}}$ | $\frac{1.63}{\sqrt{n}}$ |

Where n = sample size
 α = significance

Table compiled from:

Sources: Conovan W.J.; 1999; *Practical Nonparametric Statistics*; 3rd Ed.; p547; Chichester; John Wiley & Sons.
 RAEA; 1998; *Problem Solvers: Statistics: A Complete Solution to Any Textbook*; p878; Piscataway, New Jersey; RAEA.
 Siegel S.; 1956; *Nonparametric Statistics for the Behavioural Sciences*; p251; London; McGraw Hill;

Appendix 4.8.5: Shapiro-Wilk Statistic and Significance

| Quantile/ Significance T_3 | 0.10 | 0.50 | 0.90 | 0.95 | 0.99 |
|---------------------------------|-------|-------|-------|-------|-------|
| n | | | | | |
| 3 | 0.789 | 0.959 | 0.998 | 0.999 | 1.000 |
| 4 | 0.792 | 0.935 | 0.987 | 0.992 | 0.997 |
| 5 | 0.806 | 0.927 | 0.979 | 0.986 | 0.993 |
| 6 | 0.826 | 0.927 | 0.974 | 0.981 | 0.989 |
| 7 | 0.838 | 0.928 | 0.972 | 0.979 | 0.988 |
| 8 | 0.851 | 0.932 | 0.972 | 0.978 | 0.987 |
| 9 | 0.859 | 0.935 | 0.972 | 0.978 | 0.986 |
| 10 | 0.869 | 0.938 | 0.972 | 0.978 | 0.986 |
| 11 | 0.876 | 0.940 | 0.973 | 0.979 | 0.986 |
| 12 | 0.883 | 0.943 | 0.973 | 0.979 | 0.986 |
| 13 | 0.889 | 0.945 | 0.974 | 0.979 | 0.986 |
| 14 | 0.895 | 0.947 | 0.975 | 0.980 | 0.986 |
| 15 | 0.901 | 0.950 | 0.975 | 0.980 | 0.987 |

| Quantile/ Significance T_3 | 0.10 | 0.50 | 0.90 | 0.95 | 0.99 |
|---------------------------------|-------|-------|-------|-------|-------|
| n | | | | | |
| 16 | 0.906 | 0.952 | 0.976 | 0.981 | 0.987 |
| 17 | 0.910 | 0.954 | 0.977 | 0.981 | 0.987 |
| 18 | 0.914 | 0.956 | 0.978 | 0.982 | 0.988 |
| 19 | 0.917 | 0.957 | 0.978 | 0.982 | 0.988 |
| 20 | 0.920 | 0.959 | 0.979 | 0.983 | 0.988 |
| 21 | 0.923 | 0.960 | 0.980 | 0.983 | 0.989 |
| 22 | 0.926 | 0.961 | 0.980 | 0.984 | 0.990 |
| 23 | 0.928 | 0.962 | 0.981 | 0.984 | 0.990 |
| 24 | 0.930 | 0.963 | 0.981 | 0.984 | 0.991 |
| 25 | 0.964 | 0.964 | 0.985 | 0.985 | 0.991 |
| 30 | 0.967 | 0.967 | 0.985 | 0.985 | 0.990 |
| 35 | 0.969 | 0.969 | 0.986 | 0.986 | 0.990 |
| 40 | 0.972 | 0.972 | 0.987 | 0.987 | 0.991 |
| 45 | 0.973 | 0.973 | 0.988 | 0.988 | 0.991 |
| 50 | 0.955 | 0.974 | 0.988 | 0.988 | 0.991 |

Where n = sample size
w = significance

Table compiled from:

Source: Conovan W.J.; 1999; Practical Nonparametric Statistics; 3rd Ed.; p552; Chichester; John Wiley & Sons.

Appendix 4.8.6: Kolmogorov-Smirnov test and Shapiro-Wilk Test**Kolmogorov-Smirnov Test**

A significance test proposed by Kolmogorov (1933) and Smirnov (1939) and later writers. If $F(x)$ is the population distribution function and $S_n(x)$ the observed distribution (step) function of the sample then the test makes use of the statistic $d = \max\{F(x) - S_n(x)\}$. This has a distribution independent of $F(x)$ provided that the latter is a continuous distribution function. The method can be extended to discontinuous distributions by modifying the association probability statement from an exact to a minimum level.

The test may be applied as one of ‘goodness of fit’ and the *d*-statistic may also be used to set confidence limits to an unknown distribution. It has been extended by Smirnov to test the homogeneity of the two distributed functions on the basis of a sample from each. The Smirnov test of homogeneity depends on the greatest difference of the two observed distribution (step-) functions and is distribution free.

Source: Kendal and Buckland (1971: 79)

Shapiro-Wilk Test. (1965)

An analysis of variance-type test of Normality for a complete sample where the test statistic is the ratio of the sum of the square of a linear combination of the sample order statistics to the usual estimate of the variance.

Source: Kendal and Buckland (1971: 137)

Appendix 4.8.7: ‘Stem and Leaf’ Plots Data: Employment Data (Full Dataset)

| Offset 0 year | |
|----------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 4.00 | 14 . 1135 |
| 5.00 | 15 . 23399 |
| 3.00 | 16 . 179 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -1 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 4.00 | 13 . 1135 |
| 5.00 | 15 . 23359 |
| 3.00 | 16 . 179 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -2 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 4.00 | 14 . 1135 |
| 6.00 | 15 . 233559 |
| 2.00 | 16 . 79 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -3 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 4.00 | 14 . 1135 |
| 6.00 | 15 . 223559 |
| 2.00 | 16 . 79 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -4 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 3.00 | 14 . 113 |
| 7.00 | 15 . 2233559 |
| 2.00 | 16 . 79 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -5 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 2.00 | 14 . 113 |
| 7.00 | 15 . 2233559 |
| 3.00 | 16 . 079 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -6 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 4.00 | 13 . 7788 |
| 1.00 | 14 . 1 |
| 7.00 | 15 . 2233559 |
| 4.00 | 16 . 799 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

| Offset -7 years | |
|------------------------|------------------------|
| Frequency | Stem & Leaf |
| 3.00 | 13 . 778 |
| 1.00 | 14 . 1 |
| 7.00 | 15 . 2233559 |
| 5.00 | 16 . 06799 |
| 1.00 | 17 . 3 |
| 1.00 | 18 . 3 |
| Stem width: 100 | |
| Each leaf: 1 case(s) | |

Appendix 4.8.8: ‘Stem and Leaf’ Plots Data: Acceptances data

| Offset 0 year | |
|----------------------|------------------------|
| Frequency | Stem & Leaf |
| 2.00 | 3 . 34 |
| 1.00 | 3 . 5 |
| 3.00 | 4 . 344 |
| 3.00 | 4 . 689 |
| 2.00 | 5 . 24 |
| 3.00 | 5 . 699 |
| 3.00 | 6 . 011 |
| 1.00 | 6 . 8 |
| | |
| Stem width: | 100 |
| Each leaf: | 1 case(s) |

Appendix 4.8.9: Box-plot Data

| Employment x1000 | | | | | |
|-------------------------|---------|---------|---------|-------|----------------------|
| Offset (Years) | Median | Minimum | Maximum | Range | Inter-quartile range |
| 0 | 1527.00 | 1371 | 1832 | 461 | 225 |
| -1 | 1527.00 | 1371 | 1832 | 461 | 225 |
| -2 | 1527.00 | 1371 | 1832 | 461 | 209 |
| -3 | 1523.50 | 1371 | 1832 | 461 | 209 |
| -4 | 1530.00 | 1371 | 1832 | 461 | 209 |
| -5 | 1535.50 | 1371 | 1832 | 461 | 219 |
| -6 | 1547.00 | 1371 | 1832 | 461 | 277 |
| -7 | 1577.50 | 1371 | 1832 | 461 | 189 |
| Acceptances | | | | | |
| Actual | 5090.00 | 3379 | 6877 | 3498 | 1579 |

**Appendix 4.8.10: Construction Employment and University Acceptances Correlation:
Full Dataset 2-Tailed Testing**

| Test | | | | Total Employment Level | Acceptances Actual | Total Employment Level | Acceptances Step -1 year | Total Employment Level | Acceptances Step - 2 years | Total Employment Level | Acceptances Step - 3 years |
|----------------|-----------------|------------------------|---|---|-------------------------|------------------------|--------------------------|------------------------|----------------------------|------------------------|----------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.464** 0.007 18 | 1.000 35 | -0.229 0.185 18 | 1.000 35 | -0.046 0.791 18 | 1.000 35 | 0.098 0.570 18 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.464** 0.007 18 | 1.000 18 | -0.229 0.185 18 | 1.000 18 | -0.046 0.791 18 | 1.000 18 | 0.098 0.570 18 | 1.000 18 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.628** 0.005 18 | 1.000 35 | -0.327 0.185 18 | 1.000 35 | -0.071 0.779 18 | 1.000 35 | 0.205 0.414 18 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.628** 0.005 18 | 1.000 18 | -0.327 0.185 18 | 1.000 18 | -0.071 0.779 18 | 1.000 18 | 0.205 0.414 18 | 1.000 18 |
| | | | | **. Correlation is significant at the 0.01 level (2-tailed) | | | | | | | |

| Test | | | | Total Employment Level | Acceptances Step -4 years | Total Employment Level | Acceptances Step -5 years | Total Employment Level | Acceptances Step -6 years | Total Employment Level | Acceptances Step -7 years | |
|-----------------------|------------------------|------------------------|---|--|---------------------------|------------------------|---------------------------|------------------------|---------------------------|------------------------|---------------------------|-------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.320 18 | 1.000 35 | 0.438* 18 | 1.000 35 | 0.307 18 | 1.000 35 | 0.137 18 | |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.320 0.063 18 | 1.000 18 | 0.438* 0.011 18 | 1.000 18 | 0.307 0.075 18 | 1.000 18 | 0.137 0.426 18 | 1.000 18 | |
| | | | | | | | | | | | | |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.432 18 | 1.000 35 | 0.531* 18 | 1.000 18 | 1.000 35 | 0.422 18 | 1.000 35 | 0.197 18 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.432 0.073 18 | 1.000 18 | 0.531* 0.023 18 | 1.000 18 | 0.422 0.081 18 | 1.000 18 | 0.197 0.433 18 | 1.000 18 | |
| | | | | | | | | | | | | |
| | | | | *. Correlation is significant at the 0.05 level (2-tailed) | | | | | | | | |

Appendix 4.8.11: Industry Employment and University Acceptances: Selected Dataset: Rising Acceptances

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1969 | 1892 | | | | | | | | |
| 1970 | 1802 | | | | | | | | |
| 1971 | 1764 | | | | | | | | |
| 1972 | 1794 | | | | | | | | |
| 1973 | 1911 | | | | | | | | |
| 1974 | 1855 | | | | | | | | |
| 1975 | 1746 | | | | | | | | |
| 1976 | 1713 | | | | | | | | |
| 1977 | 1592 | | | | | | | | |
| 1978 | 1680 | | | | | | | | |
| 1979 | 1666 | | | | | | | | |
| 1980 | 1696 | | | | | | | | 3379 |
| 1981 | 1606 | | | | | | | 3379 | 3460 |
| 1982 | 1533 | | | | | | 3379 | 3460 | 4336 |
| 1983 | 1527 | | | | | 3379 | 3460 | 4336 | 4966 |
| 1984 | 1559 | | | | 3379 | 3460 | 4336 | 4966 | 5624 |
| 1985 | 1556 | | | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 |
| 1986 | 1538 | | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 |
| 1987 | 1592 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 |
| 1988 | 1677 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 |
| 1989 | 1733 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | |
| 1990 | 1832 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | | |

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|-------------|-----------------------------|---|--|--|--|--|--|--|--|
| 1991 | 1698 | 5624 | 6092 | 6114 | 6122 | 6877 | | | |
| 1992 | 1520 | 6092 | 6114 | 6122 | 6877 | | | | |
| 1993 | 1410 | 6114 | 6122 | 6877 | | | | | |
| 1994 | 1388 | 6122 | 6877 | | | | | | |
| 1995 | 1374 | 6877 | | | | | | | |
| 1996 | 1371 | | | | | | | | |
| 1997 | 1385 | | | | | | | | |
| 1998 | 1430 | | | | | | | | |
| 1999 | 1415 | | | | | | | | |
| 2000 | 1451 | | | | | | | | |
| 2001 | 1534 | | | | | | | | |
| 2002 | 1614 | | | | | | | | |
| 2003 | 1596 | | | | | | | | |

Appendix 4.8.12: Construction Employment and University Acceptances Correlation:
Selected Dataset: Rising Acceptances 2-tailed Testing

| Test | | | | Total Employment Level | Acceptances Actual | Total Employment Level | Acceptances Step -1 year | Total Employment Level | Acceptance's Step - 2 years | Total Employment Level | Acceptances Step - 3 years |
|----------------|-----------------|------------------------|---|--|-----------------------|------------------------|--------------------------|------------------------|-----------------------------|------------------------|----------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.556* 0.037 9 | 1.000 35 | -0.278 0.297 9 | 1.000 35 | 0.000 1.000 9 | 1.000 35 | 0.278 0.297 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.556* 0.037 9 | 1.000 9 | -0.278 0.297 9 | 1.000 9 | 0.000 1.000 9 | 1.000 9 | 0.278 0.297 9 | 1.000 9 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.717* 0.030 9 | 1.000 35 | -0.467 0.205 9 | 1.000 35 | -0.133 0.732 9 | 1.000 9 | 0.283 0.460 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.717* 0.030 9 | 1.000 9 | -0.467 0.205 9 | 1.000 9 | -0.133 0.732 9 | 1.000 9 | 0.283 0.460 9 | 1.000 9 |
| | | | | *. Correlation is significant at the 0.05 level (2-tailed) | | | | | | | |

| Test | | | | Total Employment Level | Acceptances Step -4 years | Total Employment Level | Acceptances Step -5 years | Total Employment Level | Acceptances Step -6 years | Total Employment Level | Acceptances Step -7 years |
|----------------|-----------------|------------------------|---|---|---------------------------|---|---------------------------|------------------------|---------------------------|------------------------|---------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.722** 0.007 9 | 1.000 35 | 0.778** 0.004 9 | 1.000 35 | 0.444 0.095 9 | 1.000 35 | 0.000 1.000 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.722** 0.007 9 | 1.000 9 | 0.778** 0.004 9 | 1.000 9 | 0.444 0.095 9 | 1.000 9 | 0.000 1.000 9 | 1.000 1.000 9 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.883** 0.002 9 | 1.000 35 | 0.917** 0.001 9 | 1.000 35 | 0.567 0.112 9 | 1.000 35 | -0.033 0.932 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.883** 0.002 9 | 1.000 9 | 0.917** 0.001 9 | 1.000 9 | 0.567 0.112 9 | 1.000 9 | -0.033 0.932 9 | 1.000 1.000 9 |
| | | | | **. Correlation is significant at the 0.01 level (2-tailed) | | **. Correlation is significant at the 0.01 level (2-tailed) | | | | | |

Appendix 4.8.13: Industry Employment and University Acceptances: Selected Dataset: Falling Acceptances

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1969 | 1892 | | | | | | | | |
| 1970 | 1802 | | | | | | | | |
| 1971 | 1764 | | | | | | | | |
| 1972 | 1794 | | | | | | | | |
| 1973 | 1911 | | | | | | | | |
| 1974 | 1855 | | | | | | | | |
| 1975 | 1746 | | | | | | | | |
| 1976 | 1713 | | | | | | | | |
| 1977 | 1592 | | | | | | | | |
| 1978 | 1680 | | | | | | | | |
| 1979 | 1666 | | | | | | | | 3578 |
| 1980 | 1696 | | | | | | | 3578 | 3379 |
| 1981 | 1606 | | | | | | 3578 | 3379 | 3460 |
| 1982 | 1533 | | | | | 3578 | 3379 | 3460 | 4336 |
| 1983 | 1527 | | | | 3578 | 3379 | 3460 | 4336 | 4966 |
| 1984 | 1559 | | | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 |
| 1985 | 1556 | | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 |
| 1986 | 1538 | 3578 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 |
| 1987 | 1592 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 |
| 1988 | 1677 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 |
| 1989 | 1733 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 |
| 1990 | 1832 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 |

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|-------------|-----------------------------|---|--|--|--|--|--|--|--|
| 1991 | 1698 | 5624 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 |
| 1992 | 1520 | 6092 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 |
| 1993 | 1410 | 6114 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 |
| 1994 | 1388 | 6122 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 |
| 1995 | 1374 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 |
| 1996 | 1371 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 |
| 1997 | 1385 | 5961 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 | |
| 1998 | 1430 | 5214 | 4835 | 4624 | 4442 | 4465 | 5445 | | |
| 1999 | 1415 | 4835 | 4624 | 4442 | 4465 | 5445 | | | |
| 2000 | 1451 | 4624 | 4442 | 4465 | 5445 | | | | |
| 2001 | 1534 | 4442 | 4465 | 5445 | | | | | |
| 2002 | 1614 | 4465 | 5445 | | | | | | |
| 2003 | 1596 | 5445 | | | | | | | |

Appendix 4.8.14: Construction Employment and University Acceptances Correlation:
Selected Dataset: Falling Acceptances 2-Tailed testing

| Test | | | | Total Employment Level | Acceptances Actual | Total Employment Level | Acceptances Step -1 year | Total Employment Level | Acceptance's Step - 2 years | Total Employment Level | Acceptances Step - 3 years |
|----------------|-----------------|------------------------|--|--|------------------------|------------------------|--------------------------|------------------------|-----------------------------|------------------------|----------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.810* 0.011 7 | 1.000 35 | -0.524 0.099 7 | 1.000 35 | -0.143 0.652 7 | 1.000 35 | 0.333 0.293 7 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.810* 0.011 7 | 1.000 7 | -0.524 0.099 7 | 1.000 7 | -0.143 0.652 7 | 1.000 7 | 0.333 0.293 7 | 1.000 7 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.929** 0.003 7 | 1.000 35 | -0.714 0.071 7 | 1.000 35 | -0.357 0.432 7 | 1.000 35 | 0.357 0.432 7 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.929** 0.003 7 | 1.000 7 | -0.714 0.071 7 | 1.000 7 | -0.357 0.432 7 | 1.000 7 | 0.357 0.432 7 | 1.000 7 |
| | | | | *. Correlation is significant at the 0.05 level (2-tailed) *. Correlation is significant at the 0.01 level (2-tailed) | | | | | | | |

| Test | | | | Total Employment Level | Acceptances Step -4 years | Total Employment Level | Acceptances Step -5 years | Total Employment Level | Acceptances Step -6 years | Total Employment Level | Acceptances Step -7 years | |
|----------------|-----------------|------------------------|---|---|---------------------------|---|---------------------------|---|---------------------------|--|---------------------------|---------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 7 | 0.810* 0.011 7 | 1.000 35 7 | 1.000** 0.000 7 | 1.000 35 7 | 0.905** 0.004 7 | 1.000 35 7 | 0.619 0.051 7 | |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.810* 0.011 7 | 1.000 1.000 7 | 1.000** 0.000 7 | 1.000 1.000 7 | 0.905** 0.004 7 | 1.000 1.000 7 | 0.619 0.051 7 | 1.000 1.000 7 | |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 7 | 0.893** 0.007 7 | 1.000 35 7 | 1.000** 0.000 7 | 1.000** 0.000 9 | 1.000 35 7 | 0.964** 0.000 7 | 1.000 35 7 | 0.750 0.052 7 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.893** 0.007 7 | 1.000 1.000 7 | 1.000** 0.000 7 | 1.000 1.000 7 | 0.964** 0.000 7 | 1.000 1.000 7 | 0.750 0.052 7 | 1.000 1.000 7 | |
| | | | | *. Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2-tailed) | | **. Correlation is significant at the 0.01 level (2-tailed) | | **. Correlation is significant at the 0.01 level (2-tailed) | | *. Correlation is significant at the 0.05 level (2-tailed) | | |

Appendix 4.8.15: Industry Employment and University Acceptances: Selected Dataset: All-Rising Acceptances

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1969 | 1892 | | | | | | | | |
| 1970 | 1802 | | | | | | | | |
| 1971 | 1764 | | | | | | | | |
| 1972 | 1794 | | | | | | | | |
| 1973 | 1911 | | | | | | | | |
| 1974 | 1855 | | | | | | | | |
| 1975 | 1746 | | | | | | | | |
| 1976 | 1713 | | | | | | | | |
| 1977 | 1592 | | | | | | | | |
| 1978 | 1680 | | | | | | | | |
| 1979 | 1666 | | | | | | | | |
| 1980 | 1696 | | | | | | | | 3379 |
| 1981 | 1606 | | | | | | | 3379 | 3460 |
| 1982 | 1533 | | | | | | 3379 | 3460 | 4336 |
| 1983 | 1527 | | | | | 3379 | 3460 | 4336 | 4966 |
| 1984 | 1559 | | | | 3379 | 3460 | 4336 | 4966 | 5624 |
| 1985 | 1556 | | | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 |
| 1986 | 1538 | | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 |
| 1987 | 1592 | 3379 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 |
| 1988 | 1677 | 3460 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 |
| 1989 | 1733 | 4336 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | |
| 1990 | 1832 | 4966 | 5624 | 6092 | 6114 | 6122 | 6877 | | |

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1991 | 1698 | 5624 | 6092 | 6114 | 6122 | 6877 | | | |
| 1992 | 1520 | 6092 | 6114 | 6122 | 6877 | | | | |
| 1993 | 1410 | 6114 | 6122 | 6877 | | | | | |
| 1994 | 1388 | 6122 | 6877 | | | | | | 4442 |
| 1995 | 1374 | 6877 | | | | | | 4442 | 4465 |
| 1996 | 1371 | | | | | | 4442 | 4465 | 5445 |
| 1997 | 1385 | | | | | 4442 | 4465 | 5445 | |
| 1998 | 1430 | | | | 4442 | 4465 | 5445 | | |
| 1999 | 1415 | | | 4442 | 4465 | 5445 | | | |
| 2000 | 1451 | | 4442 | 4465 | 5445 | | | | |
| 2001 | 1534 | 4442 | 4465 | 5445 | | | | | |
| 2002 | 1614 | 4465 | 5445 | | | | | | |
| 2003 | 1596 | 5445 | | | | | | | |

Appendix 4.8.16: Construction Employment and University Acceptances Correlation:
Selected Dataset: All-Rising Acceptances 2-tailed Testing

| Test | | | | Total Employment Level | Acceptances Actual | Total Employment Level | Acceptances Step -1 year | Total Employment Level | Acceptance's Step - 2 years | Total Employment Level | Acceptances Step - 3 years | |
|----------------|-----------------|------------------------|---|--|------------------------|------------------------|--------------------------|------------------------|-----------------------------|------------------------|----------------------------|----------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.485* 0.028 12 | 1.000 35 | -0.182 0.411 12 | 1.000 35 | 0.030 0.891 12 | 1.000 35 | 0.273 0.217 12 | |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.485* 0.028 12 | 1.000 12 | -0.182 0.411 12 | 1.000 12 | 0.030 0.891 12 | 1.000 12 | 0.273 0.217 12 | 1.000 12 | |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.622* 0.031 12 | 1.000 35 | -0.287 0.366 12 | 1.000 35 | 0.000 1.000 12 | 1.000 1.000 12 | 1.000 35 | 0.406 0.191 12 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.622* 0.031 12 | 1.000 12 | -0.287 0.366 12 | 1.000 12 | 0.000 1.000 12 | 1.000 12 | 0.406 0.191 12 | 1.000 12 | |
| | | | | *. Correlation is significant at the 0.05 level (2-tailed) | | | | | | | | |

| Test | | | | Total Employment Level | Acceptances Step -4 years | Total Employment Level | Acceptances Step -5 years | Total Employment Level | Acceptances Step -6 years | Total Employment Level | Acceptances Step -7 years | |
|----------------|-----------------|------------------------|---|------------------------|--|------------------------|---|------------------------|---------------------------|------------------------|---------------------------|--|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.515* 0.020 12 | 1.000 35 | 0.576** 0.009 12 | 1.000 35 | 0.364 0.100 12 | 1.000 35 | 0.061 0.784 12 | |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.515* 0.020 12 | 1.000 12 | 0.576** 0.009 12 | 1.000 12 | 0.364 0.100 12 | 1.000 12 | 0.061 0.784 12 | 1.000 12 | |
| | | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.692* 0.013 12 | 1.000 35 | 0.706* 0.010 12 | 1.000 35 | 0.503 0.095 12 | 1.000 35 | 0.077 0.812 12 | |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.692* 0.013 12 | 1.000 12 | 0.706* 0.010 12 | 1.000 12 | 0.503 0.095 12 | 1.000 12 | 0.077 0.812 12 | 1.000 12 | |
| | | | | | *. Correlation is significant at the 0.05 level (2-tailed) | | *. Correlation is significant at the 0.05 level (2-tailed) **. Correlation is significant at the 0.01 level (2-tailed) | | | | | |

Appendix 4.8.17: Industry Employment and University Acceptances: Selected Dataset: All-Falling Acceptances

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1969 | 1892 | | | | | | | | |
| 1970 | 1802 | | | | | | | | |
| 1971 | 1764 | | | | | | | | |
| 1972 | 1794 | | | | | | | | |
| 1973 | 1911 | | | | | | | | |
| 1974 | 1855 | | | | | | | | |
| 1975 | 1746 | | | | | | | | |
| 1976 | 1713 | | | | | | | | |
| 1977 | 1592 | | | | | | | | |
| 1978 | 1680 | | | | | | | | |
| 1979 | 1666 | | | | | | | | 3578 |
| 1980 | 1696 | | | | | | | 3578 | 3379 |
| 1981 | 1606 | | | | | | 3578 | 3379 | |
| 1982 | 1533 | | | | | 3578 | 3379 | | |
| 1983 | 1527 | | | | 3578 | 3379 | | | |
| 1984 | 1559 | | | 3578 | 3379 | | | | |
| 1985 | 1556 | | 3578 | 3379 | | | | | |
| 1986 | 1538 | 3578 | 3379 | | | | | | |
| 1987 | 1592 | 3379 | | | | | | | |
| 1988 | 1677 | | | | | | | | 6877 |
| 1989 | 1733 | | | | | | | 6877 | 5962 |
| 1990 | 1832 | | | | | | 6877 | 5962 | 5961 |

| Year | Employment x1000 | Acceptances offset 0 years | Acceptances offset -1 years | Acceptances offset -2 years | Acceptances offset -3 years | Acceptances offset -4 years | Acceptances offset -5 years | Acceptances offset -6 years | Acceptances offset -7 years |
|------|---------------------|----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 1991 | 1698 | | | | | 6877 | 5962 | 5961 | 5214 |
| 1992 | 1520 | | | | 6877 | 5962 | 5961 | 5214 | 4835 |
| 1993 | 1410 | | | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 |
| 1994 | 1388 | | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 |
| 1995 | 1374 | 6877 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | |
| 1996 | 1371 | 5962 | 5961 | 5214 | 4835 | 4624 | 4442 | | |
| 1997 | 1385 | 5961 | 5214 | 4835 | 4624 | 4442 | | | |
| 1998 | 1430 | 5214 | 4835 | 4624 | 4442 | | | | |
| 1999 | 1415 | 4835 | 4624 | 4442 | | | | | |
| 2000 | 1451 | 4624 | 4442 | | | | | | |
| 2001 | 1534 | 4442 | | | | | | | |
| 2002 | 1614 | | | | | | | | |
| 2003 | 1596 | | | | | | | | |

Appendix 4.8.18: Construction Employment and University Acceptances Correlation:
Selected Dataset: All-Falling Acceptances 2-tailed Testing

| Test | | | | Total Employment Level | Acceptances Actual | Total Employment Level | Acceptances Step - 1 year | Total Employment Level | Acceptance's Step - 2 years | Total Employment Level | Acceptances Step - 3 years |
|----------------|-----------------|------------------------|---|--|------------------------|---|---------------------------|---|-----------------------------|------------------------|----------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.889** 0.001 9 | 1.000 35 | -0.667* 0.012 9 | 1.000 35 | -0.444 0.095 9 | 1.000 35 | -0.222 0.404 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.889** 0.001 9 | 1.000 9 | -0.667* 0.012 9 | 1.000 9 | -0.444 0.095 9 | 1.000 9 | -0.222 0.404 9 | 1.000 9 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | -0.967** 0.000 9 | 1.000 35 | -0.850** 0.004 9 | 1.000 35 | -0.683* 0.042 9 | 1.000 35 | -0.367 0.332 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | -0.967** 0.000 9 | 1.000 9 | -0.850** 0.004 9 | 1.000 9 | -0.683* 0.042 9 | 1.000 9 | -0.367 0.332 9 | 1.000 9 |
| | | | | ** . Correlation is significant at the 0.01 level (2-tailed) | | * . Correlation is significant at the 0.05 level (2-tailed) ** . Correlation is significant at the 0.01 level (2-tailed) | | * . Correlation is significant at the 0.05 level (2-tailed) | | | |

| Test | | | | Total Employment Level | Acceptances Step -4 years | Total Employment Level | Acceptances Step -5 years | Total Employment Level | Acceptances Step -6 years | Total Employment Level | Acceptances Step -7 years |
|----------------|-----------------|------------------------|---|------------------------|---------------------------|------------------------|---------------------------|------------------------|---------------------------|------------------------|---------------------------|
| Non-parametric | Kendall's Tau_b | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.222 0.404 9 | 1.000 35 | 0.444 0.095 9 | 1.000 35 | 0.500 0.061 9 | 1.000 35 | 0.333 0.211 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.222 0.404 9 | 1.000 9 | 0.444 0.095 9 | 1.000 9 | 0.500 0.061 9 | 1.000 9 | 0.333 0.211 9 | 1.000 9 |
| | Spearman's Rho | Total Employment level | Correlation coefficient Sig. (2-tailed) N | 1.000 35 | 0.150 0.700 9 | 1.000 35 | 0.417 0.265 9 | 1.000 35 | 0.583 0.099 9 | 1.000 35 | 0.483 0.187 9 |
| | | Acceptances | Correlation coefficient Sig. (2-tailed) N | 0.150 0.700 9 | 1.000 9 | 0.417 0.265 9 | 1.000 9 | 0.583 0.099 9 | 1.000 9 | 0.483 0.187 9 | 1.000 9 |
| | | | | | | | | | | | |

Appendix 4.8.19: SPSS Output for Curve Estimation – Full Dataset.

| | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|---------|------|-------------|---------|---------|---------|----|--|-----|------|------|------|------|-------------|---------|---------|---------|---------|--|
| Independent: Acceptances_0 | | | | | | | | | | | Independent: Acceptances_1 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .244 | 16 | 5.18 | .037 | 4310.83 | -326.53 | | | | Total_Em | LOG | .035 | 16 | .57 | .460 | 2568.03 | -122.07 | | | | |
| Total_Em | INV | .218 | 16 | 4.46 | .051 | 1236.95 | 1432899 | | | | Total_Em | INV | .030 | 16 | .49 | .494 | 1420.67 | 526797 | | | | |
| Total_Em | QUA | .309 | 15 | 3.35 | .063 | 1232.65 | .2036 | -3.E-05 | | | Total_Em | QUA | .062 | 15 | .50 | .616 | 1180.84 | .1755 | -2.E-05 | | | |
| 9 Total_Em | CUB | .308 | 15 | 3.34 | .063 | 1454.92 | .0662 | | -2.E-09 | | 9 Total_Em | CUB | .069 | 15 | .55 | .586 | 1436.71 | | 1.8E-05 | -3.E-09 | | |
| Total_Em | COM | .287 | 16 | 6.45 | .022 | 1936.07 | 1.0000 | | | | Total_Em | COM | .050 | 16 | .84 | .374 | 1680.73 | 1.0000 | | | | |
| Total_Em | POW | .263 | 16 | 5.71 | .030 | 9679.14 | -.2171 | | | | Total_Em | POW | .044 | 16 | .73 | .404 | 3225.44 | -.0881 | | | | |
| Total_Em | S | .235 | 16 | 4.93 | .041 | 7.1339 | 954.655 | | | | Total_Em | S | .039 | 16 | .64 | .434 | 7.2495 | 384.448 | | | | |
| Total_Em | GRO | .287 | 16 | 6.45 | .022 | 7.5684 | -5.E-05 | | | | Total_Em | GRO | .050 | 16 | .84 | .374 | 7.4270 | -2.E-05 | | | | |
| Total_Em | EXP | .287 | 16 | 6.45 | .022 | 1936.07 | -5.E-05 | | | | Total_Em | EXP | .050 | 16 | .84 | .374 | 1680.73 | -2.E-05 | | | | |
| Total_Em | LGS | .287 | 16 | 6.45 | .022 | . | .0005 | 1.0000 | | | Total_Em | LGS | .050 | 16 | .84 | .374 | . | .0006 | 1.0000 | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |
| Independent: Acceptances_2 | | | | | | | | | | | Independent: Acceptances_3 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .002 | 16 | .03 | .870 | 1295.93 | 26.9925 | | | | Total_Em | LOG | .049 | 16 | .82 | .379 | 304.213 | 143.437 | | | | |
| Total_Em | INV | .001 | 16 | .01 | .910 | 1543.59 | -87049 | | | | Total_Em | INV | .033 | 16 | .54 | .474 | 1637.19 | -545085 | | | | |
| Total_Em | QUA | .004 | 15 | .03 | .967 | 1630.61 | -.0513 | 5.8E-06 | | | Total_Em | QUA | .155 | 15 | 1.38 | .283 | 2307.65 | -.3648 | 4.0E-05 | | | |
| 9 Total_Em | CUB | .004 | 15 | .03 | .967 | 1630.61 | -.0513 | 5.8E-06 | | | 9 Total_Em | CUB | .141 | 15 | 1.23 | .320 | 1940.27 | -.1510 | | | 2.4E-09 | |
| Total_Em | COM | .001 | 16 | .01 | .913 | 1501.72 | 1.0000 | | | | Total_Em | COM | .057 | 16 | .97 | .339 | 1368.66 | 1.0000 | | | | |
| Total_Em | POW | .000 | 16 | 5.2E-03 | .943 | 1425.86 | .0075 | | | | Total_Em | POW | .041 | 16 | .68 | .422 | 743.213 | .0840 | | | | |
| Total_Em | S | .000 | 16 | 3.9E-04 | .985 | 7.3285 | -9.5360 | | | | Total_Em | S | .026 | 16 | .42 | .525 | 7.3899 | -310.42 | | | | |
| Total_Em | GRO | .001 | 16 | .01 | .913 | 7.3144 | 2.4E-06 | | | | Total_Em | GRO | .057 | 16 | .97 | .339 | 7.2216 | 2.1E-05 | | | | |
| Total_Em | EXP | .001 | 16 | .01 | .913 | 1501.72 | 2.4E-06 | | | | Total_Em | EXP | .057 | 16 | .97 | .339 | 1368.66 | 2.1E-05 | | | | |
| Total_Em | LGS | .001 | 16 | .01 | .913 | . | .0007 | 1.0000 | | | Total_Em | LGS | .057 | 16 | .97 | .339 | . | .0007 | 1.0000 | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|------|------|-------------|---------|---------|---------|----|--|-----|------|------|-------|------|-------------|---------|---------|----|---------|--|
| Independent: Acceptances_4 | | | | | | | | | | | Independent: Acceptances_5 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .142 | 16 | 2.65 | .123 | -538.20 | 242.926 | | | | Total_Em | LOG | .202 | 16 | 4.06 | .061 | -889.27 | 285.410 | | | | |
| Total_Em | INV | .100 | 16 | 1.78 | .201 | 1724.20 | -946884 | | | | Total_Em | INV | .142 | 16 | 2.64 | .124 | 1768.29 | -1.E+06 | | | | |
| Total_Em | QUA | .468 | 15 | 6.60 | .009 | 2913.19 | -.6416 | 7.0E-05 | | | Total_Em | QUA | .718 | 15 | 19.05 | .000 | 3282.34 | -.8027 | 8.7E-05 | | | |
| 9 Total_Em | CUB | .454 | 15 | 6.24 | .011 | 2332.79 | -.2870 | | 4.5E-09 | | 9 Total_Em | CUB | .708 | 15 | 18.20 | .000 | 2580.86 | -.3679 | | | 5.7E-09 | |
| Total_Em | COM | .176 | 16 | 3.42 | .083 | 1270.68 | 1.0000 | | | | Total_Em | COM | .256 | 16 | 5.49 | .032 | 1236.68 | 1.0000 | | | | |
| Total_Em | POW | .130 | 16 | 2.39 | .141 | 429.419 | .1488 | | | | Total_Em | POW | .189 | 16 | 3.73 | .071 | 341.020 | .1767 | | | | |
| Total_Em | S | .089 | 16 | 1.57 | .228 | 7.4469 | -573.10 | | | | Total_Em | S | .130 | 16 | 2.40 | .141 | 7.4764 | -682.40 | | | | |
| Total_Em | GRO | .176 | 16 | 3.42 | .083 | 7.1473 | 3.6E-05 | | | | Total_Em | GRO | .256 | 16 | 5.49 | .032 | 7.1202 | 4.3E-05 | | | | |
| Total_Em | EXP | .176 | 16 | 3.42 | .083 | 1270.68 | 3.6E-05 | | | | Total_Em | EXP | .256 | 16 | 5.49 | .032 | 1236.68 | 4.3E-05 | | | | |
| Total_Em | LGS | .176 | 16 | 3.42 | .083 | .0008 | 1.0000 | | | | Total_Em | LGS | .256 | 16 | 5.49 | .032 | .0008 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |
| Independent: Acceptances_6 | | | | | | | | | | | M Independent: Acceptances_7 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .092 | 16 | 1.62 | .221 | -105.33 | 195.062 | | | | Total_Em | LOG | .016 | 16 | .26 | .616 | 900.733 | 78.7190 | | | | |
| Total_Em | INV | .056 | 16 | .94 | .346 | 1699.80 | -704251 | | | | Total_Em | INV | .004 | 16 | .07 | .792 | 1610.49 | -192996 | | | | |
| Total_Em | QUA | .470 | 15 | 6.66 | .009 | 3141.40 | -.7160 | 7.7E-05 | | | Total_Em | QUA | .282 | 15 | 2.95 | .083 | 2978.18 | -.6130 | 6.4E-05 | | | |
| 9 Total_Em | CUB | .446 | 15 | 6.05 | .012 | 2493.87 | -.3242 | | 4.9E-09 | | 9 Total_Em | CUB | .257 | 15 | 2.60 | .107 | 2423.18 | -.2820 | | | 4.0E-09 | |
| Total_Em | COM | .130 | 16 | 2.39 | .141 | 1325.53 | 1.0000 | | | | Total_Em | COM | .033 | 16 | .54 | .473 | 1451.85 | 1.0000 | | | | |
| Total_Em | POW | .088 | 16 | 1.54 | .233 | 548.857 | .1219 | | | | Total_Em | POW | .015 | 16 | .25 | .625 | 1030.58 | .0491 | | | | |
| Total_Em | S | .052 | 16 | .87 | .364 | 7.4352 | -435.56 | | | | Total_Em | S | .004 | 16 | .06 | .804 | 7.3799 | -116.31 | | | | |
| Total_Em | GRO | .130 | 16 | 2.39 | .141 | 7.1896 | 3.1E-05 | | | | Total_Em | GRO | .033 | 16 | .54 | .473 | 7.2806 | 1.5E-05 | | | | |
| Total_Em | EXP | .130 | 16 | 2.39 | .141 | 1325.53 | 3.1E-05 | | | | Total_Em | EXP | .033 | 16 | .54 | .473 | 1451.85 | 1.5E-05 | | | | |
| Total_Em | LGS | .130 | 16 | 2.39 | .141 | .0008 | 1.0000 | | | | Total_Em | LGS | .033 | 16 | .54 | .473 | .0007 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |

Appendix 4.8.20: SPSS Output for Curve Estimation – Rising Dataset

| | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|------|------|-------------|---------|---------|---------|----|--|-----|------|------|------|------|-------------|---------|---------|----|---------|
| Independent: Acceptances_0 | | | | | | | | | | | Independent: Acceptances_1 | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 |
| Total_Em | LOG | .334 | 7 | 3.50 | .103 | 4730.64 | -369.25 | | | | Total_Em | LOG | .037 | 7 | .27 | .620 | 2539.76 | -110.31 | | | |
| Total_Em | INV | .267 | 7 | 2.55 | .154 | 1269.40 | 1528682 | | | | Total_Em | INV | .017 | 7 | .12 | .740 | 1528.85 | 343126 | | | |
| Total_Em | QUA | .729 | 6 | 8.09 | .020 | 105.856 | .7295 | -8.E-05 | | | Total_Em | QUA | .593 | 6 | 4.36 | .068 | -418.26 | .8948 | -9.E-05 | | |
| 9 Total_Em | CUB | .706 | 6 | 7.20 | .025 | 805.859 | .3073 | | -5.E-09 | | 9 Total_Em | CUB | .590 | 6 | 4.31 | .069 | 329.480 | .4303 | | | -6.E-09 |
| Total_Em | COM | .424 | 7 | 5.15 | .058 | 2094.67 | .9999 | | | | Total_Em | COM | .081 | 7 | .62 | .457 | 1780.01 | 1.0000 | | | |
| Total_Em | POW | .353 | 7 | 3.82 | .091 | 12352.7 | -.2416 | | | | Total_Em | POW | .048 | 7 | .35 | .572 | 3120.15 | -.0788 | | | |
| Total_Em | S | .286 | 7 | 2.80 | .138 | 7.1560 | 1005.21 | | | | Total_Em | S | .024 | 7 | .17 | .690 | 7.3202 | 259.352 | | | |
| Total_Em | GRO | .424 | 7 | 5.15 | .058 | 7.6472 | -5.E-05 | | | | Total_Em | GRO | .081 | 7 | .62 | .457 | 7.4844 | -2.E-05 | | | |
| Total_Em | EXP | .424 | 7 | 5.15 | .058 | 2094.67 | -5.E-05 | | | | Total_Em | EXP | .081 | 7 | .62 | .457 | 1780.01 | -2.E-05 | | | |
| Total_Em | LGS | .424 | 7 | 5.15 | .058 | . | .0005 | 1.0001 | | | Total_Em | LGS | .081 | 7 | .62 | .457 | . | .0006 | 1.0000 | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | |
| Independent: Acceptances_2 | | | | | | | | | | | Independent: Acceptances_3 | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 |
| Total_Em | LOG | .026 | 7 | .18 | .682 | 944.162 | 78.9049 | | | | Total_Em | LOG | .260 | 7 | 2.46 | .161 | -142.11 | 208.172 | | | |
| Total_Em | INV | .042 | 7 | .31 | .595 | 1713.16 | -470949 | | | | Total_Em | INV | .271 | 7 | 2.60 | .151 | 1834.03 | -983654 | | | |
| Total_Em | QUA | .465 | 6 | 2.61 | .153 | -184.00 | .7527 | -7.E-05 | | | Total_Em | QUA | .367 | 6 | 1.74 | .253 | 645.702 | .3698 | -3.E-05 | | |
| 9 Total_Em | CUB | .499 | 6 | 2.99 | .126 | 369.168 | .3952 | | -5.E-09 | | 9 Total_Em | CUB | .400 | 6 | 2.00 | .216 | 849.305 | .2248 | | | -2.E-09 |
| Total_Em | COM | .006 | 7 | .04 | .845 | 1572.45 | 1.0000 | | | | Total_Em | COM | .234 | 7 | 2.14 | .187 | 1433.65 | 1.0000 | | | |
| Total_Em | POW | .018 | 7 | .13 | .731 | 1137.01 | .0410 | | | | Total_Em | POW | .258 | 7 | 2.44 | .163 | 561.960 | .1249 | | | |
| Total_Em | S | .033 | 7 | .24 | .639 | 7.4381 | -257.69 | | | | Total_Em | S | .270 | 7 | 2.59 | .152 | 7.5171 | -591.03 | | | |
| Total_Em | GRO | .006 | 7 | .04 | .845 | 7.3604 | 4.9E-06 | | | | Total_Em | GRO | .234 | 7 | 2.14 | .187 | 7.2680 | 2.5E-05 | | | |
| Total_Em | EXP | .006 | 7 | .04 | .845 | 1572.45 | 4.9E-06 | | | | Total_Em | EXP | .234 | 7 | 2.14 | .187 | 1433.65 | 2.5E-05 | | | |
| Total_Em | LGS | .006 | 7 | .04 | .845 | . | .0006 | 1.0000 | | | Total_Em | LGS | .234 | 7 | 2.14 | .187 | . | .0007 | 1.0000 | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|-------|------|-------------|---------|---------|---------|---------|--|-----|------|------|-------|------|-------------|---------|---------|---------|---------|--|--|
| Independent: Acceptances_4 | | | | | | | | | | | Independent: Acceptances_5 | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .563 | 7 | 9.04 | .020 | -958.06 | 303.903 | | | | Total_Em | LOG | .540 | 7 | 8.22 | .024 | -968.44 | 302.970 | | | | | |
| Total_Em | INV | .525 | 7 | 7.73 | .027 | 1910.76 | -1.E+06 | | | | Total_Em | INV | .477 | 7 | 6.37 | .040 | 1884.28 | -1.E+06 | | | | | |
| Total_Em | QUA | .612 | 6 | 4.73 | .058 | 1592.41 | -.0608 | 1.3E-05 | | | Total_Em | QUA | .828 | 6 | 14.49 | .005 | 2287.44 | -.3664 | 4.3E-05 | | | | |
| 9 Total_Em | CUB | .612 | 6 | 4.73 | .058 | 1592.41 | -.0608 | 1.3E-05 | | | 9 Total_Em | CUB | .844 | 6 | 16.19 | .004 | 1711.31 | | | -3.E-05 | 4.9E-09 | | |
| Total_Em | COM | .609 | 7 | 10.92 | .013 | 1328.16 | 1.0000 | | | | Total_Em | COM | .616 | 7 | 11.23 | .012 | 1306.88 | 1.0000 | | | | | |
| Total_Em | POW | .579 | 7 | 9.64 | .017 | 335.861 | .1853 | | | | Total_Em | POW | .551 | 7 | 8.58 | .022 | 336.136 | .1839 | | | | | |
| Total_Em | S | .540 | 7 | 8.20 | .024 | 7.5657 | -827.27 | | | | Total_Em | S | .488 | 7 | 6.67 | .036 | 7.5489 | -800.59 | | | | | |
| Total_Em | GRO | .609 | 7 | 10.92 | .013 | 7.1916 | 3.9E-05 | | | | Total_Em | GRO | .616 | 7 | 11.23 | .012 | 7.1754 | 4.0E-05 | | | | | |
| Total_Em | EXP | .609 | 7 | 10.92 | .013 | 1328.16 | 3.9E-05 | | | | Total_Em | EXP | .616 | 7 | 11.23 | .012 | 1306.88 | 4.0E-05 | | | | | |
| Total_Em | LGS | .609 | 7 | 10.92 | .013 | | .0008 | 1.0000 | | | Total_Em | LGS | .616 | 7 | 11.23 | .012 | | .0008 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | |
| Independent: Acceptances_6 | | | | | | | | | | | Independent: Acceptances_7 | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .244 | 7 | 2.26 | .177 | 444.228 | 134.443 | | | | Total_Em | LOG | .058 | 7 | .43 | .534 | 2076.72 | -57.388 | | | | | |
| Total_Em | INV | .191 | 7 | 1.66 | .239 | 1703.40 | -551324 | | | | Total_Em | INV | .099 | 7 | .77 | .410 | 1516.33 | 347852 | | | | | |
| Total_Em | QUA | .679 | 6 | 6.36 | .033 | 2304.75 | -.3412 | 3.7E-05 | | | Total_Em | QUA | .823 | 6 | 13.97 | .006 | 2747.46 | -.4836 | 4.8E-05 | | | | |
| 9 Total_Em | CUB | .689 | 6 | 6.64 | .030 | 1759.81 | | | -3.E-05 | 4.5E-09 | 9 Total_Em | CUB | .823 | 6 | 13.97 | .006 | 2747.46 | -.4836 | 4.8E-05 | | | | |
| Total_Em | COM | .301 | 7 | 3.01 | .126 | 1439.16 | 1.0000 | | | | Total_Em | COM | .025 | 7 | .18 | .687 | 1626.61 | 1.0000 | | | | | |
| Total_Em | POW | .242 | 7 | 2.23 | .179 | 786.947 | .0824 | | | | Total_Em | POW | .057 | 7 | .42 | .537 | 2144.50 | -.0354 | | | | | |
| Total_Em | S | .190 | 7 | 1.64 | .241 | 7.4401 | -337.90 | | | | Total_Em | S | .098 | 7 | .76 | .412 | 7.3253 | 214.935 | | | | | |
| Total_Em | GRO | .301 | 7 | 3.01 | .126 | 7.2718 | 1.9E-05 | | | | Total_Em | GRO | .025 | 7 | .18 | .687 | 7.3943 | -5.E-06 | | | | | |
| Total_Em | EXP | .301 | 7 | 3.01 | .126 | 1439.16 | 1.9E-05 | | | | Total_Em | EXP | .025 | 7 | .18 | .687 | 1626.61 | -5.E-06 | | | | | |
| Total_Em | LGS | .301 | 7 | 3.01 | .126 | | .0007 | 1.0000 | | | Total_Em | LGS | .025 | 7 | .18 | .687 | | .0006 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | |

Appendix 4.8.21: SPSS Output for Curve Estimation – Falling Dataset

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|-------|------|-------------|---------|---------|----|----|--|-----|------|------|-------|------|-------------|---------|---------|----|----|---------|--|
| Independent: Acceptances_0 | | | | | | | | | | | Independent: Acceptances_1 | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .703 | 5 | 11.83 | .018 | 4008.45 | -301.14 | | | | Total_Em | LOG | .635 | 5 | 8.69 | .032 | 2707.95 | -152.10 | | | | | |
| Total_Em | INV | .739 | 5 | 14.19 | .013 | 1105.77 | 1680385 | | | | Total_Em | INV | .682 | 5 | 10.73 | .022 | 1240.14 | 857781 | | | | | |
| Total_Em | QUA | .825 | 4 | 9.40 | .031 | 2854.88 | -.4707 | 3.7E-05 | | | Total_Em | QUA | .900 | 4 | 17.97 | .010 | 2397.19 | -.3372 | 2.8E-05 | | | | |
| 9 Total_Em | CUB | .825 | 4 | 9.40 | .031 | 2854.88 | -.4707 | 3.7E-05 | | | 9 Total_Em | CUB | .900 | 4 | 17.97 | .010 | 2397.19 | -.3372 | 2.8E-05 | | | | |
| Total_Em | COM | .675 | 5 | 10.39 | .023 | 1735.94 | 1.0000 | | | | Total_Em | COM | .583 | 5 | 7.00 | .046 | 1551.25 | 1.0000 | | | | | |
| Total_Em | POW | .715 | 5 | 12.53 | .017 | 8599.69 | -.2096 | | | | Total_Em | POW | .635 | 5 | 8.70 | .032 | 3542.15 | -.1080 | | | | | |
| Total_Em | S | .751 | 5 | 15.06 | .012 | 7.0392 | 1168.76 | | | | Total_Em | S | .682 | 5 | 10.74 | .022 | 7.1306 | 608.909 | | | | | |
| Total_Em | GRO | .675 | 5 | 10.39 | .023 | 7.4593 | -4.E-05 | | | | Total_Em | GRO | .583 | 5 | 7.00 | .046 | 7.3468 | -2.E-05 | | | | | |
| Total_Em | EXP | .675 | 5 | 10.39 | .023 | 1735.94 | -4.E-05 | | | | Total_Em | EXP | .583 | 5 | 7.00 | .046 | 1551.25 | -2.E-05 | | | | | |
| Total_Em | LGS | .675 | 5 | 10.39 | .023 | . | .0006 | 1.0000 | | | Total_Em | LGS | .583 | 5 | 7.00 | .046 | . | .0006 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | |
| Independent: Acceptances_2 | | | | | | | | | | | Independent: Acceptances_3 | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .091 | 5 | .50 | .511 | 1758.51 | -42.204 | | | | Total_Em | LOG | .359 | 5 | 2.79 | .155 | -271.63 | 195.988 | | | | | |
| Total_Em | INV | .121 | 5 | .69 | .444 | 1346.02 | 265616 | | | | Total_Em | INV | .304 | 5 | 2.18 | .200 | 1596.31 | -981256 | | | | | |
| Total_Em | QUA | .702 | 4 | 4.71 | .089 | 2318.70 | -.3302 | 2.9E-05 | | | Total_Em | QUA | .951 | 4 | 38.79 | .002 | 3102.61 | -.6542 | 6.2E-05 | | | | |
| 9 Total_Em | CUB | .702 | 4 | 4.71 | .089 | 2318.70 | -.3302 | 2.9E-05 | | | 9 Total_Em | CUB | .945 | 4 | 34.20 | .003 | 2453.29 | -.3051 | | | | 3.6E-09 | |
| Total_Em | COM | .062 | 5 | .33 | .589 | 1430.63 | 1.0000 | | | | Total_Em | COM | .412 | 5 | 3.50 | .120 | 1223.14 | 1.0000 | | | | | |
| Total_Em | POW | .090 | 5 | .49 | .514 | 1805.68 | -.0300 | | | | Total_Em | POW | .354 | 5 | 2.74 | .159 | 443.314 | .1348 | | | | | |
| Total_Em | S | .120 | 5 | .68 | .446 | 7.2057 | 188.855 | | | | Total_Em | S | .299 | 5 | 2.14 | .204 | 7.3788 | -674.34 | | | | | |
| Total_Em | GRO | .062 | 5 | .33 | .589 | 7.2659 | -5.E-06 | | | | Total_Em | GRO | .412 | 5 | 3.50 | .120 | 7.1092 | 2.6E-05 | | | | | |
| Total_Em | EXP | .062 | 5 | .33 | .589 | 1430.63 | -5.E-06 | | | | Total_Em | EXP | .412 | 5 | 3.50 | .120 | 1223.14 | 2.6E-05 | | | | | |
| Total_Em | LGS | .062 | 5 | .33 | .589 | . | .0007 | 1.0000 | | | Total_Em | LGS | .412 | 5 | 3.50 | .120 | . | .0008 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | |

| Independent: Acceptances_4 | | | | | | | | | | | Independent: Acceptances_5 | | | | | | | | | | | |
|----------------------------|-----|------|------|-------|------|-------------|---------|---------|---------|---------|----------------------------|-----|------|------|-------|------|-------------|---------|---------|---------|---------|--|
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .718 | 5 | 12.72 | .016 | | -4066.1 | 642.376 | | | Total_Em | LOG | .858 | 5 | 30.24 | .003 | | -7613.4 | 1062.96 | | | |
| Total_Em | INV | .670 | 5 | 10.15 | .024 | | 2086.60 | -3.E+06 | | | Total_Em | INV | .829 | 5 | 24.22 | .004 | | 2585.79 | -6.E+06 | | | |
| Total_Em | QUA | .930 | 4 | 26.75 | .005 | | 3257.14 | -.7762 | 8.0E-05 | | Total_Em | QUA | .910 | 4 | 20.17 | .008 | | 1988.55 | -.3634 | 5.0E-05 | | |
| 9 Total_Em | CUB | .931 | 4 | 26.97 | .005 | | 1821.78 | | -6.E-05 | 8.1E-09 | 9 Total_Em | CUB | .909 | 4 | 19.88 | .008 | | 1449.52 | -.0777 | | 2.9E-09 | |
| Total_Em | COM | .772 | 5 | 16.96 | .009 | | 941.887 | 1.0001 | | | Total_Em | COM | .891 | 5 | 40.74 | .001 | | 767.728 | 1.0001 | | | |
| Total_Em | POW | .728 | 5 | 13.38 | .015 | | 37.8003 | .4244 | | | Total_Em | POW | .870 | 5 | 33.60 | .002 | | 4.4283 | .6788 | | | |
| Total_Em | S | .681 | 5 | 10.69 | .022 | | 7.6976 | -2233.7 | | | Total_Em | S | .844 | 5 | 27.05 | .003 | | 8.0023 | -3636.3 | | | |
| Total_Em | GRO | .772 | 5 | 16.96 | .009 | | 6.8479 | 7.9E-05 | | | Total_Em | GRO | .891 | 5 | 40.74 | .001 | | 6.6434 | .0001 | | | |
| Total_Em | EXP | .772 | 5 | 16.96 | .009 | | 941.887 | 7.9E-05 | | | Total_Em | EXP | .891 | 5 | 40.74 | .001 | | 767.728 | .0001 | | | |
| Total_Em | LGS | .772 | 5 | 16.96 | .009 | | | .0011 | .9999 | | Total_Em | LGS | .891 | 5 | 40.74 | .001 | | | .0013 | .9999 | | |

Notes:
9 Tolerance limits reached; some dependent variables were not entered.

| Independent: Acceptances_6 | | | | | | | | | | | Independent: Acceptances_7 | | | | | | | | | | | |
|----------------------------|-----|------|------|-------|------|-------------|---------|---------|---------|---------|----------------------------|-----|------|------|-------|------|-------------|---------|---------|--------|---------|--|
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .828 | 5 | 24.12 | .004 | | -7606.2 | 1068.14 | | | Total_Em | LOG | .648 | 5 | 9.21 | .029 | | -5758.5 | 857.993 | | | |
| Total_Em | INV | .848 | 5 | 27.92 | .003 | | 2674.63 | -6.E+06 | | | Total_Em | INV | .699 | 5 | 11.59 | .019 | | 2522.75 | -5.E+06 | | | |
| Total_Em | QUA | .893 | 4 | 16.73 | .011 | | -2312.2 | 1.2289 | -9.E-05 | | Total_Em | QUA | .951 | 4 | 38.57 | .002 | | -4252.4 | 1.9927 | -.0002 | | |
| 9 Total_Em | CUB | .899 | 4 | 17.72 | .010 | | -1402.2 | .7228 | | -6.E-09 | 9 Total_Em | CUB | .951 | 4 | 39.09 | .002 | | -2545.3 | 1.0692 | | -1.E-08 | |
| Total_Em | COM | .813 | 5 | 21.70 | .006 | | 806.733 | 1.0001 | | | Total_Em | COM | .603 | 5 | 7.60 | .040 | | 959.506 | 1.0001 | | | |
| Total_Em | POW | .843 | 5 | 26.75 | .004 | | 4.4401 | .6824 | | | Total_Em | POW | .659 | 5 | 9.66 | .027 | | 14.7632 | .5458 | | | |
| Total_Em | S | .863 | 5 | 31.62 | .002 | | 8.0587 | -3758.2 | | | Total_Em | S | .710 | 5 | 12.22 | .017 | | 7.9595 | -3081.6 | | | |
| Total_Em | GRO | .813 | 5 | 21.70 | .006 | | 6.6930 | .0001 | | | Total_Em | GRO | .603 | 5 | 7.60 | .040 | | 6.8664 | 9.4E-05 | | | |
| Total_Em | EXP | .813 | 5 | 21.70 | .006 | | 806.733 | .0001 | | | Total_Em | EXP | .603 | 5 | 7.60 | .040 | | 959.506 | 9.4E-05 | | | |
| Total_Em | LGS | .813 | 5 | 21.70 | .006 | | | .0012 | .9999 | | Total_Em | LGS | .603 | 5 | 7.60 | .040 | | | .0010 | .9999 | | |

Notes:
9 Tolerance limits reached; some dependent variables were not entered.

Appendix 4.8.22: SPSS Output for Curve Estimation – All-Rising Dataset

| | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|------|------|-------------|---------|---------|---------|----|--|-----|------|------|------|------|-------------|---------|---------|---------|----|--|
| Independent: Acceptances_0 | | | | | | | | | | | Independent: Acceptatnces_1 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .299 | 10 | 4.26 | .066 | 4485.83 | -341.15 | | | | Total_Em | LOG | .010 | 10 | .10 | .757 | 2084.21 | -58.946 | | | | |
| Total_Em | INV | .243 | 10 | 3.20 | .104 | 1286.26 | 1433800 | | | | Total_Em | INV | .003 | 10 | .03 | .858 | 1549.46 | 159672 | | | | |
| Total_Em | QUA | .563 | 9 | 5.80 | .024 | 572.571 | .5055 | -6.E-05 | | | Total_Em | QUA | .263 | 9 | 1.60 | .254 | 247.115 | .5753 | -6.E-05 | | | |
| 9 Total_Em | CUB | .559 | 9 | 5.69 | .025 | 1039.66 | .2163 | | -4.E-09 | | 9 Total_Em | CUB | .299 | 9 | 1.92 | .202 | 1131.56 | | 6.2E-05 | -8.E-09 | | |
| Total_Em | COM | .379 | 10 | 6.10 | .033 | 2035.63 | .9999 | | | | Total_Em | COM | .029 | 10 | .30 | .596 | 1685.53 | 1.0000 | | | | |
| Total_Em | POW | .320 | 10 | 4.70 | .055 | 10645.5 | -.2244 | | | | Total_Em | POW | .015 | 10 | .16 | .701 | 2332.90 | -.0460 | | | | |
| Total_Em | S | .261 | 10 | 3.53 | .090 | 7.1676 | 946.095 | | | | Total_Em | S | .007 | 10 | .07 | .801 | 7.3343 | 141.041 | | | | |
| Total_Em | GRO | .379 | 10 | 6.10 | .033 | 7.6186 | -5.E-05 | | | | Total_Em | GRO | .029 | 10 | .30 | .596 | 7.4298 | -1.E-05 | | | | |
| Total_Em | EXP | .379 | 10 | 6.10 | .033 | 2035.63 | -5.E-05 | | | | Total_Em | EXP | .029 | 10 | .30 | .596 | 1685.53 | -1.E-05 | | | | |
| Total_Em | LGS | .379 | 10 | 6.10 | .033 | .0005 | 1.0001 | | | | Total_Em | LGS | .029 | 10 | .30 | .596 | .0006 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |
| Independent: Acceptances_2 | | | | | | | | | | | Independent: Acceptances_3 | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | |
| Total_Em | LOG | .055 | 10 | .58 | .464 | 435.227 | 134.392 | | | | Total_Em | LOG | .200 | 10 | 2.50 | .145 | -555.62 | 251.188 | | | | |
| Total_Em | INV | .058 | 10 | .62 | .449 | 1712.71 | -647949 | | | | Total_Em | INV | .174 | 10 | 2.11 | .177 | 1807.98 | -1.E+06 | | | | |
| Total_Em | QUA | .120 | 9 | .61 | .563 | 683.865 | .3439 | -3.E-05 | | | Total_Em | QUA | .222 | 9 | 1.28 | .323 | 1515.48 | -.0323 | 8.5E-06 | | | |
| 9 Total_Em | CUB | .144 | 9 | .75 | .498 | 855.962 | .2119 | | -2.E-09 | | 9 Total_Em | CUB | .225 | 9 | 1.31 | .317 | 1378.22 | | 1.3E-05 | -9.E-10 | | |
| Total_Em | COM | .039 | 10 | .41 | .538 | 1461.45 | 1.0000 | | | | Total_Em | COM | .209 | 10 | 2.65 | .135 | 1333.75 | 1.0000 | | | | |
| Total_Em | POW | .047 | 10 | .49 | .500 | 812.631 | .0777 | | | | Total_Em | POW | .192 | 10 | 2.37 | .155 | 427.110 | .1535 | | | | |
| Total_Em | S | .050 | 10 | .53 | .483 | 7.4391 | -376.12 | | | | Total_Em | S | .166 | 10 | 1.98 | .189 | 7.5010 | -665.42 | | | | |
| Total_Em | GRO | .039 | 10 | .41 | .538 | 7.2872 | 1.5E-05 | | | | Total_Em | GRO | .209 | 10 | 2.65 | .135 | 7.1958 | 3.3E-05 | | | | |
| Total_Em | EXP | .039 | 10 | .41 | .538 | 1461.45 | 1.5E-05 | | | | Total_Em | EXP | .209 | 10 | 2.65 | .135 | 1333.75 | 3.3E-05 | | | | |
| Total_Em | LGS | .039 | 10 | .41 | .538 | .0007 | 1.0000 | | | | Total_Em | LGS | .209 | 10 | 2.65 | .135 | .0007 | 1.0000 | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | |

| Independent: Acceptances_4 | | | | | | | | | | | Independent: Acceptances_5 | | | | | | | | | | |
|----------------------------|-----|------|------|------|------|-------------|---------|---------|---------|---------|----------------------------|-----|------|------|-------|------|-------------|---------|---------|---------|---------|
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 |
| Total_Em | LOG | .333 | 10 | 4.98 | .050 | | -1333.6 | 341.973 | | | Total_Em | LOG | .348 | 10 | 5.35 | .043 | | -1422.4 | 350.355 | | |
| Total_Em | INV | .272 | 10 | 3.75 | .082 | | 1874.93 | -1.E+06 | | | Total_Em | INV | .273 | 10 | 3.76 | .081 | | 1858.42 | -1.E+06 | | |
| Total_Em | QUA | .538 | 9 | 5.24 | .031 | | 2318.22 | -.3933 | 4.7E-05 | | Total_Em | QUA | .757 | 9 | 14.01 | .002 | | 2835.00 | -.6196 | 6.9E-05 | |
| 9 Total_Em | CUB | .520 | 9 | 4.88 | .037 | | 1903.48 | -.1481 | | 2.9E-09 | 9 Total_Em | CUB | .752 | 9 | 13.62 | .002 | | 2277.40 | -.2732 | | 4.5E-09 |
| Total_Em | COM | .375 | 10 | 6.01 | .034 | | 1236.93 | 1.0000 | | | Total_Em | COM | .408 | 10 | 6.88 | .025 | | 1208.95 | 1.0000 | | |
| Total_Em | POW | .319 | 10 | 4.69 | .056 | | 260.988 | .2109 | | | Total_Em | POW | .332 | 10 | 4.98 | .050 | | 245.923 | .2166 | | |
| Total_Em | S | .259 | 10 | 3.50 | .091 | | 7.5430 | -886.92 | | | Total_Em | S | .259 | 10 | 3.50 | .091 | | 7.5330 | -892.85 | | |
| Total_Em | GRO | .375 | 10 | 6.01 | .034 | | 7.1204 | 4.7E-05 | | | Total_Em | GRO | .408 | 10 | 6.88 | .025 | | 7.0975 | 4.9E-05 | | |
| Total_Em | EXP | .375 | 10 | 6.01 | .034 | | 1236.93 | 4.7E-05 | | | Total_Em | EXP | .408 | 10 | 6.88 | .025 | | 1208.95 | 4.9E-05 | | |
| Total_Em | LGS | .375 | 10 | 6.01 | .034 | . | .0008 | 1.0000 | | | Total_Em | LGS | .408 | 10 | 6.88 | .025 | . | .0008 | 1.0000 | | |

Notes:
9 Tolerance limits reached; some dependent variables were not entered.

| Independent: Acceptances_6 | | | | | | | | | | | Independent: Acceptances_7 | | | | | | | | | | |
|----------------------------|-----|------|------|------|------|-------------|---------|---------|---------|---------|----------------------------|-----|------|------|---------|------|-------------|---------|---------|---------|---------|
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 |
| Total_Em | LOG | .133 | 10 | 1.53 | .245 | | -7.8065 | 181.476 | | | Total_Em | LOG | .000 | 10 | 1.1E-03 | .974 | | 1577.17 | -4.9809 | | |
| Total_Em | INV | .084 | 10 | .92 | .361 | | 1675.84 | -673322 | | | Total_Em | INV | .009 | 10 | .09 | .768 | | 1491.53 | 210473 | | |
| Total_Em | QUA | .618 | 9 | 7.29 | .013 | | 2917.66 | -.6242 | 6.6E-05 | | Total_Em | QUA | .638 | 9 | 7.92 | .010 | | 3351.34 | -.7637 | 7.7E-05 | |
| 9 Total_Em | CUB | .604 | 9 | 6.86 | .016 | | 2374.23 | -.2898 | | 4.3E-09 | 9 Total_Em | CUB | .610 | 9 | 7.04 | .014 | | 2719.05 | -.3764 | | 4.9E-09 |
| Total_Em | COM | .177 | 10 | 2.15 | .173 | | 1327.16 | 1.0000 | | | Total_Em | COM | .007 | 10 | .07 | .801 | | 1490.64 | 1.0000 | | |
| Total_Em | POW | .123 | 10 | 1.40 | .264 | | 577.809 | .1146 | | | Total_Em | POW | .000 | 10 | 2.0E-05 | .997 | | 1536.88 | -.0004 | | |
| Total_Em | S | .076 | 10 | .83 | .384 | | 7.4220 | -421.96 | | | Total_Em | S | .007 | 10 | .07 | .793 | | 7.3083 | 123.980 | | |
| Total_Em | GRO | .177 | 10 | 2.15 | .173 | | 7.1908 | 2.8E-05 | | | Total_Em | GRO | .007 | 10 | .07 | .801 | | 7.3070 | 5.2E-06 | | |
| Total_Em | EXP | .177 | 10 | 2.15 | .173 | | 1327.16 | 2.8E-05 | | | Total_Em | EXP | .007 | 10 | .07 | .801 | | 1490.64 | 5.2E-06 | | |
| Total_Em | LGS | .177 | 10 | 2.15 | .173 | . | .0008 | 1.0000 | | | Total_Em | LGS | .007 | 10 | .07 | .801 | . | .0007 | 1.0000 | | |

Notes:
9 Tolerance limits reached; some dependent variables were not entered.

Appendix 4.8.23: SPSS Output for Curve Estimation – All-Falling Dataset

| | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----|------|------|-------|------|-------------|---------|---------|---------|--|------------|-----|------|------|--------|------|-------------|---------|---------|----|----|---------|--|
| Independent: Acceptances_0 | | | | | | | | | | Independent: Acceptances_1 | | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .875 | 7 | 48.97 | .000 | 4185.02 | -321.62 | | | | Total_Em | LOG | .845 | 7 | 38.04 | .000 | 3726.81 | -270.03 | | | | | |
| Total_Em | INV | .890 | 7 | 56.45 | .000 | 1136.42 | 1509352 | | | | Total_Em | INV | .897 | 7 | 60.71 | .000 | 1161.39 | 1294846 | | | | | |
| Total_Em | QUA | .899 | 6 | 26.67 | .001 | 2167.70 | -.2268 | 1.6E-05 | | | Total_Em | QUA | .960 | 6 | 71.63 | .000 | 2281.98 | -.2950 | 2.4E-05 | | | | |
| 9 Total_Em | CUB | .901 | 6 | 27.37 | .001 | 2045.85 | -.1489 | | 1.1E-09 | | 9 Total_Em | CUB | .962 | 6 | 76.23 | .000 | 2095.28 | -.1772 | | | | 1.6E-09 | |
| Total_Em | COM | .843 | 7 | 37.68 | .000 | 1809.30 | 1.0000 | | | | Total_Em | COM | .776 | 7 | 24.19 | .002 | 1717.78 | 1.0000 | | | | | |
| Total_Em | POW | .879 | 7 | 50.72 | .000 | 9312.56 | -.2189 | | | | Total_Em | POW | .849 | 7 | 39.27 | .000 | 6904.66 | -.1852 | | | | | |
| Total_Em | S | .890 | 7 | 56.84 | .000 | 7.0650 | 1025.26 | | | | Total_Em | S | .899 | 7 | 62.31 | .000 | 7.0804 | 887.205 | | | | | |
| Total_Em | GRO | .843 | 7 | 37.68 | .000 | 7.5007 | -4.E-05 | | | | Total_Em | GRO | .776 | 7 | 24.19 | .002 | 7.4488 | -4.E-05 | | | | | |
| Total_Em | EXP | .843 | 7 | 37.68 | .000 | 1809.30 | -4.E-05 | | | | Total_Em | EXP | .776 | 7 | 24.19 | .002 | 1717.78 | -4.E-05 | | | | | |
| Total_Em | LGS | .843 | 7 | 37.68 | .000 | .0006 | 1.0000 | | | | Total_Em | LGS | .776 | 7 | 24.19 | .002 | .0006 | 1.0000 | | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | | |
| Independent: Acceptances_2 | | | | | | | | | | Independent: Acceptances_3 | | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | |
| Total_Em | LOG | .681 | 7 | 14.92 | .006 | 3621.38 | -257.88 | | | | Total_Em | LOG | .181 | 7 | 1.55 | .254 | 2575.14 | -133.65 | | | | | |
| Total_Em | INV | .767 | 7 | 23.09 | .002 | 1163.50 | 1274293 | | | | Total_Em | INV | .265 | 7 | 2.53 | .156 | 1281.69 | 753436 | | | | | |
| Total_Em | QUA | .961 | 6 | 73.06 | .000 | 2554.84 | -.4134 | 3.6E-05 | | | Total_Em | QUA | .978 | 6 | 135.44 | .000 | 2883.46 | -.5759 | 5.5E-05 | | | | |
| 9 Total_Em | CUB | .961 | 6 | 73.06 | .000 | 2554.84 | -.4134 | 3.6E-05 | | | 9 Total_Em | CUB | .979 | 6 | 141.89 | .000 | 2450.29 | -.3043 | | | | 3.6E-09 | |
| Total_Em | COM | .579 | 7 | 9.63 | .017 | 1688.58 | 1.0000 | | | | Total_Em | COM | .103 | 7 | .80 | .400 | 1544.34 | 1.0000 | | | | | |
| Total_Em | POW | .679 | 7 | 14.82 | .006 | 6343.00 | -.1754 | | | | Total_Em | POW | .177 | 7 | 1.51 | .259 | 3104.16 | -.0906 | | | | | |
| Total_Em | S | .766 | 7 | 22.86 | .002 | 7.0830 | 866.805 | | | | Total_Em | S | .261 | 7 | 2.47 | .160 | 7.1638 | 511.511 | | | | | |
| Total_Em | GRO | .579 | 7 | 9.63 | .017 | 7.4316 | -3.E-05 | | | | Total_Em | GRO | .103 | 7 | .80 | .400 | 7.3424 | -1.E-05 | | | | | |
| Total_Em | EXP | .579 | 7 | 9.63 | .017 | 1688.58 | -3.E-05 | | | | Total_Em | EXP | .103 | 7 | .80 | .400 | 1544.34 | -1.E-05 | | | | | |
| Total_Em | LGS | .579 | 7 | 9.63 | .017 | .0006 | 1.0000 | | | | Total_Em | LGS | .103 | 7 | .80 | .400 | .0006 | 1.0000 | | | | | |
| Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | Notes: 9 Tolerance limits reached; some dependent variables were not entered. | | | | | | | | | | | | | |

| <p>Independent: Acceptances_4</p> <table border="1"> <thead> <tr> <th>Dependent</th> <th>Mth</th> <th>Rsq</th> <th>d.f.</th> <th>F</th> <th>Sigf</th> <th>Upper bound</th> <th>b0</th> <th>b1</th> <th>b2</th> <th>b3</th> </tr> </thead> <tbody> <tr> <td>Total_Em</td> <td>LOG</td> <td>.045</td> <td>7</td> <td>.33</td> <td>.583</td> <td>620.223</td> <td>99.7766</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>INV</td> <td>.013</td> <td>7</td> <td>.09</td> <td>.770</td> <td>1519.79</td> <td>-248956</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>QUA</td> <td>.925</td> <td>6</td> <td>36.76</td> <td>.000</td> <td>3262.80</td> <td>-.7768</td> <td>8.0E-05</td> <td></td> <td></td> </tr> <tr> <td>9 Total_Em</td> <td>CUB</td> <td>.925</td> <td>6</td> <td>36.88</td> <td>.000</td> <td>2632.25</td> <td>-.3816</td> <td></td> <td>5.2E-09</td> <td></td> </tr> <tr> <td>Total_Em</td> <td>COM</td> <td>.088</td> <td>7</td> <td>.67</td> <td>.439</td> <td>1332.21</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>POW</td> <td>.038</td> <td>7</td> <td>.27</td> <td>.616</td> <td>876.685</td> <td>.0604</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>S</td> <td>.009</td> <td>7</td> <td>.06</td> <td>.807</td> <td>7.3178</td> <td>-137.71</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>GRO</td> <td>.088</td> <td>7</td> <td>.67</td> <td>.439</td> <td>7.1946</td> <td>1.9E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>EXP</td> <td>.088</td> <td>7</td> <td>.67</td> <td>.439</td> <td>1332.21</td> <td>1.9E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>LGS</td> <td>.088</td> <td>7</td> <td>.67</td> <td>.439</td> <td>.0008</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Notes: 9 Tolerance limits reached; some dependent variables were not entered.</p> | | | | | | | | | | | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Total_Em | LOG | .045 | 7 | .33 | .583 | 620.223 | 99.7766 | | | | Total_Em | INV | .013 | 7 | .09 | .770 | 1519.79 | -248956 | | | | Total_Em | QUA | .925 | 6 | 36.76 | .000 | 3262.80 | -.7768 | 8.0E-05 | | | 9 Total_Em | CUB | .925 | 6 | 36.88 | .000 | 2632.25 | -.3816 | | 5.2E-09 | | Total_Em | COM | .088 | 7 | .67 | .439 | 1332.21 | 1.0000 | | | | Total_Em | POW | .038 | 7 | .27 | .616 | 876.685 | .0604 | | | | Total_Em | S | .009 | 7 | .06 | .807 | 7.3178 | -137.71 | | | | Total_Em | GRO | .088 | 7 | .67 | .439 | 7.1946 | 1.9E-05 | | | | Total_Em | EXP | .088 | 7 | .67 | .439 | 1332.21 | 1.9E-05 | | | | Total_Em | LGS | .088 | 7 | .67 | .439 | .0008 | 1.0000 | | | | <p>Independent: Acceptances_5</p> <table border="1"> <thead> <tr> <th>Dependent</th> <th>Mth</th> <th>Rsq</th> <th>d.f.</th> <th>F</th> <th>Sigf</th> <th>Upper bound</th> <th>b0</th> <th>b1</th> <th>b2</th> <th>b3</th> </tr> </thead> <tbody> <tr> <td>Total_Em</td> <td>LOG</td> <td>.173</td> <td>7</td> <td>1.47</td> <td>.265</td> <td>-898.50</td> <td>285.542</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>INV</td> <td>.106</td> <td>7</td> <td>.83</td> <td>.392</td> <td>1744.70</td> <td>-1.E+06</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>QUA</td> <td>.842</td> <td>6</td> <td>15.99</td> <td>.004</td> <td>3565.83</td> <td>-.9218</td> <td>9.8E-05</td> <td></td> <td></td> </tr> <tr> <td>9 Total_Em</td> <td>CUB</td> <td>.826</td> <td>6</td> <td>14.27</td> <td>.005</td> <td>2767.88</td> <td>-.4287</td> <td></td> <td>6.3E-09</td> <td></td> </tr> <tr> <td>Total_Em</td> <td>COM</td> <td>.235</td> <td>7</td> <td>2.16</td> <td>.186</td> <td>1222.12</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>POW</td> <td>.157</td> <td>7</td> <td>1.30</td> <td>.292</td> <td>349.909</td> <td>.1729</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>S</td> <td>.093</td> <td>7</td> <td>.71</td> <td>.426</td> <td>7.4557</td> <td>-618.27</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>GRO</td> <td>.235</td> <td>7</td> <td>2.16</td> <td>.186</td> <td>7.1083</td> <td>4.4E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>EXP</td> <td>.235</td> <td>7</td> <td>2.16</td> <td>.186</td> <td>1222.12</td> <td>4.4E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>LGS</td> <td>.235</td> <td>7</td> <td>2.16</td> <td>.186</td> <td>.0008</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Notes: 9 Tolerance limits reached; some dependent variables were not entered.</p> | | | | | | | | | | | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Total_Em | LOG | .173 | 7 | 1.47 | .265 | -898.50 | 285.542 | | | | Total_Em | INV | .106 | 7 | .83 | .392 | 1744.70 | -1.E+06 | | | | Total_Em | QUA | .842 | 6 | 15.99 | .004 | 3565.83 | -.9218 | 9.8E-05 | | | 9 Total_Em | CUB | .826 | 6 | 14.27 | .005 | 2767.88 | -.4287 | | 6.3E-09 | | Total_Em | COM | .235 | 7 | 2.16 | .186 | 1222.12 | 1.0000 | | | | Total_Em | POW | .157 | 7 | 1.30 | .292 | 349.909 | .1729 | | | | Total_Em | S | .093 | 7 | .71 | .426 | 7.4557 | -618.27 | | | | Total_Em | GRO | .235 | 7 | 2.16 | .186 | 7.1083 | 4.4E-05 | | | | Total_Em | EXP | .235 | 7 | 2.16 | .186 | 1222.12 | 4.4E-05 | | | | Total_Em | LGS | .235 | 7 | 2.16 | .186 | .0008 | 1.0000 | | | |
|--|-----|------|------|-------|------|-------------|---------|---------|---------|----|-----------|-----|-----|------|---|------|-------------|----|----|----|----|----------|-----|------|---|-----|------|---------|---------|--|--|--|----------|-----|------|---|-----|------|---------|---------|--|--|--|----------|-----|------|---|-------|------|---------|--------|---------|--|--|------------|-----|------|---|-------|------|---------|--------|--|---------|--|----------|-----|------|---|------|------|---------|--------|--|--|--|----------|-----|------|---|-----|------|---------|-------|--|--|--|----------|---|------|---|-----|------|--------|---------|--|--|--|----------|-----|------|---|------|------|--------|---------|--|--|--|----------|-----|------|---|------|------|---------|---------|--|--|--|----------|-----|------|---|------|------|-------|--------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|-----------|-----|-----|------|---|------|-------------|----|----|----|----|----------|-----|------|---|------|------|---------|---------|--|--|--|----------|-----|------|---|-----|------|---------|---------|--|--|--|----------|-----|------|---|-------|------|---------|--------|---------|--|--|------------|-----|------|---|-------|------|---------|--------|--|---------|--|----------|-----|------|---|------|------|---------|--------|--|--|--|----------|-----|------|---|------|------|---------|-------|--|--|--|----------|---|------|---|-----|------|--------|---------|--|--|--|----------|-----|------|---|------|------|--------|---------|--|--|--|----------|-----|------|---|------|------|---------|---------|--|--|--|----------|-----|------|---|------|------|-------|--------|--|--|--|
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | LOG | .045 | 7 | .33 | .583 | 620.223 | 99.7766 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | INV | .013 | 7 | .09 | .770 | 1519.79 | -248956 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | QUA | .925 | 6 | 36.76 | .000 | 3262.80 | -.7768 | 8.0E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 Total_Em | CUB | .925 | 6 | 36.88 | .000 | 2632.25 | -.3816 | | 5.2E-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | COM | .088 | 7 | .67 | .439 | 1332.21 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | POW | .038 | 7 | .27 | .616 | 876.685 | .0604 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | S | .009 | 7 | .06 | .807 | 7.3178 | -137.71 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | GRO | .088 | 7 | .67 | .439 | 7.1946 | 1.9E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | EXP | .088 | 7 | .67 | .439 | 1332.21 | 1.9E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | LGS | .088 | 7 | .67 | .439 | .0008 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | LOG | .173 | 7 | 1.47 | .265 | -898.50 | 285.542 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | INV | .106 | 7 | .83 | .392 | 1744.70 | -1.E+06 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | QUA | .842 | 6 | 15.99 | .004 | 3565.83 | -.9218 | 9.8E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 Total_Em | CUB | .826 | 6 | 14.27 | .005 | 2767.88 | -.4287 | | 6.3E-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | COM | .235 | 7 | 2.16 | .186 | 1222.12 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | POW | .157 | 7 | 1.30 | .292 | 349.909 | .1729 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | S | .093 | 7 | .71 | .426 | 7.4557 | -618.27 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | GRO | .235 | 7 | 2.16 | .186 | 7.1083 | 4.4E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | EXP | .235 | 7 | 2.16 | .186 | 1222.12 | 4.4E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | LGS | .235 | 7 | 2.16 | .186 | .0008 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <p>Independent: Acceptances_6</p> <table border="1"> <thead> <tr> <th>Dependent</th> <th>Mth</th> <th>Rsq</th> <th>d.f.</th> <th>F</th> <th>Sigf</th> <th>Upper bound</th> <th>b0</th> <th>b1</th> <th>b2</th> <th>b3</th> </tr> </thead> <tbody> <tr> <td>Total_Em</td> <td>LOG</td> <td>.116</td> <td>7</td> <td>.92</td> <td>.369</td> <td>-482.88</td> <td>243.460</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>INV</td> <td>.069</td> <td>7</td> <td>.52</td> <td>.495</td> <td>1767.89</td> <td>-872238</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>QUA</td> <td>.497</td> <td>6</td> <td>2.96</td> <td>.127</td> <td>3139.54</td> <td>-.7096</td> <td>7.6E-05</td> <td></td> <td></td> </tr> <tr> <td>9 Total_Em</td> <td>CUB</td> <td>.458</td> <td>6</td> <td>2.54</td> <td>.159</td> <td>2461.00</td> <td>-.3084</td> <td></td> <td>4.7E-09</td> <td></td> </tr> <tr> <td>Total_Em</td> <td>COM</td> <td>.161</td> <td>7</td> <td>1.35</td> <td>.284</td> <td>1307.80</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>POW</td> <td>.108</td> <td>7</td> <td>.85</td> <td>.388</td> <td>445.220</td> <td>.1489</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>S</td> <td>.062</td> <td>7</td> <td>.46</td> <td>.519</td> <td>7.4732</td> <td>-524.46</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>GRO</td> <td>.161</td> <td>7</td> <td>1.35</td> <td>.284</td> <td>7.1761</td> <td>3.7E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>EXP</td> <td>.161</td> <td>7</td> <td>1.35</td> <td>.284</td> <td>1307.80</td> <td>3.7E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>LGS</td> <td>.161</td> <td>7</td> <td>1.35</td> <td>.284</td> <td>.0008</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Notes: 9 Tolerance limits reached; some dependent variables were not entered.</p> | | | | | | | | | | | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Total_Em | LOG | .116 | 7 | .92 | .369 | -482.88 | 243.460 | | | | Total_Em | INV | .069 | 7 | .52 | .495 | 1767.89 | -872238 | | | | Total_Em | QUA | .497 | 6 | 2.96 | .127 | 3139.54 | -.7096 | 7.6E-05 | | | 9 Total_Em | CUB | .458 | 6 | 2.54 | .159 | 2461.00 | -.3084 | | 4.7E-09 | | Total_Em | COM | .161 | 7 | 1.35 | .284 | 1307.80 | 1.0000 | | | | Total_Em | POW | .108 | 7 | .85 | .388 | 445.220 | .1489 | | | | Total_Em | S | .062 | 7 | .46 | .519 | 7.4732 | -524.46 | | | | Total_Em | GRO | .161 | 7 | 1.35 | .284 | 7.1761 | 3.7E-05 | | | | Total_Em | EXP | .161 | 7 | 1.35 | .284 | 1307.80 | 3.7E-05 | | | | Total_Em | LGS | .161 | 7 | 1.35 | .284 | .0008 | 1.0000 | | | | <p>Independent: Acceptances_7</p> <table border="1"> <thead> <tr> <th>Dependent</th> <th>Mth</th> <th>Rsq</th> <th>d.f.</th> <th>F</th> <th>Sigf</th> <th>Upper bound</th> <th>b0</th> <th>b1</th> <th>b2</th> <th>b3</th> </tr> </thead> <tbody> <tr> <td>Total_Em</td> <td>LOG</td> <td>.082</td> <td>7</td> <td>.63</td> <td>.455</td> <td>66.4792</td> <td>183.504</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>INV</td> <td>.050</td> <td>7</td> <td>.36</td> <td>.565</td> <td>1764.21</td> <td>-663345</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>QUA</td> <td>.267</td> <td>6</td> <td>1.09</td> <td>.394</td> <td>2535.60</td> <td>-.4257</td> <td>4.7E-05</td> <td></td> <td></td> </tr> <tr> <td>9 Total_Em</td> <td>CUB</td> <td>.234</td> <td>6</td> <td>.91</td> <td>.450</td> <td>2077.69</td> <td>-.1670</td> <td></td> <td>2.7E-09</td> <td></td> </tr> <tr> <td>Total_Em</td> <td>COM</td> <td>.111</td> <td>7</td> <td>.87</td> <td>.381</td> <td>1408.88</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>POW</td> <td>.077</td> <td>7</td> <td>.58</td> <td>.469</td> <td>622.350</td> <td>.1125</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>S</td> <td>.045</td> <td>7</td> <td>.33</td> <td>.583</td> <td>7.4734</td> <td>-401.02</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>GRO</td> <td>.111</td> <td>7</td> <td>.87</td> <td>.381</td> <td>7.2506</td> <td>2.8E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>EXP</td> <td>.111</td> <td>7</td> <td>.87</td> <td>.381</td> <td>1408.88</td> <td>2.8E-05</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Total_Em</td> <td>LGS</td> <td>.111</td> <td>7</td> <td>.87</td> <td>.381</td> <td>.0007</td> <td>1.0000</td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>Notes: 9 Tolerance limits reached; some dependent variables were not entered.</p> | | | | | | | | | | | Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | Total_Em | LOG | .082 | 7 | .63 | .455 | 66.4792 | 183.504 | | | | Total_Em | INV | .050 | 7 | .36 | .565 | 1764.21 | -663345 | | | | Total_Em | QUA | .267 | 6 | 1.09 | .394 | 2535.60 | -.4257 | 4.7E-05 | | | 9 Total_Em | CUB | .234 | 6 | .91 | .450 | 2077.69 | -.1670 | | 2.7E-09 | | Total_Em | COM | .111 | 7 | .87 | .381 | 1408.88 | 1.0000 | | | | Total_Em | POW | .077 | 7 | .58 | .469 | 622.350 | .1125 | | | | Total_Em | S | .045 | 7 | .33 | .583 | 7.4734 | -401.02 | | | | Total_Em | GRO | .111 | 7 | .87 | .381 | 7.2506 | 2.8E-05 | | | | Total_Em | EXP | .111 | 7 | .87 | .381 | 1408.88 | 2.8E-05 | | | | Total_Em | LGS | .111 | 7 | .87 | .381 | .0007 | 1.0000 | | | |
| Dependent | Mth | Rsq | d.f. | F | Sigf | Upper bound | b0 | b1 | b2 | b3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | LOG | .116 | 7 | .92 | .369 | -482.88 | 243.460 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | INV | .069 | 7 | .52 | .495 | 1767.89 | -872238 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | QUA | .497 | 6 | 2.96 | .127 | 3139.54 | -.7096 | 7.6E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 Total_Em | CUB | .458 | 6 | 2.54 | .159 | 2461.00 | -.3084 | | 4.7E-09 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | COM | .161 | 7 | 1.35 | .284 | 1307.80 | 1.0000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | POW | .108 | 7 | .85 | .388 | 445.220 | .1489 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | S | .062 | 7 | .46 | .519 | 7.4732 | -524.46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | GRO | .161 | 7 | 1.35 | .284 | 7.1761 | 3.7E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total_Em | EXP | .161 | 7 | 1.35 | .284 | 1307.80 | 3.7E-05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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Appendix 4.8.24 SPSS Equations for Curve Estimation

Linear. Model whose equation is $Y = b_0 + (b_1 * t)$. The series values are modeled as a linear function of time.

Logarithmic. Model whose equation is $Y = b_0 + (b_1 * \ln(t))$.

Inverse. Model whose equation is $Y = b_0 + (b_1 / t)$.

Quadratic. Model whose equation is $Y = b_0 + (b_1 * t) + (b_2 * t^{**2})$. The quadratic model can be used to model a series which "takes off" or a series which dampens.

Cubic. Model defined by the equation $Y = b_0 + (b_1 * t) + (b_2 * t^{**2}) + (b_3 * t^{**3})$.

Power. Model whose equation is $Y = b_0 * (t^{**b_1})$ or $\ln(Y) = \ln(b_0) + (b_1 * \ln(t))$.

Compound. Model whose equation is $Y = b_0 * (b_1^{**t})$ or $\ln(Y) = \ln(b_0) + (\ln(b_1) * t)$.

S-curve. Model whose equation is $Y = e^{**}(b_0 + (b_1/t))$ or $\ln(Y) = b_0 + (b_1/t)$.

Logistic. Model whose equation is $Y = 1 / (1/u + (b_0 * (b_1^{**t})))$ or $\ln(1/y-1/u) = \ln(b_0) + (\ln(b_1)*t)$ where u is the upper boundary value. After selecting Logistic, specify the upper boundary value to use in the regression equation. The value must be a positive number, greater than the largest dependent variable value.

Growth. Model whose equation is $Y = e^{**}(b_0 + (b_1 * t))$ or $\ln(Y) = b_0 + (b_1 * t)$.

Exponential. Model whose equation is $Y = b_0 * (e^{**}(b_1 * t))$ or $\ln(Y) = \ln(b_0) + (b_1 * t)$.

**Nottingham Trent University
The Nottingham Business School**

Doctor of Business Administration Programme

***Management Education, Training and
Development of Construction Managers -
Will They Ever Learn?***

Thesis

Document 5

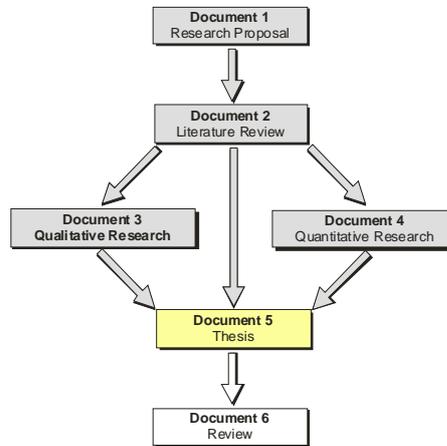
**A.G. Hurst
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**NOTTINGHAM
TRENT UNIVERSITY** 

This document is submitted in fulfilment of Document 5, being a partial fulfilment of the Doctor of Business Administration programme.

Document 5: Thesis

Title: Management Education, Training and Development of Construction Managers - Will They Ever Learn?



Supervisors: Professor Alistair Mutch
Professor Myra Hodgkinson

October 2009

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Abstract

This thesis investigates the current state of education, training and development of construction managers in the UK by undertaking three strands of research.

The first research strand undertakes a longitudinal study to determine the structure of the UK construction industry, and how it has evolved into its present form. Using published Government reports the industry is analysed in terms of the levels and distribution of employment within the industry and the numbers, sizes and types of construction companies that comprise the construction industry.

The second research strand comprises a study of the current state of education, training and development of construction managers amongst the top 150 UK construction companies. Research, using a postal questionnaire, is undertaken to establish, firstly, company policies and attitudes towards education, training and development of construction managers; secondly, company policies and attitudes towards links with higher education establishments; and thirdly, the extent of ICT availability to construction managers that could be used to support continuing education, training and development of those managers. Questionnaire responses were either cross-tabulated and subjected to statistical analysis using Chi-Square Tests and Symmetrical Measures to establish the statistical significance of the responses; or were ranked using Relative Importance Indices to determine company attitudes and preferences.

The third strand of research comprises a desktop study of the continuing professional development (CPD) requirements of seventeen of the principal professional institutions serving the construction industry. The research establishes the various requirements, policies, practices and procedures incumbent on the institutions' members undertaking CPD activities.

This thesis concludes, firstly, that the construction industry is becoming evermore fragmented as the number of small trades contractors continues to increase together with a continued growth in self-employment and agency working in the industry. This has a negative impact on management education, training and development as the increasing fragmentation makes this more difficult for smaller firms and self-employed workers to accommodate.

This thesis concludes, secondly, that construction companies are dominated by a task-culture, resulting from the project-based nature of the industry and the competitive way that work is procured. Consequently, construction companies tend to focus on meeting short-term financial and production objectives rather than long-term development strategies required for effective staff education, training and development.

Thirdly, this thesis concludes that the principal drivers for education, training and development of managers in the construction industry are not the construction companies, but the professional institutions to which construction managers might belong. It is the institutions requirements for CPD for admission to, and continuation of, membership that provides one of the key drivers for undertaking CPD by managers. However, the adoption of new Construction Industry Council (CIC) recommendations by the professional institutions is producing a move away from formalised, often time-based, CPD requirements towards a requirement that CPD should be undertaken on an 'as needs' basis according to the members position and requirements. This has the potential to create loophole that could undermine all attempts to maintain or raise management standards through CPD.

Finally, this thesis concludes that for management standards in the construction industry to be raised, continuing education, training and development of managers must become fully embedded in the culture of the construction industry, not just the professional institutions. CPD requirements should be formally linked to both academic standards and achievement, as well becoming a mandatory requirement of all supervisory and managerial grades of schemes such as the Construction Skills Certification Scheme (CSCS).

Keywords

Construction companies; Construction management; Continuing professional development; Management education, training and development; Professional institutions; UK construction industry.

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5.0.3 List of Abbreviations and Acronyms

| | |
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| AAS | Annual Abstract of Statistics |
| ABE | Association of Building Engineers |
| APM | Association for Project Management |
| ASCC | Alliance of Sector Skills Councils |
| BERR | (Department for) Business, Enterprise and Regulatory Reform |
| BIFM | British Institute of Facilities Management |
| BoT | Board of Trade |
| CIAT | Chartered Institute of Architectural Technologists |
| CIBSE | Chartered Institute of Building Services Engineers |
| CIC | Construction Industry Council |
| CIOB | Chartered Institute of Building |
| CIOT | Chartered Institute of Taxation |
| CIPD | Chartered Institute of Personnel and Development |
| CIS | Construction Industry Scheme |
| CISC | Construction Industry Council's Standards Committee |
| CITB | Construction Industry Training Board |
| CITB-CS | Construction Industry Training Board - ConstructionSkills |
| CMI | Chartered Management Institute |
| CPD | Continuing Professional Development; or Continuing Personal Development |
| CPPD | Continuing Professional and Personal Development |
| CSA | Construction Statistics Annual |
| CSCS | Construction Skills Certificate Scheme |
| CSO | Central Statistical Office |
| CQS | Construction Qualifications Strategy |
| DES | Department of Education and Science |
| DETR | Department for the Environment, Transport and the Regions |
| DfEE | Department for Education and Employment |
| DLO | Direct Labour Organisation |
| DoE | Department of Education |
| DTI | Department for Transport and Industry |

| | |
|----------|--|
| DIUS | Department of Innovation, Universities and Skills |
| ECUK | Engineering Council United Kingdom |
| EUCLR | European Institute for Construction Labour Research |
| EUSCCCIP | European Project for the Use of Standards of Competence in CPD for Construction Industry Practitioners |
| FE | Further Education |
| GDP | Gross Domestic Product |
| GVA | Gross Value Added |
| HCS | Housing and Construction Statistics |
| HCT | Human Capital Theory |
| HE | Higher Education |
| HESA | Higher Education Statistics Agency |
| HMCE | Her Majesty's Customs and Excise |
| HMCR | Her Majesty's Customs and Revenue |
| HMIR | Her Majesty's Inland Revenue |
| HMSO | Her Majesty's Stationary Office |
| HMT | Her Majesty's Treasury |
| HoCBEC | House of Commons Business Enterprise Committee |
| HRD | Human Resources Development |
| HRM | Human Resources Management |
| ICE | Institution of Civil Engineers |
| ICES | Institution of Civil Engineering Surveyors |
| ICPD | Institute of Continuing Professional Development |
| ICWGB | Institute of Clerks of Works of Great Britain |
| IHIE | Institute of Highways Incorporated Engineers |
| IHT | Institution of Highways and Transportation |
| ILO | International Labour Office |
| IMBM | Institute of Maintenance and Building Management |
| IPD | Institute of Personnel and Development |
| IPHE | Institute of Plumbing and Heating Engineering |
| IR | Inland Revenue |
| IStructE | Institution of Structural Engineers |

| | |
|-------|---|
| KPI | Key Performance Indicators |
| KSA | Knowledge, Skills, Attitude |
| L-I | Landscape Institute |
| MCG | Main Contractors Group |
| MCI | Management Standards Initiative |
| MD | Management Development |
| MSC | Management Standards Centre |
| NOED | New Oxford English Dictionary |
| NOS | National Occupation Standards |
| NVQ | National Vocational Qualification |
| ONS | Office for National Statistics |
| PCAS | Polytechnic Central Admission Service |
| PDP | Personal Development Plan |
| PQP | Professionally Qualified Person |
| RIBA | Royal Institute of British Architects |
| RICS | Royal Institution of Chartered Surveyors |
| RTPI | Royal Town Planning Institute |
| SDD | Self-Directed Development |
| SDL | Self-Directed Learning |
| SIC | Standard Industry Classification |
| SMD | Self-Managed Development |
| SML | Self-Managed Learning |
| SSC | Sector Skills Council |
| SSDA | Sector Skills Development Agency |
| TSO | The Stationary Office |
| UCAS | Universities Central Admissions Council |
| UCATT | Union of Construction and Allied Trades Technicians |
| UCCA | Universities Central Council for Admissions |
| UGC | University Grants Committee |
| USR | Universities Statistical Record |
| WW1 | World War 1 |
| WW2 | World War 2 |

5.0.4 Acknowledgement of Trademarks.

MS Access is a registered trademark of Microsoft Corporation Inc.

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MindMap is a registered trademark of Mindjet LLC.

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SPSS is a registered trademark of SPSS Inc.

5.1 Introduction

This thesis forms part of an overall research project that has focused on the construction industry. It identifies that significant gaps in research in relation to education, training and development within the industry exist, and that this is particularly prevalent in the field of construction managers.

The industry has often been denigrated by successive governments, other industries and even the general public at large for its poor performance and low productivity (e.g. Hillebrandt 1984, 2000; Ive et al 2004; Blake, Croot and Hastings 2004). At the same time it has also been recognised that a significant contributor to the industry's poor performance and low productivity is a lack of education, training and development activity amongst the workforce, including managers (Latham, 1994). However, this is not unique to the construction industry as it has also been identified as part of a general malaise in many UK manufacturing industries. Much of the lack of education, training and development in the UK construction industry can be attributed to the structural composition and working conditions within it (Cooper, 2004), hence the need in this thesis to explore the composition and conditions lying beneath the visible surface of the industry.

The significance of the role of education, training and development of all levels of employees has been established as a key factor of the productivity, and ultimately profitability, of organisations (Bruce, 1984). The poor productivity and low profitability levels of the construction industry have long been a cause for concern (Barrett & Lee, 2008), and the working practices of the industry itself have also been the subject of a number of important Government reviews and reports during the last seventy years. These include Simons (1944), Phillips (1950), Emerson (1962), Banwell (1964), Phelps Brown (1968), Wood (1975), Latham (1994), Egan (1994, 2002) and Fairclough (2002), as shown in the timeline illustration shown in Figure 5.1 below.

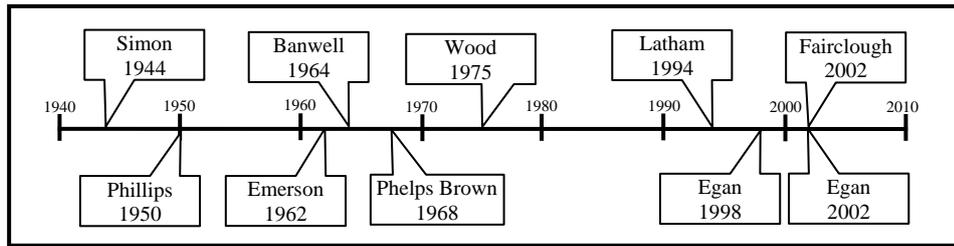


Figure 5.1: Timeline of Major Government Reports Relating to the Construction Industry

However, it is not until the Egan report (1998) that the contribution that education, training and development of staff can make to improved productivity and profits is explicitly identified. It is noticeable that the pre-Egan reports focussed very much on trying to improve the industry's processes and practices rather than the people within the industry. In the post-Egan era reports such as those produced by Pearce (2003) and the House of Commons Business Enterprise Committee (HoCBEC) (2008) take a much more holistic view of the industry and fully recognise the importance that the people within the industry make to the industry's performance and profitability.

The construction industry is a large and complex industry incorporating both manufacturing and servicing; it is project based, and is one that is vital to the economy of the country. Yet it is different from other industries in ways that give it both uniqueness and its own special problems. Against this background Loosemore, Dainty and Lingard (2003: 3) identify a number of factors that are common to the projects undertaken by the industry:

- The unique one-off nature of the product;
- The tendency for project contracts to be awarded at very short notice;
- The reliance on a largely transient workforce;
- Clients that are becoming increasingly demanding, and
- An industry culture that is male-dominated.

In addition to these is a factor that almost no other industry has to contend with – a high level of fragmentation resulting from the industry's products having to be manufactured at the place of use. This requires that the 'factory' and all its input resources have to be taken to the location where the product is required, and the

product mostly manufactured in-situ. Thus the construction industry's operating environment is extremely complex and highly fragmented with difficulties faced by few other industries. Within this complex environment a workforce must be created that can not only tolerate but thrive in what can be considered to be harsh operating conditions. The workforce required, both at trades level and at managerial level, not only has to function effectively, efficiently and economically within this environment, but has to develop and maintain its skills and knowledge base to cope with the ever-changing demands of the industry and of the projects it undertakes (Raidén, Dainty and Neale, 2009).

This thesis cannot provide a definitive analysis of such a vast and complex industry, but it does set an agenda for both future research and a reshaping of some educational practices within the industry. It draws together and presents findings from research into the structure of the construction industry; management education, training and development in the construction industry; and continuing professional development requirements of the principal professional institutions serving the construction industry. However, before this is done in detail, a brief overview of research already completed is given in Chapter 5.2.

5.1.1 Focus and structure of the thesis

The focus of this thesis is the development and maintenance of skills and knowledge of the construction managers employed by the construction companies. The structure of this thesis which follows a traditional research model (e.g. Saunders, Lewis and Thornhill, 2007: 10) as shown in Figure 5.2 overleaf. The three strands of the thesis, the evolving structure of the UK construction industry; education, training and development of construction managers; and the continuing professional development (CPD) requirements of the professional institutions are first identified in the literature review. Each strand of the research is considered separately within the literature review and the research methodology chapters, with each strand having its own chapter for consideration of the research findings. These strands are brought

together in Chapter 5.9: Conclusions before identifying opportunities for further research.

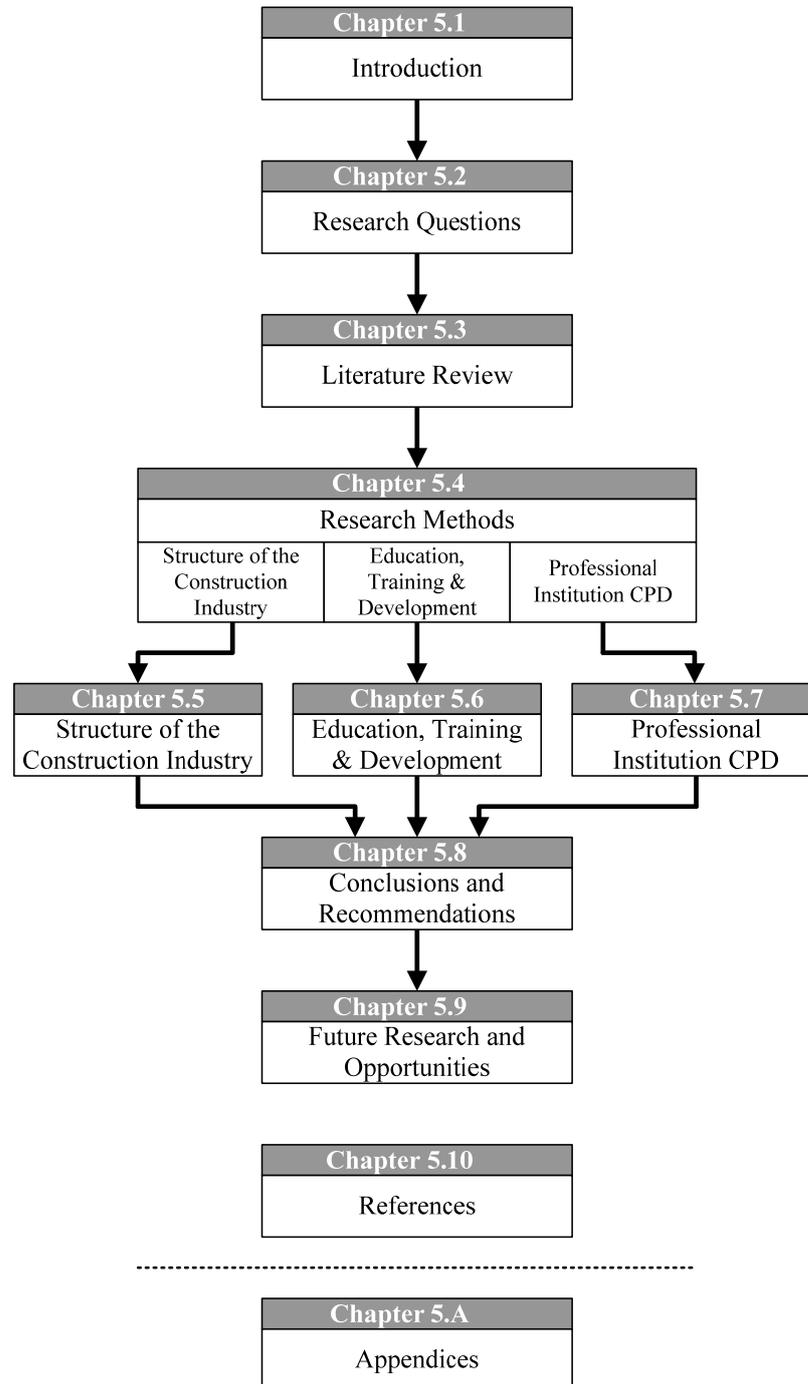


Figure 5.2: Thesis Structure

Critical realism was found to be an eminently suitable approach, not only for the qualitative research undertaken in Document 3, but also for the quantitative research undertaken in Document 4, providing continuity of philosophical approach. The critical realist approach is maintained for this thesis to ensure a consistent philosophy throughout the research project. Its adoption also facilitates this thesis building upon preceding research work undertaken in Document 3 and Document 4.

5.1.2 Chapter 5.2: The Research Questions.

This chapter considers the original research questions posed in Document 1 and discusses how they have evolved through the Qualitative Research Project of Document 3 and the Quantitative Research Project of Document 4. Based upon the findings of those research projects new research questions for this thesis are proposed that consider various aspects of management education, training and development essential for the future prosperity and development of both the construction industry and the managers within it.

5.1.3 Chapter 5.3: Literature Review.

This chapter builds upon the literature review of Document 2 and the literature reviewed in Document 3 and Document 4. Even though Documents 3 and 4 did not contain explicit literature reviews, literature was implicitly reviewed within the research projects. The literature review in this thesis considers the following areas:

- Critical realist research philosophy;
- Definitions of education, training and development;
- Management development
- Skills and performance in the construction industry;
- The flexible firm;
- The effects of flexibility upon the workforce;
- Work-life balance and conflict;
- The case for the older worker; and
- Continuing professional development;

5.1.4 Chapter 5.4: Research Methods.

This chapter considers the research methodology used and the research methods employed for this thesis. A number of research methods are employed for the qualitative and quantitative research aspects of this thesis.

Qualitative research: Here the methods used are the analysis of the seventeen principle professional institutions' web-sites and down-loadable documentation in order to establish the implementation of CPD policies and practices for their members. Unstructured telephone interviews are used to obtain additional information and/or clarification of information not available from the web-sites.

Quantitative research: Two research techniques are employed. Firstly, those of abstraction, processing, synthesis and analysis of various statistical data published by assorted government agencies such as the DTI (now the BERR), to provide a framework for the determination of the structure of the construction industry and how that structure is evolving. Secondly, a postal questionnaire is developed and utilised with the UK's top 150 construction companies to establish their approaches to CPD, their needs of, and relationships with, higher education; and the accessibility of ICT to their managers

5.1.5 Chapter 5.5: Structure: The Structure of the Construction Industry.

This chapter reports the findings of a desk-top study that considers the evolving structure and composition of the UK construction industry. It describes the economic importance and contribution that the industry makes to the UK economy in terms of employment and gross domestic product (GDP)/gross value added (GVA).

Using data published by the Government's 'Annual Abstract of Statistics' from 1923 (when the industry was first reported as an industry in its own right) to the latest figures available for 2006, annual employment levels in the industry are established. A more detailed breakdown of the industry has only been published in a consistent statistical form since 1969; the latest available data is for 2006. Using these Government statistics enables the evolving structure of the industry to be determined

by plotting the changes in various industry segments (trades) and the numbers and sizes of the companies operating in these various segments.

These statistics reveal the reactions of the industry to prevailing UK economic condition, including the various ‘boom and bust’ cycles for which the industry is notorious. Standardisation of financial reporting in the post World-War Two (WW2) era enables the financial contribution of the construction industry to the UK economy in terms of its GDP/GVA to be plotted.

5.1.6 Chapter 5.6: Mechanism: Education, Training and Development of Construction Managers

This chapter presents the findings from the questionnaire survey of the UK’s top 150 construction companies (by financial turnover) establishing the current position with regard to the education, training and development of construction managers within those firms.

The questionnaire attempts to elicit responses from construction in the following three areas:

- Staff development and appraisal;
- Links to higher education; and
- ICT access and usage for staff development purposes.

The data from the responses to each question are collated and presented in Appendix 5.10 through the use of statistical tables, bubble diagrams and bar charts. The data is analysed and cross-tabulations of responses undertaken using a number of established statistical techniques to determine the strengths of the association between the responses to various questions.

5.1.7 Chapter 5.7: Conditions: Professional Institution CPD Requirements

Here the findings from the desk-top survey of the CPD requirements of the seventeen principal professional institutions that serve the construction industry are presented and considered. The survey examines the professional institutions’ web-sites and

publicly downloadable documentation content to establish the CPD policies and practices to be complied with by the members of each institution. The survey seeks, firstly, to determine the CPD approach adopted by the professional institutes and, secondly, the extent to which the policies and practices appear to be implemented. The survey establishes the time minimum requirements stipulated by the professional institutions for CPD activities, the monitoring of the records of CPD activities undertaken by members, and the sanctions imposed by institutions for non-compliance with institutions' CPD requirements. The nature of the activities that professional institutions consider as acceptable CPD are categorised and discussed. Finally the adoption and implementation of the European Project for the Use of Standards of Competence in CPD for Construction Industry Practitioners (EUSCCCIP) CPD model adopted by the Construction Industry Council (CIC) and by the professional institutions is considered.

5.1.8 Chapter 5.8: Conclusions and Recommendations

In this chapter the three strands of the research are brought together and the implications for management education, training and development in the construction industry are considered and, where appropriate, recommendations for the industry are made.

5.1.9 Chapter 5.9: Future Research

Here various possibilities for continuing and extending the research undertaken in this thesis are presented. Opportunities for continuing various themes of the research undertaken are considered, particularly in terms of their relevance and importance to the construction industry in the future, and in particular:

- The evolving structure and composition of the construction industry;
- Education, training and development of construction managers; and
- Professional institution CPD requirements.

Each of the above strands identifies a number of areas within it that might prove fruitful for future research. Some research in ongoing trends and changes in the construction industry requires long-term low-level research, whilst others warrant major research projects in themselves. This chapter also suggests areas within this thesis for conference papers and journal articles.

This thesis, as previously mentioned, builds upon research undertaken in earlier documents in this research project. The next chapter, Chapter 5.2: The Research Questions, reviews this earlier research and then sets out the research questions to be considered in this thesis from a critical realist perspective. The research questions will set an agenda, firstly, for an exploration of structural issues of the construction industry, and how that structure is changing; thus setting the background for the second area of research, investigating education, training and development of construction managers. Finally, the research questions set an agenda for an examination of the role of the professional institutions in determining the extent to which they contribute to education, training and development of construction managers through implementation of continuing professional development (CPD).

5.2 The Research Questions

5.2.1 Introduction

This chapter reviews the four documents and the evolution of the various research questions considered that lead up to this thesis. It considers the original research themes and questions proposed in Document 1 and how they evolved in response to push and pull factors during the preparation of Document 2, to provide research questions for Document 3 and Document 4. The conclusions from these earlier documents, together with their recommendations for areas of further study, are brought together providing the context for development of the research questions for this thesis, Document 5.

5.2.2 Document 1: ‘Definition and Mapping of the Research Question’,

Document 1 set out the initial research proposal which was to consist of a fusion of two main themes:

- Training and development for construction industry professionals to meet the future needs and requirements of the industry in light of the Latham Report.
- New learning technologies, in particular the internet, for the delivery of management education, education and training by higher education institutions.

(Document 1, 2003: 1.4)

These themes would lead to a proposal of the initial research question:

How might the new learning technologies be best used by the Higher Education sector to help meet the needs of management education, training and development for lifelong learning in the construction industry?

(Document 1, 2003: 1.20)

The consideration of the research question was to be dependent upon the qualitative and quantitative research projects undertaken in Document 3 and Document 4 respectively, and upon which it would build. It was proposed that Document 3 would, through a qualitative research project, consider the research question:

‘How might the new learning technologies be best used to develop management education, training and development in the construction industry?’

(Document 1, 2003: 1.15)

Whilst Document 4 would, through a quantitative research project, consider the research question:

‘What management education, training and development is needed by the construction profession to meet the future needs of industry?’

(Document 1, 2003: 1.17)

Whilst both of these topics are still of great interest to the author, various developments throughout the course of the DBA would lead to the focus being subjected to two significant forces, one a pull-factor and the other a push-factor, which would lead to a change of direction as the DBA progressed and a redefinition of the research questions. The first research theme would come to dominate, whilst the second developed a state of atrophy.

5.2.3 Document 2: The Literature Review

The literature review, Document 2, originally intended to underpin and support the research questions posed above. Document 2 followed the format of the two research themes identified in Document 1, and considered three main areas of literature:

- 1) The construction industry and higher education;
- 2) The learning organisation and lifelong learning; and
- 3) E-learning and new learning technologies.

However, it was during the preparation of Document 2 that two critical events, one the pull-factor and the other the push-factor mentioned above occurred, which were to lead to a change in emphasis in the research occurred.

5.2.3.1 The ‘Pull’ Factor – The Coulter Report

A forum composed of leading academics and industrialists was held with the working title of ‘Rethinking Construction Education’ (echoing the title of Sir John Egan’s far reaching report into the construction industry entitled ‘Rethinking Construction’ (Egan, 1998)) to consider the current state of higher education degree courses for the construction industry. The findings of the forum were published by

Coulter (2003) and were immediately seized upon by the construction industry press leading to a feature articles entitled ‘Death of a Degree’ (Smith, 2003a) and ‘Closing Time’ (Smith, 2003b) being published in *Construction Manager*, although earlier articles by Clark (2003) and Clark and Nikkhah (2003) in *Building* went largely unnoticed. Smith’s articles focussed upon one thread of the forum’s discussions and reported that if the then [2003] rate of decline in applications to construction management courses continued at its present rate then within ten years there would not be a single applicant or enrolment for a construction management degree course anywhere in the UK. This finding was the result of an extrapolation and projection of the previous five year’s UCAS data during which time applications and enrolments had been in decline. Had a longer time-series been considered then the forum might have arrived at a very different conclusion. Nevertheless, the article achieved its perhaps intended aim of creating quite a stir within industry and particularly in higher education construction circles.

The ‘Rethinking Construction Education’ report and ensuing articles lead to a change in emphasis and redefinition of the research questions for Document 3 and Document 4 to explore two of the issues arising from the report.

5.2.3.2 The ‘Push’ Factor – The Minerva Project

Following the experiences gained with the MSc International Construction Management programme (see Document 1: Appendix 2) the programme partners, Waterford Institute of Technology (WIT) in Ireland, Fachhochschule-Karlsruhe (FH-K)¹ in Germany, Nottingham Trent University (NTU) together with another organisation, Muliti-Media Instructional Design (MMID) in Waterford, Ireland, agreed to submit a bid for European Union (EU) funding under the Minerva initiative in 2002 to try and secure funding to research and develop the use of IT to deliver CPD courses to industry. The Minerva project was to be used to feed the DBA project through the second theme.

¹ Now renamed Hochschule- Karlsruhe (H-K)

The bid received favourable comments from the EU, but was rejected ultimately in the final round of bidding. Following very positive feedback from the EU the bid was amended in accordance with feedback received and, as advised, was resubmitted in 2003 only to be rejected outright at the first stage consideration.

The participants agreed to make one final attempt to secure funding for the project in March 2005 with an enlarged number of partners for the project, adding Istanbul Technical University (ITU) in Turkey as a participant. Much to the partners' surprise the bid was accepted and funding of €178,000 (75% of the bid of €237,000) was awarded for the project to start in October 2005 and to last a period of two years. This was received too late to become a part of the DBA research project but, ultimately, some of the DBA research work would be used to feed into the Minerva project.

5.2.4 Document 3: The Qualitative Research Project

Following the reports that occurred during the preparation of Document 2, the research question for the Qualitative Research Project in Document 3, was redefined as:

What are the structures and mechanisms behind the perceived poor state of management education, training and development, and the decline in entrants into the construction industry, with particular reference to construction management?

(Document 3, 2004: 3.13)

Research conducted through interviews with personnel and development managers in four of the UK's largest construction companies revealed a number of principal themes relating to the state of the industry:

- 1) Perceived poor image of the construction industry;
- 2) Recruitment into the industry; and
- 3) Education, training and development in the construction industry

(Document 3, 2004: 3.69)

In consideration of the third theme conclusions drawn led to the recommendation that industry education, training and development be taken forward for further in-

depth research (see Figure 5.3 below). The other two themes, each worthy of study in their own right, would not form any further part of this project.

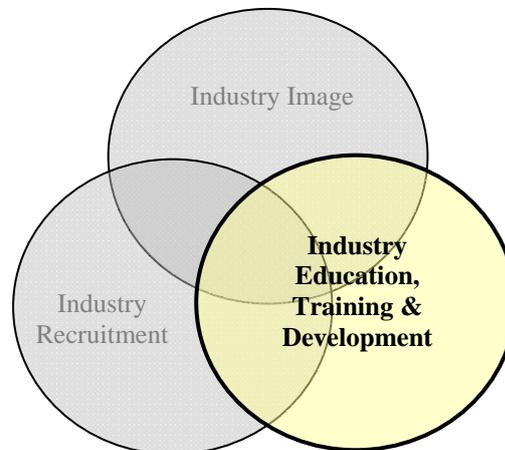


Figure 5.3: Future Research Areas
Source: Document 3, 2004: 3.74

The conclusions to Document 3 stated that:

The genuine need for management education, training and development is really only just beginning to be recognised in the construction industry as having an important role in organisational productivity and hence profitability. It is perhaps regrettable to note that little real progress seems to have been achieved in the almost 20 years since the 'Making of Managers' reports by Handy et al (1987) and Constable and McCormick (1987).

(Document 3, 2004: 3.72)

Therefore, part of the research for this thesis (Document 5) would seek to establish the extent of management education, training and development in construction companies.

5.2.5 Document 4: The Quantitative Research Project

Similarly, for the Quantitative Research Project in Document 4, the research question was redefined as two hypotheses:

- 1) There is an association between the level of employment in the construction industry and the level of recruitment to higher education courses in construction industry related topics; and
- 2) The level of recruitment to higher education industry related courses might be predicted from the level of employment in the construction industry.

(Document 4, 2005: 4.17)

Both of these hypotheses were proven to be true.

During the research for Document 4 a considerable amount of industry data was collected. One of the aspects observed was the constantly changing structure of the industry. Particularly noticeable were the cyclical changes in employment that have already been discussed in Documents 3 and 4 with respect to the correlation with recruitment to higher education construction related courses. Other noticeable aspects were the structural changes in the nature of employment through:

- i) the growth in self-employment; and
- ii) the growth in the number of small specialist trades firms, i.e. those that act as subcontractors to the main contractors.

These aspects were not explored in Document 4, but will be discussed in Document 5 as this changing structure has considerable implications for management education, training and development.

Document 4 concluded with a proposal for two main themes for Document 5:

- 1) Building on the data collected during Document 4, carry out an analysis of the market(s) in which higher education takes place, through a study of the needs of construction industry employers using interviews and questionnaires, focussing on the needs of construction companies; and
- 2) A market analysis of construction industry higher education provision through the analysis of UCAS data for all higher education providers.

(Document 4, 2005: 4.107)

5.2.5.1 Industry Needs

In light of various developments and discussions that took place during and after the preparation of Document 3 and Document 4 the proposal to establish the nature of higher education provision for the construction industry has been adopted, in a modified form in terms of 'appropriateness for industry needs', to become a core theme of this thesis. The proposal to carry out interviews was not implemented due to the level of resources, particularly time, needed to undertake a meaningful number of interviews not being available.

5.2.5.2 UCAS Data.

UCAS data for all higher education providers of built environment courses was purchased from UCAS. The providers of this data, UCAS, imposed very strict terms and conditions about its use, retention of copyright and re-publication rights of their data that made its use in a thesis difficult, and especially difficult for the subsequent publication of conference papers and journal articles.

Data analysis was carried out found that some institutions were reclassifying their course codes from time to time resulting in discontinuities of the data sets, rendering meaningful, consistent analysis difficult. In particular, one of the large providers of built environment courses in the UK reclassified all its built-environment courses, including architecture, surveying, and construction management, etc., as ‘civil engineering’ thus the students suddenly became ‘civil engineering’ students rather than their ‘correct’ disciplines of architecture, surveying, construction management, etc. This resulted in a discontinuity and distortion in the respective data sets.

This issue was referred to UCAS for clarification and possible correct classification of subjects, but without success. Therefore, for the time being at least, the issue remains irresolvable. Due to the annual variations that occur with recruitment within each subject at each institution the decision was made not to attempt to apportion the students to the various disciplines, as this would also introduce a likelihood of a high level of error. Consequently, and with great reluctance, it was decided to discontinue this line of research for this thesis and to concentrate on industry needs.

5.2.6 The Research Question for Document 5: Thesis

Building upon the findings of the preceding research reports and their recommendations for further study it became apparent that the construction industry, and in particular construction firms within it, their employees, and their future or potential employees, are subject to a number of powerful forces ranging from cycles of economic boom and recession, to poor public image and perception of the

industry. All of these were found to have an adverse effect upon recruitment and retention of personnel in the industry, and the performance of the industry itself. Furthermore, the structural form of the construction industry is constantly evolving as it tries to come to terms with many of the pressures acting upon it. These forces also have implications for education, training and development of construction personnel at all levels within the industry, and the development and retention of knowledge and skills within the industry and within construction firms.

This thesis brings together the themes and threads from the research in the earlier documents and builds upon them to form a focussed area of research. One of the common themes and threads is that of education, training and development of managers in the construction industry and it is this theme that has been adopted for this thesis.

5.2.7 The Research Question

The research question investigated in this thesis is:

How might continuing education, training and development of construction managers be effectively implemented in construction companies to improve productivity and performance of the industry?

This investigation for the research question will be undertaken by consideration of three sub-questions:

- 1) How does the structure of the construction industry affect continuing education training and development of construction management?**
- 2) What continuing education, training and development of construction managers is currently undertaken by construction companies?**
- 3) How do the professional institutions serving the construction industry influence the continuing education, training and development of construction managers?**

Each of the three sub-questions above will form a part of the critical realist research model that is set out in the following chapters and will underpin the structure of this thesis.

5.2.8 Conclusion

This chapter has set out how the research topics and research questions undertaken in each part of the research project to date have evolved in response to various forces and events that have occurred both within the construction industry and the higher education environments until the research questions set out above have been finally arrived at. Maintaining the critical realist research philosophy will enable each of the three sub-questions to form a separate strand of research in the critical realist research model used to underpin this thesis and form the basis of the structure of the thesis, ultimately being brought together in the penultimate chapter, conclusions and recommendations.

In the next chapter, Chapter 5.3 The Literature Review, a review of published literature including academic journals, conference papers, government and other reports is undertaken to establish current developments, thinking and debate for each strand of the research commences by reconsidering the critical realist research philosophy and how the critical realist research model forms the structure of this thesis. It then reviews various literatures to establish the lines of enquiry and areas for investigation that form the components of the critical realist research model that underpins this thesis.

5.3 Literature Review

5.3.1 Introduction

This literature review builds upon the literature reviews of the preceding documents and seeks to establish or update current debate in number of areas appertaining to this thesis. Firstly, the critical realist research philosophy is revisited as the debate has widened considerably since the last document was produced; and secondly, analysis of literature suggests that there are a number of themes contributing to the debates of education, training and development of construction managers pertinent to this thesis. These match the ‘mechanisms’ (internal) and ‘other mechanisms’ (external) of the critical realist model being used, these being:

- Definitions of education, training and development;
- Management development;
- Skills and performance in the construction industry;
- ConstructionSkills;
- The flexible firm;
- The effects of flexibility upon the workforce;
- Work-life balance and conflict;
- The case for the older worker; and
- Continuing professional development.

Although in many cases the boundaries between these debates are extremely blurred, each of the above impacts directly upon managers and the performance of construction companies and is considered in terms of their effects on education, training and development.

5.3.2 Critical Realism

The research philosophy adopted in the preceding Document 3 and Document 4 was that of critical realism. This philosophical approach is continued in this thesis to ensure that both consistency of method and compatibility of research with earlier documents is achieved. In the intervening periods since Documents 3 and 4 there has

been an ever-increasing interest in the application of the critical realist approach to management and business studies (e.g. Ackroyd and Fleetwood, 2000; Easton, 2002; Cruikshank, 2003; and Ackroyd, 2004).

Research in construction management has, historically, been dominated by positivism and quantitative research methods (Fellows and Lui, 1997; Dainty, 2008; Runeson and Skitmore, 2008) that are traditionally rooted in natural sciences (Bhaskar, 2008) yet as a discipline construction management spans both natural sciences and the social sciences (Dainty, 2008) and therefore a research philosophy that can embrace both natural and social sciences is desirable.

Seymour and Rooke (1995) following the 1994 Latham Report call into question the ‘traditional’ methodological assumptions of rationalist paradigms of construction in the management research community. They suggest that if, as Latham proposes, a new culture in the construction industry is required, then so too will a new research paradigm be required based on a more interpretivist approach rather than that of a rationalist approach. In the ensuing debate Seymour, Crook and Rooke (1997), Raftery, McGeorge and Walters (1997), Runeson (1997) and Harriss (1998) align Seymour and Rooke’s (1995) rationalist approach with that of positivism as they (Seymour and Rooke) do not define what they mean by ‘rationalist’ (Raftery, McGeorge and Walters, 1997). The debate considered, arguing back and forth, the merits and demerits of the various methodological approaches from the established rationalist/positivist approaches rooted in quantitative research to interpretivist approaches rooted in qualitative research. Ultimately, a recognition and acceptance developed that ‘multi-strategy’ research can also be appropriate, fusing different methodologies with the aim of providing a richer insight into organisations and their workings (Dainty, 2008).

This multi-strategy approach termed ‘multimethodology’ by Mingers and Gill (1997) or methodological pluralism is consistent with the critical realist approach as

the focus on differentiation and pluralism might now sound familiar in relation to postmodernism and poststructuralism, but for many involved in this research, all this happened largely independent of their emergence. In some way critical realism, with its

focus on necessity and contingency rather than regularity, on open rather than closed systems, on the ways in which causal processes could produce quite different results in different contexts, fitted comfortably with these developments.

Sayer (2000:5)

But as Sayer (2000: 20) points out ‘given the presence of multiple systems and causes ... and the possibility of different causes producing the same effects there is always a risk of misattribution of causality.’

Sayer in his consideration of the positivist approach (2000, 15), an approach that dominates construction management research, notes that ‘consistent regularities [of causation] are also likely to occur under special conditions in closed systems ... Such ‘closed systems’ do not spontaneously occur in the social world ...’. Thus, as Sayer (2000) notes in positivism, cause and effect have a determined regularity, i.e. one particular cause will always generate the same effect (see Figure 5.4 below).

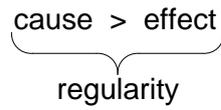


Figure 5.4 Positivist or ‘successionist’ view of causation
 Source: Sayer (2000: 14, Fig 1.1)

For a closed system to exist Bhaskar (2008) suggests that both an intrinsic and an extrinsic condition must be present. Firstly, the causal power must be stable (the intrinsic condition) and, secondly, conditions external to the cause must be constant (the extrinsic condition). In contrast Sayer (2000, 15) notes that ‘the same causal power can produce different outcomes according to how the conditions for closure are broken ... [although] sometimes different causal mechanisms can produce the same result’ as shown in Figure 5.5 below. In the case of the construction industry neither of these conditions is likely to exist in the social science/management context, as the construction industry is an open system consisting of a great many inter-connected sub-systems (Newcombe, Fellows and Langford, 1990a, 1990b; Griffiths, Stephenson and Watson, 2000)

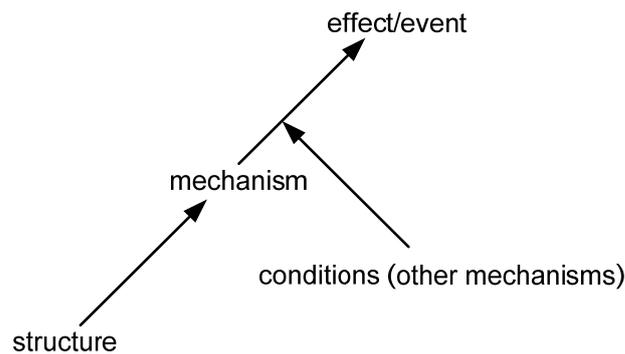


Figure 5.5 Critical realist view of causation
Source: Sayer (2000: 15, Fig 1.2)

In support of this research philosophy Sharp (Archer, Sharp and Woodiwiss, 1999) identifies three aspects that critical realism offers researchers in the social sciences:

- (1) The idea of a stratified ontology. The distinction between the empirical (the level of experiences); the actual (the level of events); and the real (the level of structures and causal powers), entailing a conception of the world as an open system, is immensely useful for the empirical social researcher.
- (2) The idea that social structures and human agency exhibit causal powers and that the task of the social scientist is to explore their interaction. Explanation must attend both to structure and to agency, and any explanation which attends to either exclusively is probably going to be inadequate.
- (3) The idea of the openness of the world and the plurality and contingency of causation. It is immensely useful for the social scientist at least to start off with the assumption that you are not going to find just one cause producing one effect. What is likely to be happening is a whole lot of causes interacting with each other, often in very complex ways, producing a variety of effects in different circumstances.

Johnson and Duberley (2000) provide a useful positioning of critical realism in terms of both its ontological and epistemological perspectives (shown in Figure 5.6 overleaf) setting it apart from other philosophical approaches and closely aligning it with pragmatism to create what they term pragmatic-critical realism.

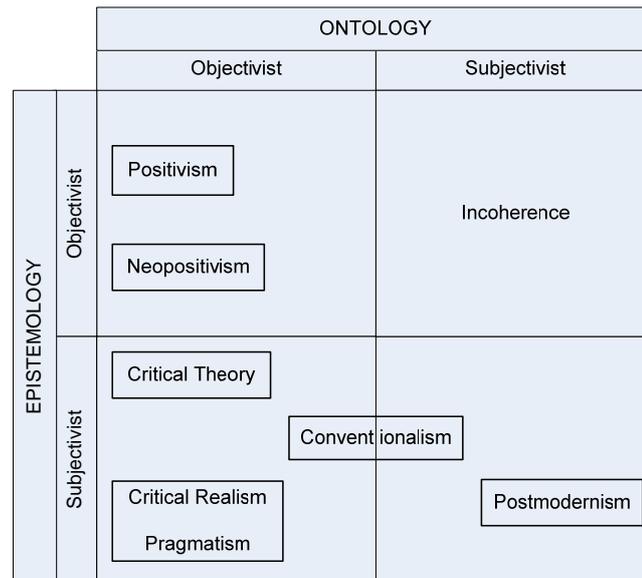


Figure 5.6: Reflexivity and Management Research

Source: Johnson and Duberley (2000: 180, Figure 8.1)

Here an important distinction is also made between the positivist perspective and the critical realist perspectives through the epistemological approaches to research. They note (p.180) that:

an objectivist view of ontology assumes that social and natural reality have an independent existence prior to human cognition whereas a subjectivist ontology assumes that what we take to be reality is an output of human cognitive processes.

In terms of epistemology, the objectivist perspective assumes a theory-neutral approach, thus the possibility of assessing the external world objectively, in manner consistent with that of a closed system. The subjectivist approach can make no such assumptions and accepts that a theory-neutral approach cannot exist, and that researchers themselves cannot be value-free, thus consistent with the author's position in the construction industry.

For the pragmatic-critical realist Johnson and Duberley (*ibid*, p.187) note that '... a key point ... is that epistemic reflexivity reframes the management researchers self-knowledge, but does not lead to a 'better' and more 'accurate' account ... but can create *different* accounts of the same phenomena which thereby become available to transformation.' (original italics).

The development of the philosophy of critical realism is invariably attributed to Bhaskar (Sayer 1992, 2000; Collier, 1994; Archer *et al*, 1998; Danermark *et al*, 2002; Cruickshank, 2003; Hartwig, 2007) who first published his *A Realist Theory of Science* in 1975 (see Bhaskar, 2008). Although the philosophy has its origins in the ending of the 1960's post-war boom the term 'critical realism' does not come into acceptance until the 1980s (Hartwig, 2007) and does not appear in either Bhaskar's original work or his subsequent work *The Possibility of Naturalism* in 1979 (see Bhaskar, 1998) , nor in those of early exponents of Bhaskar's work such as Sayer (1984). It is not until Bhaskar's 1989 work *Reclaiming Reality* that the term 'critical realism' is defined and used by him. Bhaskar developed the philosophical approach of critical realism as a way of interpreting the scientific perspective on the world (Bhaskar, 1975) which others such as Sayer (1992), Collier (1994), Archer (1995, 1996), Mutch (2004, 2008), Elder-Vass (2005, 2007a) and Hesketh and Fleetwood (2006) are now applying to the business world at large. However this is not without its problems for as Fleetwood (2004: 30) points out:

One stumbling block facing those attempting to introduce critical realism to organisation and management studies is the widespread belief that whatever realism is, it is associated with positivism – or related discussions such as empirical, scientism, scientific objectivity, structuralism, structural functionalism, functionalism, modernism, Enlightenment thinking, 'traditional' and 'mainstream approaches to organisation and management.

Bryman & Bell (2003: 468) observe that critical realism:

... accepts neither a constructionist nor objectivist ontology and instead takes the view that the 'social world is reproduced and transformed in daily life ([Bhaskar] 1989: 4)'

They further claim that:

Social phenomena are produced by mechanisms that are real, but that are not directly accessible to observation and are discernable only through these effects. For critical realism the task of business research is to construct hypotheses about such mechanisms and to seek out their efforts.

To begin to understand 'critical realism' it must be recognised that there are other types of 'realism' that are not synonymous with critical realism. Fleetwood (2004)

identifies them as ‘naïve realism’, ‘empirical realism’, ‘scientific realism’ and ‘unqualified realism’ that he associates with positivism and emphatically states:

... critical realism is not synonymous with discourses such as naïve realism, empirical realism, positivism, scientific or other associated empiricist paraphernalia: in fact it is antithetical to these discourses.

Fleetwood (2004: 31)

Ackroyd (2004: 150-151) provides a useful set of characteristics of critical realism as shown in Table 5.1 below:

Table 5.1: The Characteristics of Critical Realism.

Source: Based on Ackroyd (2004: 150-151) Table 6.2.

| Ontology | Critical Realism. |
|------------------------|--|
| Epistemology: | What is real is not given. The world has structure (there are levels of reality) and emergent structures. The engagement of people with structures is transformational. |
| Basic Ideas: | Subject matter has to reflect both its meaningfulness to actors, and their location in a given network of relationships and structures. Knowledge is ‘dualistic’. |
| Place of Role: | Theory is a conjecture about connectedness of events and the causal sequences produced by generative mechanisms. |
| Nature of Explanation: | Something is explained if it allocated a place at the end of a causal sequence. There may be multiple causes of a single event, co-variance and feedback. |
| Methods of Study: | The aim is to produce a good theory that accurately identifies causal mechanisms. The ways these work themselves out in given cases will be complicated. Multiple data will be required. |

However, as Mutch, Delbridge and Ventresca (2006: 609) point out ‘it is important ... to distinguish between critical realism as a philosophical approach and the substantive theories that make use of it.’

In the literature review carried out in Document 2, and to a lesser extent in the follow-on literature reviews in Document 3 and Document 4, the research approaches adopted by authors are rarely explicitly disclosed, but appear to be generally based upon the ontological concepts of positivism or empirical realism,

rather than interpretivism. This does not mean that these approaches are incompatible with the critical realist approach – far from it. The critical realist approach allows a world in which exists

the possibility of *open systems* i.e. causal laws *out of phase* with patterns of events and experiences, and generally epistemically insignificant experiences, i.e. experiences out of place with events and or causal laws.

Bhaskar (2008: 35) [original italics]

Closed systems, favoured by empirical realism and positivism, are systems in which constant assumptions occur that must be experimentally established. In this context the critical realist philosophy is helpful in interpreting the behaviour of an object or entity, which in the critical realist perspective can be defined as

A persistent whole formed from a set of parts, the whole being significantly structured by the relations between these parts.

Elder-Vass (2005: 317)

As neither the construction industry nor management education, training and development are closed systems, but very open systems, then neither positivism or empirical realism are appropriate ontological perspectives to adopt. Collier (1994) in discussing the empirical realist approach clearly demonstrates this closed-system approach in the consideration of the relationship between a theoretical/experimental science and its real world. Here observation of the ‘real world’ lead to experiments and models that can be tested in the real world and the results developed into applications that can be to that world, see Figure 5.7 overleaf. However, as Collier observes (p.251) in non-experimental sciences that Johnson and Duberley (2000) identify as being social sciences, then the experiments and experimental results (the arrows to the left of the diagram) are absent. Thus experimental models that in a closed system can be tested before implementation cannot be tested before implementation in practice in the social sciences.

In a closed system it is possible to create an experiment to identify causal or generative mechanisms in the system in isolation from others. Whilst experiments might be possible in open systems as Bhaskar (2008), Sayer (1992, 1999) and

Johnson and Duberley (2000) acknowledge the effects of the experiment can easily be hidden, counteracted or negated by other mechanisms in the system.

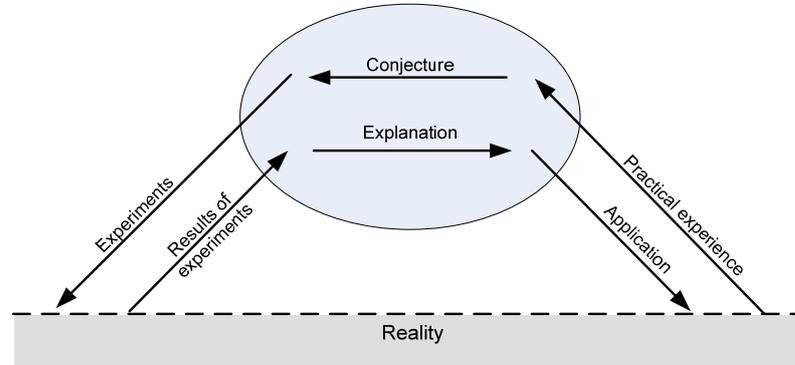


Figure 5.7: Relationship between a Science and its Real Object
Source: Based on Collier (1994, p.249)

Sayer (1992: 118) draws attention to the fact that ‘it is often assumed that a useful way of understanding a complex object is to break it down into its constituent parts, whether by abstraction, or by literally taking it to bits.’ Or, as Sayer proposes in the case of a business or industry, by disaggregation of statistics, whilst warning that it is not always a straightforward process, if at all possible, to understand how an object functions by understanding how its constituent parts function. Furthermore, Sayer, building on Bhaskar’s (2008) concept of emergence, proposes the concept of objects ‘having *emergent powers*, that is powers or liabilities that cannot be reduced to those of their constituents. This suggests that the world is not merely differentiated, but *stratified*.’ Sayer (1992: 119) [original italics].

Elder-Vass (2005: 317) provides an excellent definition of emergence and emergent properties, i.e. emergent powers:

An emergence occurs when an entity possesses one or more ‘emergent properties’ ... one that is not possessed by any of the parts of the entity individually, not when they are aggregated, without a structuring set of relations between them.

Whilst Danermark *et al* (2002, 59) comment that these strata imply ‘different layers or strata of reality, and furthermore, these strata are hierarchically organised.’ Both stratification and emergence are essential in gaining an understanding of the construction industry, its constituent parts and how they interact.

Elder-Vass (2007a: 26) in his discussions on emergentism draws heavily on Archer's theory of the 'morphogenetic approach', that Archer (1995: 5) explains as:

The 'morpho' element is an acknowledgement that society has no pre-set form or preferred state; the 'genetic' part is a recognition that it takes shape from, and is formed by, agents, originating from the intended and unintended consequences of their activities.

Thus Archer's morphogenetic approach to structure and agency emphasises the importance of the relational approach in which pre-existing structures, not only enable, but also condition and constrain the behaviour of the agents or actors within the system. Mutch, Delbridge and Ventresca (2006: 616) note that 'agency and structure have to be held apart to explore the nature of both, and the relationship between their unfolding development over time.'

Thus the critical realist approach allows attention to be paid, firstly to trying to identify the underlying mechanisms that together form the agents shaping the construction industry; and secondly, investigation of its structural context. In so doing it must be remembered that the research carried out in this thesis is part of an ongoing research project researching the wider aspects of education, training and development of construction managers. Given the size and complexity of the construction industry as an open system this thesis cannot investigate the entire system and its constituents, but instead focuses on, and emphasises, those structural and agential aspects pertinent to education, training and development of construction managers.

Consideration of the structural context and underlying mechanisms of the construction industry requires investigation of its antecedent conditions, and particular, in the scope of this thesis, this includes phenomena such as employment levels and the causal agents that influence it, including the development of self-employment and subcontracting practices within the industry. As Hesketh and Fleetwood (2006) suggest, the critical realist approach enables the human resource management – performance (HRM-p) link to be examined, particularly where a

causal connection exists between human resource practices and performance, but that the 'nature of causality is more complex than can be captured by the usual statistical techniques' (Hesketh and Fleetwood, 2006: 678). Thus, various contributing social phenomena and mechanisms in the HRM-p link can be examined and established even though they may not be statistically proven.

In this thesis the social phenomenon is that of continuing education, training and development of construction managers. The mechanisms that are real are the efforts of various professional institutions to require their members to undertake CPD, and the introduction of CPD by employers. The effect that is sought is the increase in productivity and hence profitability (Egan, 1998). Here the undertaking of CPD activities should not be equated with the social phenomena as this could be directly accessible to observation. The social phenomena are the increasing knowledge, understanding and competence gained by construction managers that is itself manifest in increased productivity and hence profitability in the workplace.

It can be seen, therefore, that critical realism engages with existing bodies of substantive theories about organisations. In the context of this thesis, the relevant work is in the domain of 'management development', itself being a subtopic of the wider domain of 'human resource development'. Emerging out of a traditional focus on training and development this seeks to adopt a broader perspective (Bach, 2005; Gibb, 2002; McGoldrick, Stewart and Watson, 2002; Sadler-Smith, 2006; Storey, 2007). This approach seeks to generate a wider focus with a particular connection to organisational strategy (Leopold, Harris and Watson, 1999, 2005; Stewart and McGoldrick, 1996; Walton, 1999). It is a new and still emerging approach, with some authors suggesting the need for a more critical approach with some parallels with the concerns raised by critical realism (Elliot and Turnbull, 2005; Grugulis, 2007; Rig, Stewart and Trehan, 2007). As a body of work it suggests some of the detailed issues that are discussed later in this chapter. However, there are two important limitations that need to be recognised. Firstly, the over-concern with various processes and practices of learning amongst the more critical approaches tend to underplay the structural factors that a critical realist approach would stress.

Secondly, there is the need to recognise that the application of these ideas to the construction industry has been very limited.

5.3.3 Definitions of Education, Training and Development

Employee development has long been recognised as an important factor in the creation of competitive advantage of an organisation the development of what Buckley and Monks (2005) describe as ‘creative human capital’. They further point out that the emphasis of human resource development (HRD) has moved from ‘ensuring that employees had the right skills and competencies to complete the role and tasks assigned to them toward a more holistic view of developing a wide range of employee competencies’ (p.53). Indeed the sheer and ever-growing numbers of books, papers and reports produced in recent decades in the fields of human resources management and management development is testament to this (Storey, 1989), together with a growing number of reports into the value and benefits of management development (Mabey and Thompson, 2000, 2001; Mabey 2005a, 2005b). However, the proportion of these focussing on the construction industry is relatively small in comparison to many other disciplines, with just six books of note having been published in the last two decades – Langford *et al* (1995), Druker and White (1996), Loosemore, Dainty and Linguard (2003), Cooper (2004), Dainty, Bagihole and Neale (2008) and Raidén, Dainty and Neale (2009). This paucity possibly reflects the small numbers of researchers active in this research discipline. Indeed the numbers of both conference and journal papers published in this discipline is proportionately much smaller than for other disciplines in the construction industry, although it is an area of increasing interest. It is intended that this thesis and papers published from its research will add to the debate on management education, training and development of construction managers.

Frank (1991), Thomas and Anthony (1996) and Kellie (2007) claim that the current interest in management has its origins in a number of reports - Mangham and Silver (1986), Constable and McCormick (1987) and Handy (1987) - which were then critical of the state of provision of management education. The responses to these

reports ultimately lead to the creation of the Management Charter Initiative (MCI) in 1988 (Frank, 1991). Its evolution led, in May 2000 to the creation of the Management Standards Centre (MSC), run under the stewardship of the Chartered Management Institute (CMI) (MSC, 2007). Thomas and Anthony (1996), in the light of the MCI, raise the question of the conceptual differentiation between management education and management training (p.21):

We can approach this issue in two ways. First, there is a matter of conceptual distinctions and if ‘training’ and ‘education’ are synonyms, then any concerns about the former being substituted for the latter might be misplaced, reflecting merely a confusion over its terms. If not, then the reduction of education to training is a logical possibility. Secondly, there is an empirical issue. If management education can in principle be educational, can it be so under current and likely future conditions?

Yet this confusion is understandable as *The New Oxford English Dictionary* (NEOD) (1998) gives the following definitions for ‘education’ and for ‘training’ (author abridged)

Education ▶ **noun**... the process of receiving or giving systematic instruction, especially at a school or university... ■ a body of knowledge acquired while being educated... ■ information about or training in a particular field or subject...

Training ▶ **noun**... the action of teaching a person... a particular skill or type of behaviour...

As it can clearly be seen above confusion is certainly evident as the definition of education includes a reference for the inclusion of training, but the definition of training does not include any reference to education, thus the terms ‘education’ and ‘training’ appear to be only partially synonymous. In order that the trilogy can be completed the NEOD definition of ‘development’ is shown below

Development ▶ **noun**... the process of developing or being developed... ■ A specified state of growth or advancement... ■ A new and refined product or idea... ■ An event constituting a new stage in a changing situation...

Dictionary definitions are often considered to be too narrow and as Eaton (2008: 132) notes they often ‘do not reveal the correct distinction’ of education and training in the workplace. Instead he considers that:

Training is vocationally based and involves the gaining of work-based information. Education is known as training for life, with equal emphasis on personal development, vocational and professional development.

Kellie (2004) however, suggests that the boundaries between education and development in a management context (i.e. management education and management development) are becoming increasingly blurred. The two terms are not synonymous as they can refer to different practices and interventions. What is perhaps more important is that almost universally the term 'education' is taken to mean the process of acquiring and gaining knowledge, i.e. learning about something, whilst that of 'training' is taken to mean 'gaining a skill' i.e. being able to do something. Sadler-Smith (2006: 4) emphasises the importance of 'learning' in the debate of education, training and development:

Learning is a longer-term challenge in the knowledge possessed by an individual, their type and level of skill, or their assumptions, attitudes, or values, which may lead to them having increased potential to grow, develop and perform in more satisfying and effective ways.

Thus learning can be seen as embodying education and training to facilitating development (see Figure 5.8 overleaf) that in turn will, with investment, lead to an increase in performance, not only of the individual but also the organisation and ultimately industry at large (Kellie, 2007). This has ultimately led to the emergence of the 'learning organisation' (Woodall and Winstanley, 1998) or the 'learning company' (Pedlar, Burgoyne and Boydell, 1997). Pedlar, Burgoyne and Boydell (p3) define a learning company as '... an organisation that facilitates the learning of all its members and **consciously** transforms itself and its context.' (original emphasis) that Woodhall and Winstanley claim can be elaborated as one that:

- has a climate in which individual members are encouraged to learn and develop their full potential;
- extends this learning culture to include customers, suppliers and significant stakeholders;
- makes human resource development strategy central to business policy;
- is in a continuous process of business transformation.

Woodhall and Winstanley (1998: 150)

Whilst this thesis does not focus upon learning companies/organisations there are important aspects that reflect and are reflected in corporate culture and attitudes towards education, training and development.

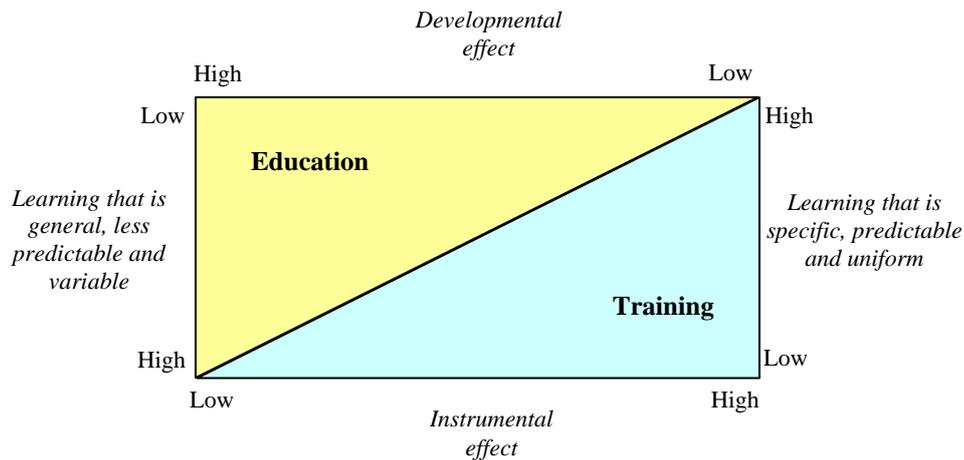


Figure 5.8: The Relationship between education, training and development
Source: Sadler-Smith (2006: 6) Figure 1.1

Sadler-Smith (2006) thus presents a model (see Figure 5.8 above) whereby learning emphasises both education and training, with learning undertaken within training being a more mechanistic process whilst the learning undertaken within education is a more organic process and is manifest in employees as suggested in Table 5.2 below.

Table 5.2: The Relationship between learning and training, development and education
Source: Sadler-Smith (2006: 11) Figure 1.3

| Outcome | What? | When? | Where? |
|--------------------|---|------------------------------|----------------------------|
| Trained employee | KSAs that are specific and uniform and that may lead to enhanced performance. | Before or during employment. | On-job and off-job. |
| Developed employee | KSAs that are variable and more general and | Usually during employment | On-job and off-job. |
| Educated employee | that may lead to professional and personal growth. | Usually before employment | Usually non-work contexts. |

K: knowledge; S: skills; A: attitude

However, Sadler-Smith's inclusion of learning in the debate is by no means new as Mumford (1988) draws attention to the importance of learning in management development where:

Training and education courses normally have a high profile for learning, low for task. Responsibility for application is left with the learner.

On-the-job management has a high concern for task, low for learning. Getting results is what matters, learning is a low priority.

Mumford (1988: 177)

This illustrated in Figure 5.9 below:

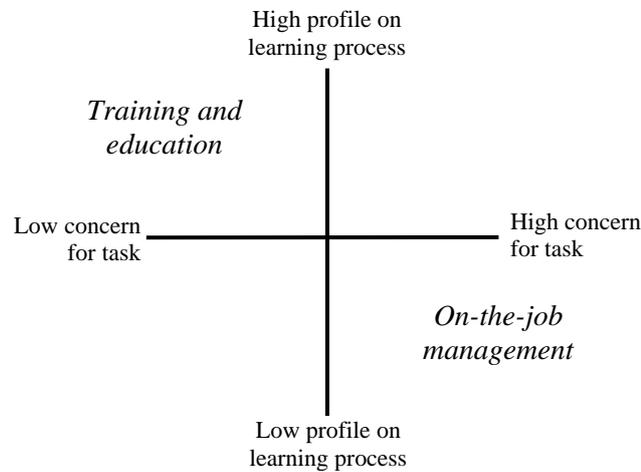


Figure 5.9: Task and Learning - Perceptions
Source: Based on Mumford (1988: 177, Fig. 11.1)

As with 'training' and 'development', the NOED (1988) provides the following definition of 'learning':

Learning ▶ **noun**... the acquisition of knowledge or skills through experience, practice, study, or by being taught... ▪ knowledge acquired this way.

Although Jacobs and Washington (2003: 344) note that all employees 'learn as natural consequence of doing work' Mumford (1988, 1994) highlights the efficacy of learning and development is influenced by a number of factors as shown in Figure 5.10 overleaf. These influences can have both positive and negative impacts on learning and development, particularly in the workplace, that in itself can have a major impact on the ability to both learn and develop (Hardy and Newsham, 2005).

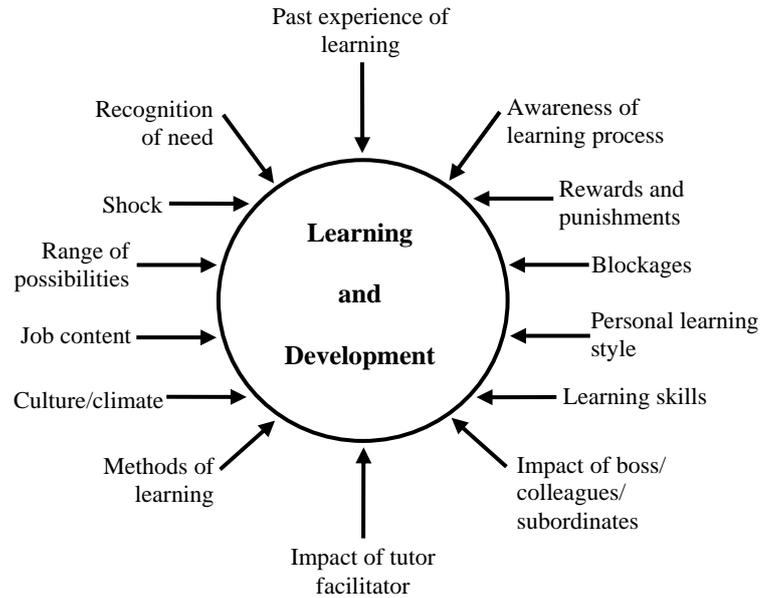


Fig 5.10: Influences on Learning
Source: Mumford (1988: 186, Fig. 11.3)

Whilst Mumford does not intend this to be a definitive list of influences they will nevertheless vary from organisation to organisation and manager to manager. However, no matter how well intended the organisation or manager it is recognised that there are various factors both within and outside the organisation and/or manager that can provide an effective block to learning. Although Mumford (1988: 190) gives the following as some of the main blockages to learning:

| | |
|----------------------|-------------------------------------|
| Perceptual | - Not seeing there is a problem |
| Cultural | - The way things are here ... |
| Emotional | - Fear or insecurity |
| Motivational | - Unwillingness to take risk |
| Cognitive | - Poor previous learning experience |
| Intellectual | - Limited learning cycles |
| Expressive | - Poor communication skills |
| Situational | - Lack of opportunities |
| Physical | - Wrong place, time |
| Specific environment | - Boss/colleagues unsupportive |

Source: Mumford (1988: 191, Fig. 11.4)

Mabey, Salaman and Storey (1988: 190) also note that ‘ ‘unlearning’ may need to take place – emotional and educational – before new learning can commence; i.e. in other words successful development may be as much about the learning environment as the individual’s learning style’ particularly where previous negative learning experiences have occurred whether in an educational or organisational setting.

Argyris (1999: 127) notes that many organisations and people don’t actually know how to learn, the worst being ‘well-educated, high-powered, high-commitment professionals’ ... as ‘they misunderstand what learning is and how to bring it about’. Argyris continues that most managers ‘define learning too narrowly – defining it as mere “problem solving” so the focus is on correcting errors in the external environment’ and identifies the need to look inwards at their own behaviour and how they often inadvertently contribute to the organisation’s problems (p. 127).

Whilst it is beyond the scope of this thesis to investigate the structures, mechanisms and agents of education, training and learning their importance in management development cannot be ignored as there is an ever-growing body of literature and emphasis being placed upon such issues as work-based learning (e.g. Raelin, 2000) and learning organisations (e.g. Pedlar, Burgoyne and Boydell, 1997). A useful model illustrating the input of education and training into the management development process by way of individual and organisational development is provided by Langford *et al* (1995) as shown in Figure 5.11 below.

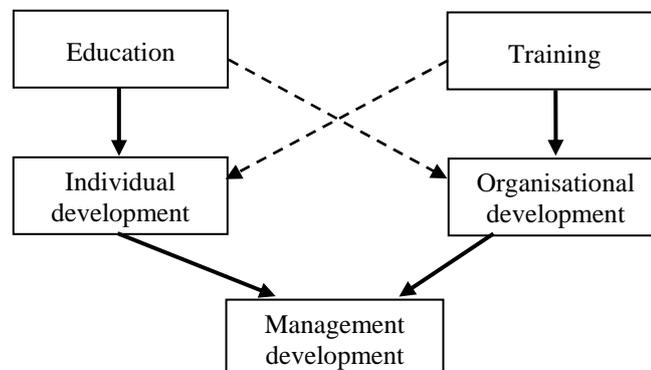


Figure 5.11: Management development process

Source: Langford *et al* (1995: 124, Fig. 7.1)

An alternative approach by Mintzberg (2004) provides a useful model of the relationship between education, training and development as a progressive transitional process as shown in Figure 5.12 below.

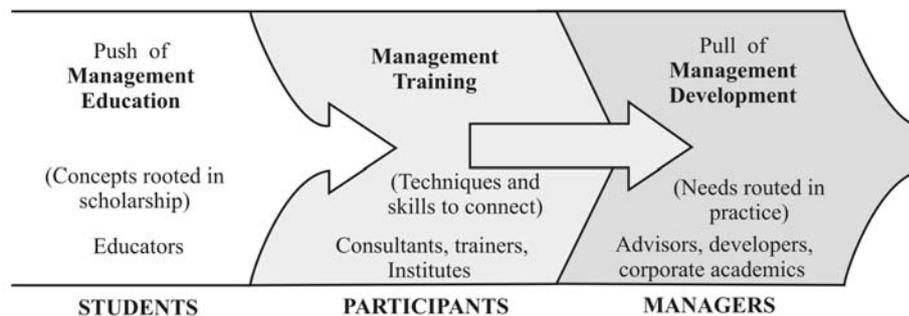


Figure 5.12: Map of Management Education and Development
Source: Mintzberg (2004: 198, Fig. 8.1)

These three phases of Mintzberg's map can be described as follows:

- **Phase I: Push of Management Education:** Here 'theories concepts, and so forth are offered to those who enrol' (Mintzberg: 2004:109). Mintzberg identifies this process as occurring outside of the organisation, either as students in education (normally tertiary level) before they take up full-time employment, or those attending educational institutes outside of their employment (e.g. part-time/day release students) to gain academic qualifications.
- **Phase II: Management Training:** Building upon their management education participants undertake management training to combine education with practical training. Training here may be facilitated by consultants, trainers, institutes and can include some element of education (normally at a higher academic level). This stage tends to be more vocationally oriented rather than academically oriented.
- **Phase III: Pull of Management Development:** In this final ongoing phase 'organisations draw on whatever they find appropriate to further the development of their managers' (Mintzberg: 2004:198). This involves contingency approach to obtain development best suited to both the needs of the organisation and the manager, drawing upon whatever resources are deemed most appropriate.

Mintzberg (2004) argues that all too often management education and management development are disconnected, and neither is particularly effective in isolation. In the ideal situation the push of management education connects with the pull of management development. He concludes (p.199) ‘that while management development may rarely educate, management education rarely develops. This is unfortunate because they are most powerful when they work in concert.’ The next section of this chapter will consider approaches to management development.

5.3.4 Management Development

Literature already reviewed (see Document 2) such as Egan (1998) has highlighted the deficiencies in the performance of the UK construction industry. Amongst these criticisms are those of poor management standards and lack of management qualifications. Thus, what is being alluded to in these reports would appear to be a criticism of the lack of management development within the UK construction industry, as Hussey (1988: 58) observes:

‘The story of management training in British industry can be summarised as inadequate resources, ineffectively managed, and with most effort being devoted to the wrong things. The fault ... is with senior and top management who give little or no attention to the activity.

Hussey’s criticism is not limited to management training, but extends to management education and development as well which fare no better, a common criticism of UK industry at large (Goodwin, Hills and Ashton, 1999; Mabey and Thompson, 2000; Watson, 2001), as only 20% of UK managers were found to possess a management related qualification (Lucas, 2006).

Stewart (1999b: 242-243) notes that ‘education’ and ‘training’ are focussed on inputs into the system whilst ‘learning’ and ‘development’ are focussed on outputs, as Jacobs and Washington (2003) point out there is a widespread belief that employee development and organisational performance are intrinsically linked. Therefore, according to Stewart (1999b: 242-243), ‘education and training become ways of achieving development and, therefore, they contribute to, but do not constitute,

management development'. Thus, management development involves far more than just education and training as Loosemore, Dainty and Lingard (2003, 278) note:

Management development plays vital role in ensuring that the managers and professionals responsible for the future performance of an organisation are provided with the skills, knowledge and opportunities to meet the organisation's strategic goals. This should be seen as a process of continual improvement; hence, the ubiquitous term *continuing professional development*.

(original italics)

Mumford (1994: 4) and Mumford and Gold (2004: 89) identify three 'aspects of effectiveness' that must be brought together to facilitate effective management development (as shown in Figure 5.13 below):

- Effective managerial behaviour;
- Development focussed on effectiveness – i.e. emphasis placed on the activities in which managers must be effective; and
- Effective learning processes – those effective for the individual or group rather than the educator.

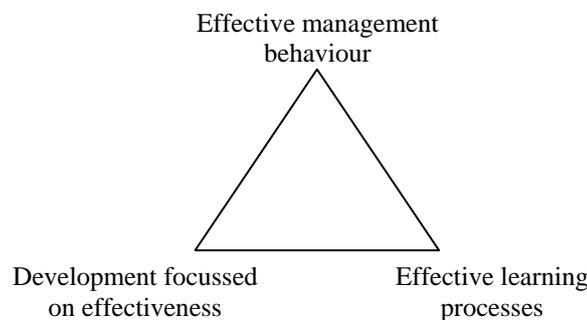


Figure 5.13: The Triangle of Effectiveness

Source: Mumford (1994: 4, Fig. 1.1), Mumford and Gold (2004: 89, Fig. 15)

These three aspects are given equal status and weighting as any weakness or dominance in any aspect will unbalance the effectiveness of any management development. However, the term 'management development' has been found to have various meanings (Stewart, 1999a, 1999b). In his consideration of these meanings Stewart provides a useful matrix to categorise the approaches to these definitions by consideration of the forms and purposes of those definitions (see Figure 5.14 below). It should be noted that Stewart considers these definitions, not

as being clearly delineated, but as being parts of a continuing spectra between the categories.

| <i>Management Development is</i> | | Focus | |
|----------------------------------|--------------------|--|---|
| | | Individual | Organisation |
| Purpose | Behaviour | ... an attempt to improve managerial effectiveness through a learning process. (Mumford, 1997: 6) | ... a conscious and systematic process to control the development of organisational resources in the organisation for the achievement of organisational goals and strategies. (Molander, 1987: 109) |
| | Career Progression | ... the total process which an organisation adopts in preparing its managers for the growth and change that occur in their working environment. (Jones and Woodcock, 1985: 1) | ... building a shared outline across the whole management group and enhancing management capability throughout the whole organisation to improve the organisation's capability to survive and prosper. (Harrison, 1997: 356) |

Figure 5.14 Dimensions of Management Development
Source: Adapted from Stewart (1999: 226, Fig 12.1)

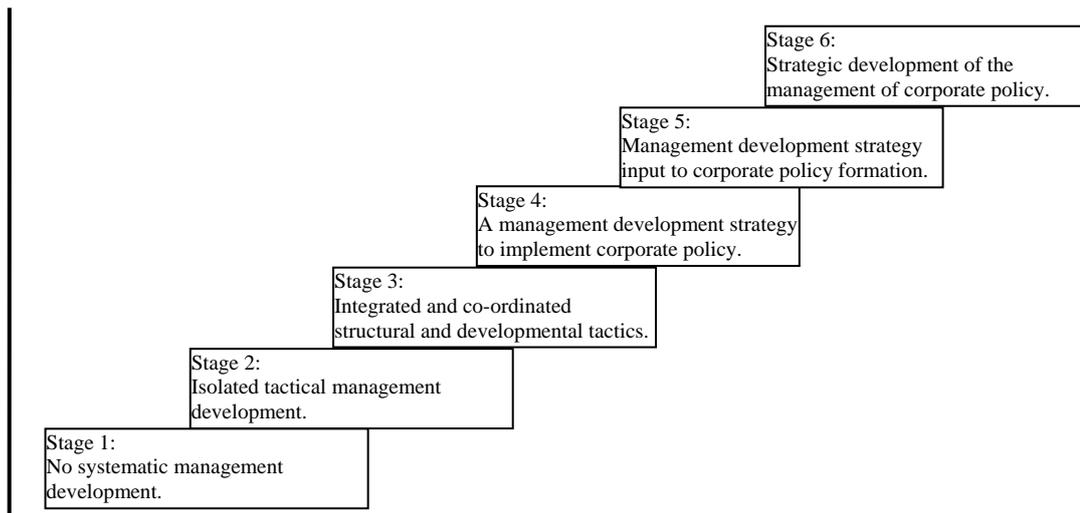


Figure 5.15: Ladder of Hierarchy of Management Development
Source: Burgoyne (1988)

Burgoyne's (1998) model of hierarchical management development comprises six incremental steps as shown in Figure 5.15 above. In describing his model Burgoyne (p.42) comments that organisations normally climb this ladder from the bottom as they develop although they may slip back occasionally, ultimately, however, all organisations should be able to reach the highest level. As an organisation passes from one level to the next higher level its management development will incorporate and retain some aspects of the lower levels. Burgoyne (1988: 41) describes these levels as:

1. No systematic management development: No systematic or deliberate management development in structural or developmental sense. Total reliance on natural *laissez-faire* processes of management development;
2. Isolated tactical management development: There are isolated and ad-hoc tactical management development activities, of either structural or developmental kinds, in response to local problems, crises, or sporadically identified general problems;
3. Integrated and coordinated structural and developmental tactics: The specific management development tactics which impinge directly on the individual manager, of career structure management, and of assisting learning are integrated and coordinated;
4. A management strategy to implement corporate policy: A management development strategy plays its part in implementing corporate policies through managerial human resources planning, and providing a strategic framework and direction for the tactics of career structure management and of learning, education and training;
5. Management development strategy input to corporate policy formation: Management development processes feed information into corporate policy decision-making processes on the organisation's managerial assets, strengths, weaknesses and potential, and contribute to the forecasting and analysis of the management of proposed projects, ventures, challenges;
6. Strategic development the management of corporate policy: Management development processes enhance the nature and quality of corporate policy-forming processes, which they also inform and help implement.

The above model has been widely adopted by authors as a foundational model for management development (e.g. Stewart, 1999;) However other authors (e.g. Mumford and Gold, 2004) prefer to omit the two highest strategic levels, focussing on the more operational and tactical lower four levels. Thus four stages in management development agendas are commonly identified as shown in Figure 5.16 below:

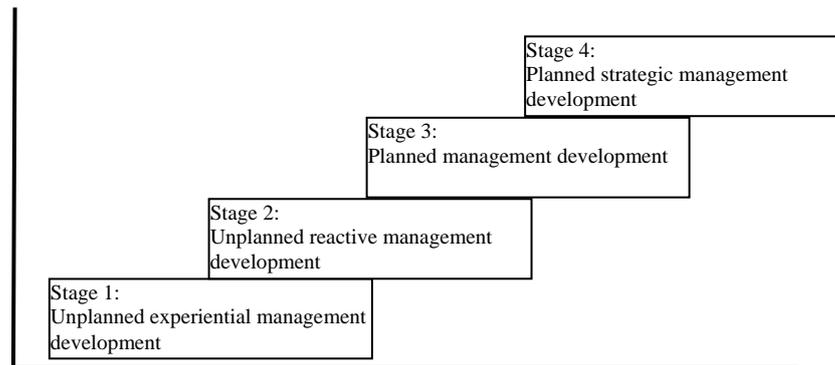


Figure 5.16: Stages in Management Development

Source: Mumford and Gold (2004: 11, Fig.2)

These four stages are:

- Stage 1: Unplanned experiential management development
The dominant approach here being that managers emerge from experience alone – an approach typical of many of the construction industry’s SMEs.
- Stage 2: Unplanned reactive management development
Development takes place in response to immediate pressures – again typical of a large part of the construction industry responding to changes in, for example, legislation.
- Stage 3: Planned management development
Organisations now develop formal mechanisms through which development takes place.
- Stage 4: Strategic management development
Here management development forms a component of an organisations’ business plans, and is focussed on meeting an organisations’ longer term needs.

The above stages also reflect the varying stages of learning identified by Mumford (1988, 1994) and Mumford and Gold (2004) required to support them as shown in Table 5.3 below, Types 1 to 3:

Table 5.3: Types of Management Development

Sources: Types 1 -3: Based on Mumford (1994: 12) Fig 1.2

Type X: Adapted from Mumford and Gold (2004, 130)

| Type X: 'Incidental Management Development' –no planned processes | |
|--|---|
| Characteristics | <ul style="list-style-type: none"> - disconnected from normal management activities - no clear development or performance objectives - unstructured in development terms - not planned in advance - not owned by managers or developers |
| Development processes | <ul style="list-style-type: none"> - learning is non-existent as generally it is afforded no value - learners learn not to learn as managers loose confidence in the process |
| Type 1: 'Informal Management Development' – accidental processes | |
| Characteristics | <ul style="list-style-type: none"> - occur within managerial activities - explicit intention is task performance - no clear development objectives - unstructured in development terms - not planned in advance - owned by managers |
| Development processes | <ul style="list-style-type: none"> - learning is real, direct, unconscious, insufficient |
| Type 2: 'Integrated Management Development' – opportunistic processes | |
| Characteristics | <ul style="list-style-type: none"> - occur within managerial activities - explicit intention is both task performance and development - clear development objectives - structured for development by boss and subordinate - planned beforehand or reviewed subsequently as learning experiences - owned by managers |
| Development processes | <ul style="list-style-type: none"> - learning is real, direct, conscious, more substantial |
| Type 3: 'Formal Management Development' – planned processes | |
| Characteristics | <ul style="list-style-type: none"> - often away from normal managerial activities - explicit intention is development - no clear development objectives - structured for development by developers - planned beforehand and reviewed subsequently as learning experiences - owned more by developers than manager |
| Development processes | <ul style="list-style-type: none"> - learning may be real (through a job) or detached (through a course), - is more likely to be conscious, relatively infrequent |

In Table 5.3 above Type X, not being included in Mumford's earlier model (1994: 12), was described later by Mumford and Gold (2004: 130) and has been added to the table by the author in the style of the original table for comparative purposes. Mumford and Gold (2004) do not allocate any name to Type X.

The four types of management development can be defined by two basic parameters: that of the concern for learning, and of the concern for the task as shown in Figure 5.17 below. Thus with the construction industry's dominant culture of high concern for task (Hurst, 1993) it might reasonably be expected to find a dominance of Type 1 and Type 2 management development, Type 1 being prevalent amongst the SMEs of which the industry is predominantly composed, and Type 2 amongst medium to large firms of which there are considerably fewer. Type 3 will be prevalent amongst the very largest firms of which there are comparatively few. Type X will dominate the many self-employed, sole traders and partnerships of there are a great many in the UK construction industry and indeed Hoque and Bacon's (2002) study of SMEs found that generally SMEs provided far less training than larger organisations.

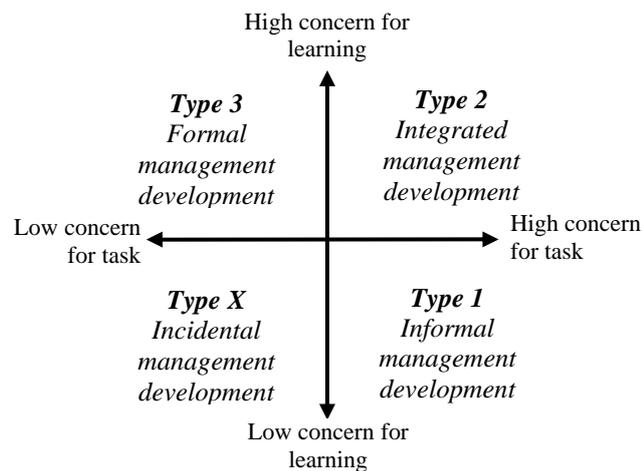


Figure 5.17: Types of Management Development
Source: Based on Mumford and Gold (2004: 117, Fig. 23)

Nevertheless for effective management development to occur in an organisation the learning necessary to support it needs to be developed into a virtuous learning cycle (see Figure 5.18 overleaf) 'where there is an effective focus for development, leading to perceived relevance of the activity and therefore instant application and the reward of success ... [that] in turn leads to enthusiasm for more learning.' (Mumford and Gold, 2004: 91)

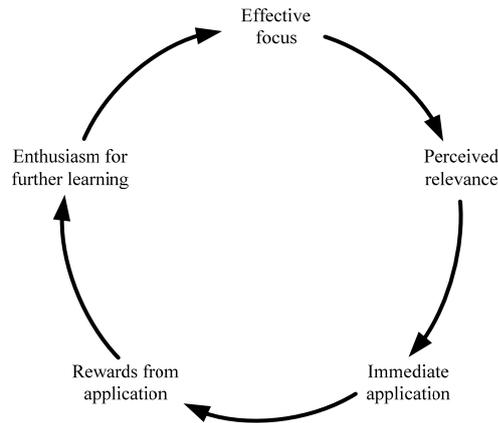


Figure 5.18: The Virtuous Learning Cycle

Source: Mumford (1994: 13, Fig. 1.3); Mumford and Gold, (2004: 91, Fig. 16)

This contrasts markedly with Mumford's (1994: 14) and Mumford and Gold's (2004: 90) 'vicious learning sequence' (see Figure 5.19 below) where management training and development may have taken place but have little or no relevance or application to the manager(s) concerned, who, being unable to effectively use their newly acquired knowledge and skills, become frustrated and are deterred from future development activities (Mabey, Salaman and Storey, 1998; Argyris, 1999).

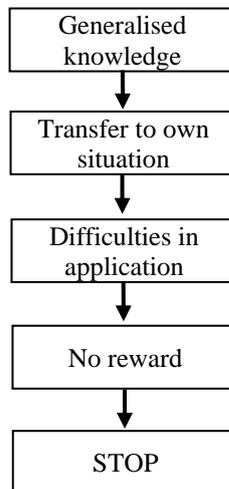


Figure 5.19: the Vicious Learning Sequence

Source: Mumford (1994: 14, Fig. 1.4) and Mumford and Gold (2004: 90, Fig. 16)

Mumford's 'vicious learning strategy' and 'virtuous learning circle' represent the polar extremes of a continuum of learning development. At the lowest level managers are actively deterred from learning and learning becomes a rather alien concept to them (Vince, 1996), whilst at the highest level managers embrace learning

and it becomes an integral part of their function and performance. These two extremes occur at the lowest level (stage 1) and at the higher levels (stages 4 to 6) of Burgoyne's 'ladder of hierarchy of management development' (see Figure 5.15), and stage 1 and stage 4 respectively of Mumford and Gold's 'stages in management development' (see Figure 5.16). The 'vicious learning strategy' can be directly related to Mumford and Gold's 'Type X – incidental management development', whilst the 'virtuous learning cycle' can be equated to 'Type 3- formal management development', as shown in Table 5.3.

Much management development literature tends to suggest a theoretical approach that managers have a considerable scope for development and performance. Storey (1989) argues that this is not necessarily the case, recognising the human dimension, that not all managers are the same and possess different levels of performance and potential. Mabey and Thompson (2000) observe however, that the greater the organisational commitment to management development then the greater the positive benefits derived from it. Using a variant of the Boston Consulting Group's 'Boston Box' for portfolio analysis (see Figure 5.20 below) four categories of managers are identified, each of which may exist within an organisation based on their level of performance and their potential for further development.

| | | | |
|--------------------|-------------|------------------------------|-------------------|
| Performance | High | Workhorses | Stars |
| | Low | Deadwood | Problem employees |
| | | Low | High |
| | | Development Potential | |

Figure 5.20: Management Development Portfolio Approaches
Source: Adapted from Storey (1989: 7, Fig 1)

Storey suggests that most managers within organisations are likely to be 'workhorses'. 'Workhorses' are high performers who have already benefitted from

development and have little potential for further development, either because they have reached the limit of the performance/development potential, and/or they are content with their current position and do not wish to undertake further development as it may impinge upon other factors such as work/life balance, families, or stress levels (Walsh, 2005). ‘Stars’ are those managers whose performance is growing and in whom there is still potential for development; however, the potential for development must be exploited and the manager provided with opportunities to develop for this to be realised. ‘Stars’ ultimately become ‘Workhorses’ when they have reached the limit of their development potential. ‘Problem Employees’ are those with potential for development but are performing below their capacity. These are prime candidates for development, however, if the potential is not developed and realised then these managers may well vegetate and become ‘Deadwood’. The final category ‘Deadwood’ are those managers having low levels of performance and have little potential for any further development. Typically they may well be underdeveloped ‘Problem employees’, victims of ‘vicious learning strategies’ who have learned not to learn (Mumford, 1994; Mumford and Gold, 2004), or who simply resistant to management education and training (Case and Selvester, 2002; Turner, Marvin and Minocha, 2006)

An alternative ‘contingency approach’ to management development is also provided by Storey (1989: 8) that compares the level of ‘real’ commitment by line managers responsible for ensuring management development, with the visible level of management development activity (see Figure 5.21 below).

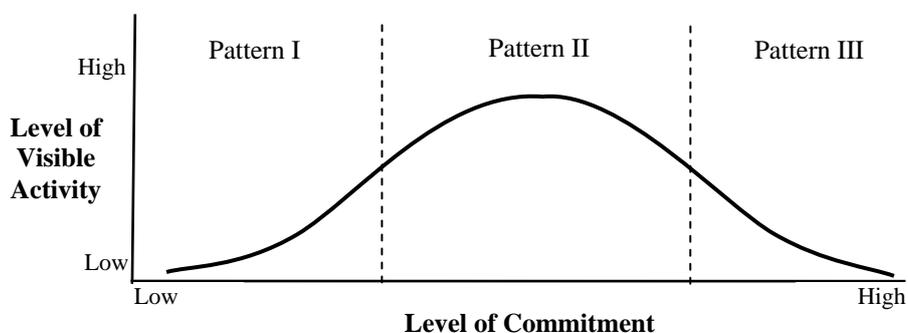


Figure 5.21: Patterns of Management Development
Source: Storey (1989: 8, Fig. 2)

The patterns of management development are described by Storey (1989: 7-8) as:

... Pattern I prevails ... [where] there is little or no genuine commitment to management development from most line managers and this is reflected in the level of activity.

... Pattern II ... [prevails where] there is continued uncertainty about the merits of development, but a great deal of ostensible activity occurs because line managers, for one reason or another, feel constrained to go along with it.

... Pattern III [prevails where there is] a more balanced and integrated situation [occurs]. The commitment has penetrated throughout management ranks and, though management development activity may be difficult for an outside observer to detect it is merely because it has become integral to the normal boss-subordinate relations.

However, in the construction industry, as will be discussed later in this chapter, construction companies today function as 'hollowed-out' organisations almost totally dependent upon subcontractors of one form or another for labour, be they at operative or professional level. The need to consider education, training and development of these subcontractors, or as Walton (1996, 1999) refers to them 'non-employees', is now beginning to be recognised as being of strategic importance to organisations, and an issue of growing importance in supply-chain management (Brown and Gale, 2009; Burtonshaw-Gunn and Ritchie, 2007), and in cultural change to improve performance (Stewart, Manhire and Hall, 1999).

Walton (1999: 262) considers non-employees to be 'those individuals or groups who have some relationship with an organisation but who have some relationship with an organisation but are not in an employer-employee relationship'. These he identifies as stakeholders in the organisation that can include the likes of subcontractors, suppliers, self-employed workers, agency workers and volunteers, all of whom could potentially benefit from the organisation's HRD activities, not least of which are development activities of education and training. Walton (1996: 123; 1999: 262) provides the following definitions in relation to non-employee development:

Non-employee training can be defined as short-term efforts to ensure that individuals not in an employment relationship with a given organisation, but who are in some way responsible for providing services to it, have the skills necessary to carry out these services.

Non-employee education can be defined as efforts to ensure that individuals who have some current or potential relationship to the organisation are provided with knowledge and understanding about the organisation's products, services and values.

Non-employee training and non-employee education that make up non-employee development 'is to enable the organisation to influence its external environment through a planned process of learning, so that the skills and knowledge of those outside its boundaries on whom it depends to a greater or lesser extent are enhanced' (Walton, 1999: 263). Given the very high level of subcontracting within the construction industry aligning these non-employees with the organisation's strategic objectives is an important issue in improving organisational performance (Chan and Kaka, 2007; Loosemore, Dainty and Lingard, 2003).

It is argued (Hussey, 1998) that all training and development should be undertaken to meet organisational strategic needs and should be driven from the top of the organisation downwards. In so doing Hussey (p.85) identifies six areas that training and development can provide a major contribution to an organisation's corporate objectives:

1. Creating an awareness that challenges the perceptual boundaries;
2. implementing a new policy;
3. implementing a strategy;
4. changing or maintaining the culture of the organisation (creating shared values).
5. meeting a major environmental change; and
6. solving specific problems.

Whilst this is generally accepted for business-at-large, in terms of construction companies Langford *et al* (1995: 134) provide a more industry specific contextualisation of these areas, identifying the following benefits of management training:

1. it helps managers learn their jobs quickly and effectively, minimising learning costs and lessening the likelihood of expensive mistakes and the cost of absence due to stress;

2. present and future workload requirements are likely to be met and maintained if there is management development in the organisation, however the organisation must be clear about its future work requirements;
3. management development can become an agent for organisational growth, help both to stimulate and control growth;
4. employee morale is inspired by management development activities. Labour turnover amongst managers, where caused by inefficient learning and inadequate development can be reduced through staff induction, training and coaching, counselling and mentoring;
5. managers can learn their jobs more rapidly and are more likely to achieve higher levels of job satisfaction, and remain longer in the organisation; and
6. management development enhances the ability of an organisation to accept, cope with and implement change proactively rather than reactively by taking advantage of new opportunities. However, to do this it requires managers whose knowledge and skills are up to date, and enable new skills and knowledge to replace obsolete ones.

The specific corporate objective(s) addressed by management development will depend very much on the organisation's particular need or agenda at any given time. Mabey, Salaman and Storey (1998) identify four principal agenda for management development found in organisations (see Table 5.4, overleaf). The focus of the agenda for construction industry identified by Egan (1998, 2002) is defined as one of 'functional performance' as these agenda rarely occur in isolation as there are clearly defined aspects of 'political performance', and 'compensation' in Egan's reports and the ensuing Rethinking Construction reports (2002a, 2002b, 2002c, 2002d).

Table 5.4: Management Development Agendas

Source: Mabey, Salaman and Storey (1998: 172-173).

| Agenda | Characteristic | Assumption | Issues |
|------------------------|---|---|---|
| Functional Performance | Knowledge, skills or attitudes to improve performance, bring about change, increase notional 'stock' of trained managers. | <ul style="list-style-type: none"> • Training needs can be objectively identified and matched against training. • Role performance can be precisely assessed. • There is a tight 'means-ends' link between MD and functional performance. | <ul style="list-style-type: none"> • Overlooks other factors influencing the impact of MD on performance. • Danger of a closed loop: corporate funding will only be given to successful MD interventions, therefore choose MD that can demonstrate success in corporate terms. |
| Political Performance | MD acts as an extension of the organisation's political order. Programmes (e.g. culture change) propagate the skills and attitudes believed by the top team as necessary to turn the company around. | <ul style="list-style-type: none"> • The top team's perception of how organisational performance is to be improved is correct. • The 'recipe for success' can be translated into an MD programme and cascaded down the organisation. | <ul style="list-style-type: none"> • The MD dogmas are frequently dependent on one or two key figures – what happens when they go? • The approach leaves little opportunity to be questioned, and the career costs of doing so may be high. Such a climate defies genuine commitment. |
| Compensation | MD's activities are offered as compensation for the deprivations of employment e.g.: <ul style="list-style-type: none"> • As a welfare substitute, • As an alternative focus to an alienating work place, • To promote self-development. | <ul style="list-style-type: none"> • Such activities encourage employees to acquire a habit of learning. • Being sponsored on courses helps motivate managers and engenders commitment to the organisation. | <ul style="list-style-type: none"> • This approach deflects attention from the causes of alienation – offering a palliative instead. • It is deceptive – and morally dubious – to 'use' education in this manner. |
| Psychic defence | MD provides a safe situation in which to discharge anxieties by giving access to/participation in more strategic matters. | <ul style="list-style-type: none"> • Managers need a social system to defend their psyche against persecutory anxiety arising from their competitive career drives. • Apparently fair appraisal systems, target setting and ordered management succession help reduce the fear of disorder and chaos if latent competition were to break out. | <ul style="list-style-type: none"> • Would greater self-development and self-determination in the workplace necessarily lead to unbridled and selfish anarchy? • Only a few MD activities would typically provide an opportunity for such displacement. |

The importance of educating, training and developing staff is embodied in the theory of Human Capital Management (HCM) that Baron and Armstrong (2007) identify as one of the three key components of Intellectual Capital. Intellectual capital is described as ‘consisting of the stocks and flows of knowledge available to an organisation’ (p.7). Baron and Armstrong identify the three elements of intellectual capital as:

Human Capital – the knowledge, skills, abilities, and capacity to develop and innovate possessed by people in an organisation.

Social Capital¹ - the structures, networks and procedures that enable those people to acquire and develop intellectual capital represented by the stocks and flows of knowledge derived from relationships within and outside an organisation.

Organisational Capital – the institutionalised knowledge possessed by an organisation that is stored in its databases, manuals, etc. ... [sometimes] called *structural capital*.

(original italics)

Whilst there is a great deal written about Intellectual capital it is the component of Human capital that is of importance in relation to education, training and development, although it can never be fully divorced from social capital and organisational capital. Both social capital and structural capital are also important to managers as they are used to create reputational capital and economic capital (wealth) with reputational capital becoming an important measures in assessing managerial performance (Martin, 2005), for as Watson (2001) observes managerial performance invariably assess what managers can do rather than what they know.

¹ Also known as ‘Customer Capital’ (Egbu, 2004).

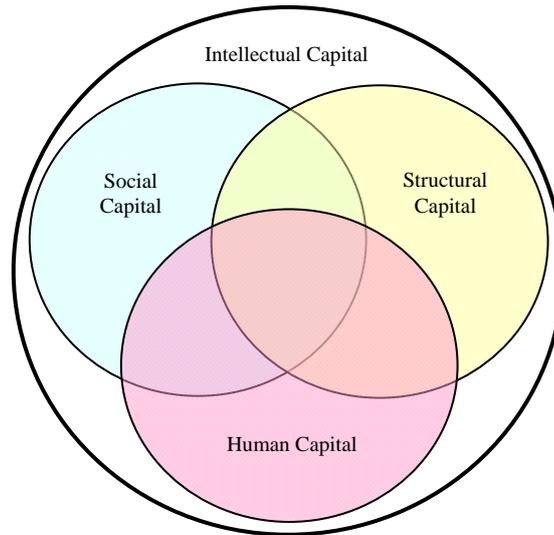


Figure 5.22: The Components of Intellectual Capital

Human Capital, as has been previously stated, concerns the knowledge, skills and abilities of the workforce and is regarded as the most important intangible asset in an organisation (Egbu, 2004). Yet this important intangible asset frequently has few resources invested in it (Ashton and Felstead, 2001) as identified by *Rethinking Construction* (2002a: 32) who found that ‘career development was not readily seen by managers operating on a short-term cost benefit basis. Consequently, investment, support and allocation of time for this activity are not readily forthcoming’. Ashton and Felstead state additionally that employee training and development is essential for organisational performance and for effective training and development to occur continuous learning is required with employees taking responsibility for their own self-development. Training is identified by Gruneberg (2006: 130) as ‘one of the key links between human capital and productivity. However, Mabey, Salaman and Storey (1998) state ‘that many organisations have got to the point that training and development is a strategic priority, rather than a tactical or knee-jerk response, but choices still exist as to where to direct investment and to what ends.’ A point emphasised by Egan (2002) and embodied in the ensuing *Rethinking Construction*’s (2002a, b) ‘Respect for People’ initiative.

Mabey, Salaman and Storey (1998) identify four strategic purposes of training and development:

1. Assessing and addressing skills deficits;
2. Providing a catalyst for change;
3. Giving an organisation a competitive edge; and
4. Encouraging a learning environment.

Here the focus of the first three is an organisational requirement, whilst the fourth focuses on the individual needs for learning, as it is through this that the first three will be accomplished. Mabey, Salaman and Storey (1998: 169) state in respect of this fourth objective that:

the focus here is ... guided by organisational goals and the un-girded belief that within each member of staff is a latent talent waiting to be tapped. Accordingly, the trend is away from structured taught courses towards enhanced opportunities for self development through such methods as on-the-job training, strategic secondments and temporary task forces, or computer-based open-learning systems where training material is provided which may, but not necessarily relate to the individual's job.

i.e. through continuous professional development through the medium of self-managed learning reliant on individually based androgogical methods that '... can be undertaken at a pace, time and possibly location which is suitable for the individual concerned' (Marchington and Wilkinson, 2000: 198-9). Thus the importance and impact of ICT in facilitating self-managed learning is not lost on Marchington and Wilkinson, as they observe that modern ICT/computer access both at home and at work creates immense opportunities in the field of self-managed learning as it 'has the major advantage of being responsive to individual needs in a way which better allows for a better fit between learning and domestic or work commitments.' (p.197). Fox (2007: 293) too recognises the importance of ICT as 'the use computing skills is something which encourages individual development and self-learning, particularly with access to the internet', but in addition notes that the ICT link between developing a learning culture and an organisation's ability to perform is often overlooked.

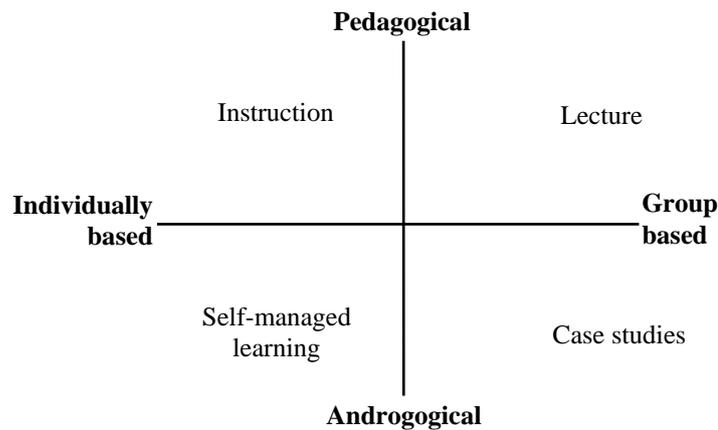


Figure 5.23 Categories of Training Methods
 Source: Marchington and Wilkinson (2000: 194, Fig. 8)

In their model (Figure 5.23 above) Marchington and Wilkinson (2000: 193) identify and align pedagogical approaches as being ‘trainer-driven’ with ‘little room for student input into the learning situation’ and contrast it with androgogical approaches, i.e. those being ‘self-directed and participation with the trainer providing a facilitative or supportive role’.

Much of the focus of management development is on increasing performance of managers and the organisation and ultimately industry as shown in Figure 5.24 overleaf. Spencer and Spencer (1993) align performance of individuals with the level of competence of the individual, but emphasise increasing competence goes beyond increasing and individual’s knowledge and skills. Spencer and Spencer identify five types of competency characteristics that directly affect an individual’s ability to perform:

- *Motives*. The things a person consistently thinks about or wants to cause action. Motives “drive, direct, and select” behaviour towards certain actions or goals away from the others;
- *Traits*. Physical characteristics and consistent responses to situations or information;
- *Self-confidence*. A person’s attitudes, values or self-image;
- *Knowledge*. Information a person has in specific content areas; and
- *Skill*. The ability to perform a certain physical or mental task.

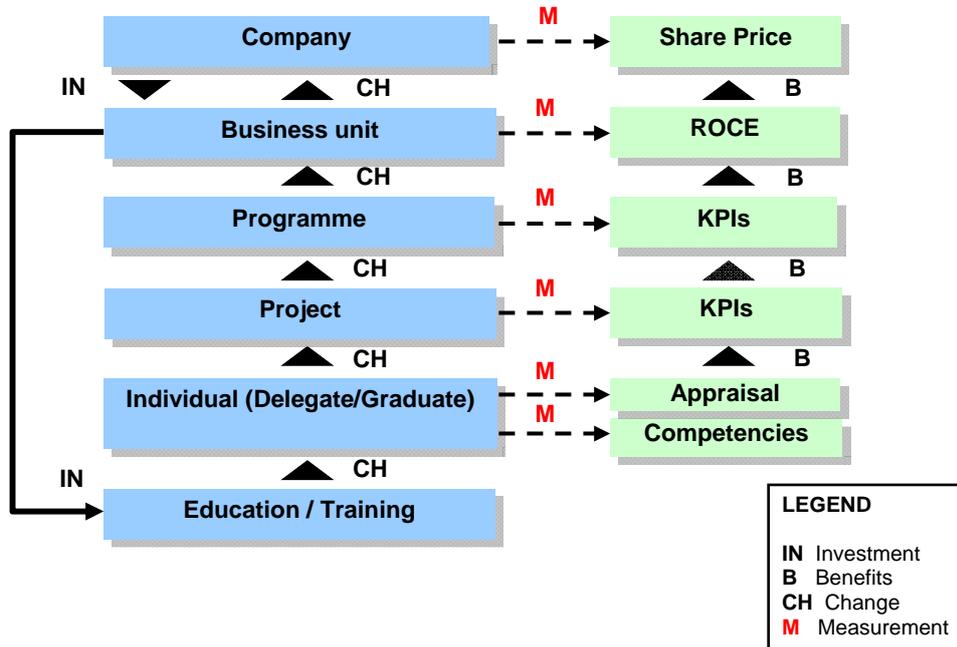


Figure 5.24: The Management Development Business Link
 Source: Brown and Gale (2009). Reproduced by kind permission of A.W. Gale; © A.W. Gale/UoM, 2009.

Here they identify motive, traits, and self-concept as ‘core competencies as they lie hidden with the core of an individual, as shown in Figure 5.25 below. These are the most difficult to assess and develop and the most cost-effective way to obtain these competencies is through careful selection of individuals. Skills and knowledge are identified as ‘surface competencies’ as these tend to be the most visible and are best developed through education and training.

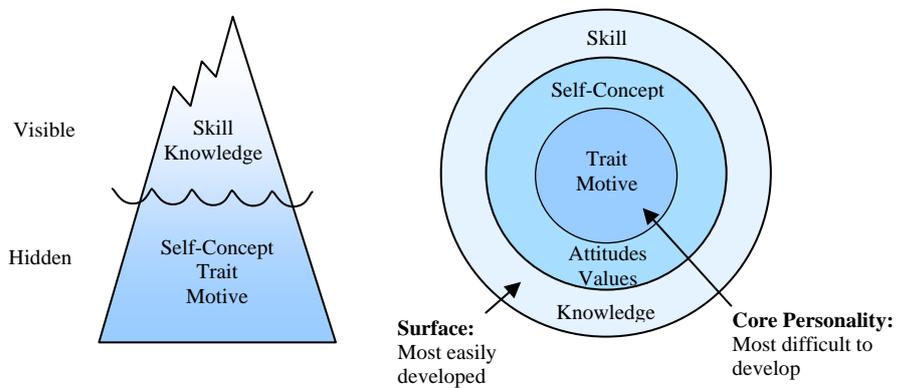


Figure 5.25: Central and Surface Competencies
 Source: Spencer and Spencer (1993: 11, Fig. 2-1)

Spencer and Spencer (2003) acknowledge that most management development is aimed at improving skills and knowledge, but to ensure long-term performance benefits it is necessary to develop the behaviour of the individual through addressing the personal characteristics of motive, trait self-concept and knowledge. Using a causal flow model these input into behaviour, and along with developed skills lead to job performance improvement as shown in Figure 5.26 below.

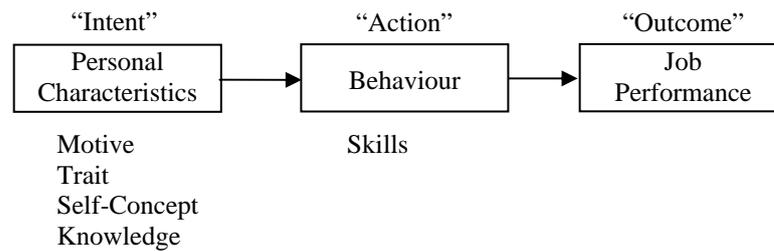


Figure 5.26: Competency Causal Flow Model
Source (Spencer and Spencer (1993: 13, Fig. 2-2)

However, Fraser (2000) notes that all too often the construction industry appears to expect its managers to conform to certain stereotypes. His research indicated that construction managers' effectiveness was linked with the following personal characteristics:

CPD: The more effective managers were found to undertake CPD;

Long service: The more effective managers had worked for no more than three companies in their careers;

Formal education: The more effective managers had completed tertiary qualifications;

Professional bodies: The more effective managers were active members of professional bodies; and

Motivation: The more effective managers were highly motivated.

Whilst it is not the intention of this thesis to research the personal characteristics of construction managers, particularly those of long service and motivation identified above, the role of CPD, education and the professional bodies will be investigated further. Nevertheless all these characteristics are important factors in developing skills and performance which is considered in the next section of this chapter.

5.3.5 Skills and Performance in the Construction Industry

The Leitch Review (2006) reveals that the UK, as a major economic power, lags significantly behind many other of the world's major economic powers in terms of its qualified workforce. Leitch (2006: 40) notes that 'the UK's skills base suffers from longstanding historic failures in the education and training system', although acknowledges that the number of UK adults with no qualifications has reduced from 21% to 13% in the period from 1994 to 2005, whilst those qualified to NVQ Level 4 and above has risen from 21% to 29% in the same period.

Drawing on the OECD's 2006 report 'Education at a Glance' Leitch observes that the UK ranked:

- 17th out of 30 OECD countries in the proportion who have low or no qualifications (equivalent to less than a Level 2 in the UK), with 35 per cent at this level, more than double the proportion in the best performing nations, such as the USA, Canada, Germany and Sweden;
- 20th in the proportion with intermediate qualifications (levels 2 and 3) with 36 per cent qualified to this level, compared to more than 50 per cent in Germany, and New Zealand; and
- 11th in the proportion who have high qualifications (Level 4 and above), with 29 per cent qualified to this level, internationally comparable, but still well behind the USA, Japan and Canada where the proportion stands at around 40 per cent.

(OECD, 2006:40)

These are illustrated in Figure 5.27 overleaf.

Here it can be seen that the UK, as one of the world's leading economic and political powers lags way behind many less well developed countries in terms of its qualification levels. Goodwin, Wills and Ashton (1999) highlight the fact that not only does the UK have one of the most deregulated labour markets in Europe, and unlike many European countries lacks an incremental approach to education and training policies, but those policies the UK has have been subject to a number of radical changes in recent years. As a result there has been a greater emphasis placed on learners to take a much greater responsibility for their own learning (Harrison, 2000). The OECD (2006), Leitch (2005, 2006) and Beaven *et al* (2005) all

emphasise the apparent importance and benefits to nations to have an improved level of education and qualifications amongst the workforce. However, they give little attention or emphasis to the issue of whether or not a highly qualified workforce is actually required or necessary, i.e. is there suitable employment available for a more highly educated and qualified workforce?

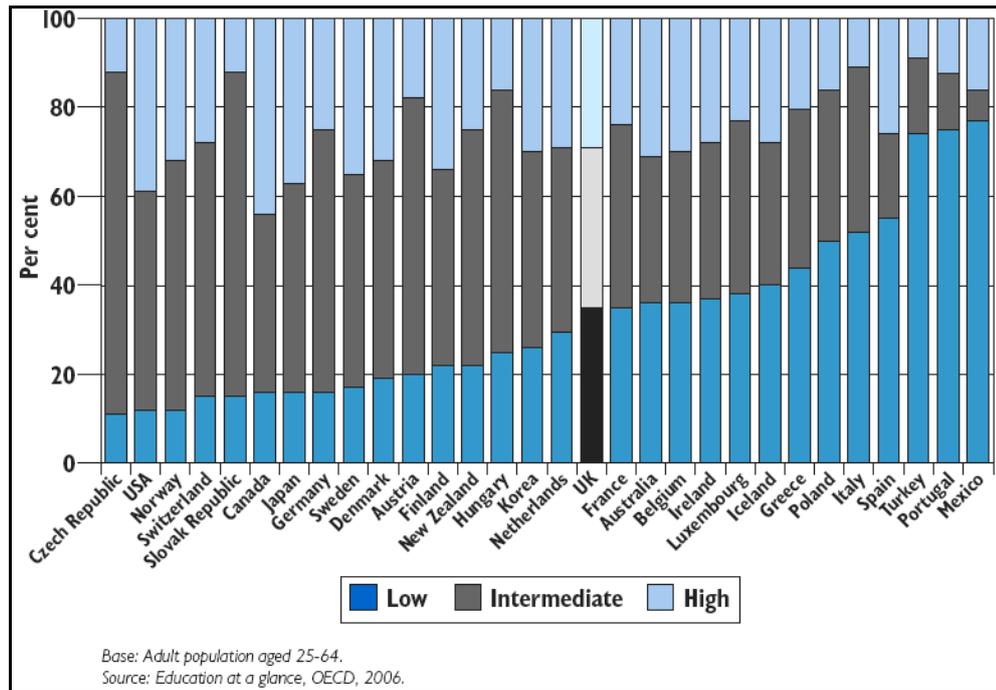


Figure 5.27: International comparison of qualification profiles
Source: Leitch (2006: 40, Chart 2.1)

In this and following tables and figures Leitch uses the following definitions of qualifications for the OECD data:

- Low: below NVQ level 2;
- Intermediate: NVQ levels 2 and 3; and
- High: NVQ level 4 and above.

An explanation of the NVQ levels is given in Appendix 5A.9.

Whilst Leitch does not give a precise source for his data and there is no similar figure in the OECD report, examination of the OECD's (2006) report suggests that Chart 2.1 (Figure 5.26) above was prepared from the data given by the OECD in 'Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37).

Table 5.5 below shows the relative percentages of each level of qualification for each of the thirty OECD nations

Table 5.5: International Comparison of Qualifications for OECD Nations

Source: Based on 'Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37)

| Country | Low | | | Intermediate | | | High | | |
|-----------------------|---------------|-----------|-----------|---------------|-----------|-----------|---------------|-----------|-----------|
| | % | Rank | | % | Rank | | % | Rank | |
| | | Low | High | | Low | High | | Low | High |
| Australia | 35.88% | 12 | 19 | 33.30% | 25 | 6 | 30.82% | 8 | 23 |
| Austria | 19.81% | 20 | 11 | 61.87% | 3 | 28 | 18.32% | 22 | 9 |
| Belgium | 36.08% | 11 | 20 | 34.24% | 24 | 7 | 29.68% | 10 | 21 |
| Canada | 15.66% | 26 | 5 | 39.74% | 17 | 14 | 44.61% | 1 | 30 |
| Czech Republic | 10.76% | 30 | 1 | 76.88% | 1 | 30 | 12.37% | 28 | 3 |
| Denmark | 18.67% | 21 | 10 | 49.16% | 9 | 22 | 32.16% | 6 | 25 |
| Finland | 22.50% | 18 | 13 | 43.43% | 14 | 17 | 34.07% | 5 | 26 |
| France | 34.71% | 14 | 17 | 41.37% | 16 | 15 | 23.92% | 19 | 12 |
| Germany | 16.10% | 24 | 7 | 58.97% | 4 | 27 | 24.93% | 18 | 13 |
| Greece | 44.05% | 7 | 24 | 35.63% | 21 | 10 | 20.32% | 21 | 10 |
| Hungary | 24.77% | 17 | 14 | 58.88% | 5 | 26 | 16.35% | 24 | 7 |
| Iceland | 40.03% | 8 | 23 | 32.14% | 26 | 5 | 27.83% | 15 | 16 |
| Ireland | 37.20% | 10 | 21 | 34.83% | 22 | 9 | 27.97% | 14 | 17 |
| Italy | 52.14% | 5 | 26 | 37.01% | 19 | 12 | 10.85% | 29 | 2 |
| Japan | 15.84% | 25 | 6 | 46.53% | 12 | 19 | 37.62% | 3 | 28 |
| Korea | 25.56% | 16 | 15 | 43.97% | 13 | 18 | 30.48% | 9 | 22 |
| Luxembourg | 37.72% | 9 | 22 | 39.43% | 18 | 13 | 22.85% | 20 | 11 |
| Mexico | 77.45% | 1 | 30 | 6.14% | 30 | 1 | 16.41% | 23 | 8 |
| Netherlands | 29.40% | 15 | 16 | 41.65% | 15 | 16 | 28.95% | 12 | 19 |
| New Zealand | 22.35% | 19 | 12 | 52.38% | 8 | 23 | 25.26% | 17 | 14 |
| Norway | 11.38% | 29 | 2 | 56.67% | 6 | 25 | 31.95% | 7 | 24 |
| Poland | 49.94% | 6 | 25 | 34.35% | 23 | 8 | 15.71% | 25 | 6 |
| Portugal | 74.84% | 2 | 29 | 12.64% | 29 | 2 | 12.52% | 26 | 5 |
| Slovak Republic | 15.34% | 27 | 4 | 72.29% | 2 | 29 | 12.37% | 27 | 4 |
| Spain | 55.07% | 4 | 27 | 18.69% | 27 | 4 | 26.24% | 16 | 15 |
| Sweden | 17.06% | 23 | 8 | 48.41% | 11 | 20 | 34.53% | 4 | 27 |
| Switzerland | 17.17% | 22 | 9 | 54.55% | 7 | 24 | 28.28% | 13 | 18 |
| Turkey | 73.94% | 3 | 28 | 16.99% | 28 | 3 | 9.07% | 30 | 1 |
| United Kingdom | 34.92% | 13 | 18 | 35.86% | 20 | 11 | 29.22% | 11 | 20 |
| United States | 12.09% | 28 | 3 | 48.85% | 10 | 21 | 39.05% | 2 | 29 |

Using the data shown in Table 5.5 above graphs can be prepared showing the relative position of each nation for each of Leith's qualification levels of low (see Figure 5.28

below), intermediate (see Figure 5.29 overleaf) and high (see Figure 5.30 overleaf)². This has produced the equivalent graph for the comparison of international qualification profiles shown in Figure 5.31 overleaf.

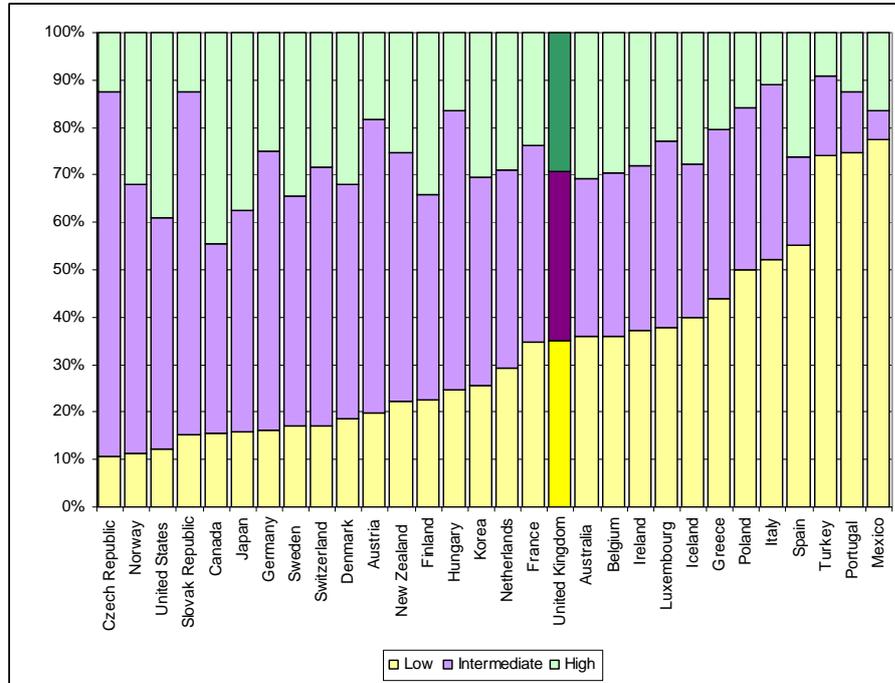


Figure 5.28: Comparison of international qualification profiles

Source: Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37)

Source data available at: <http://dx.doi.org/10.1787/701655207564> (last accessed 09/07/2007)

² It should be noted that the results and order differ slightly from those given by Leitch (see Table 5.6 and Figure 5.24 above) due to rounding 'errors' as the author has used the original OECD published data without any attempt to round figures in any way.

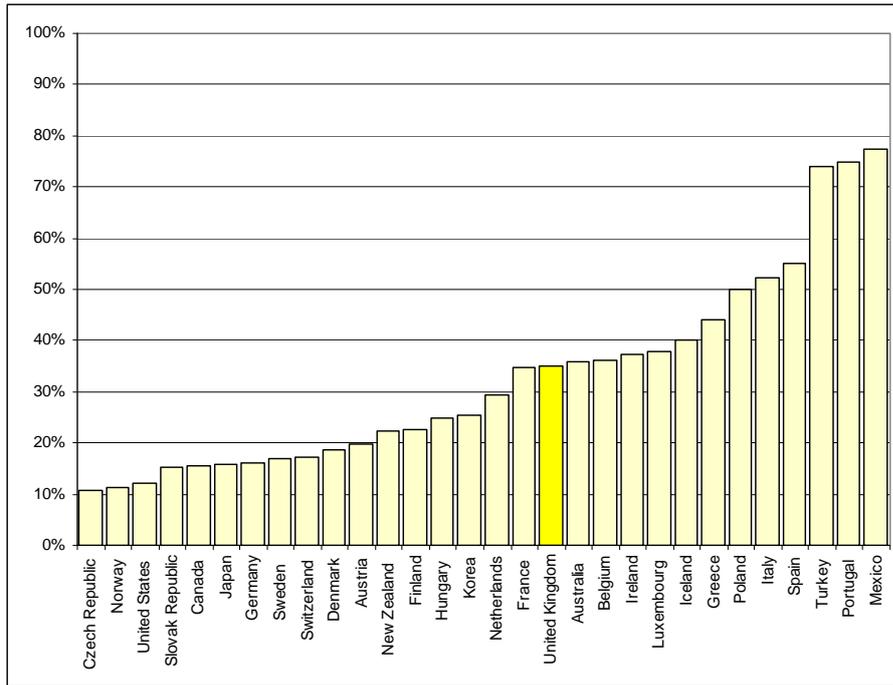


Figure 5.29: Comparison of international low qualification profiles

Source: Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37)

Source data available at: <http://dx.doi.org/10.1787/701655207564> (last accessed 09/07/2007)

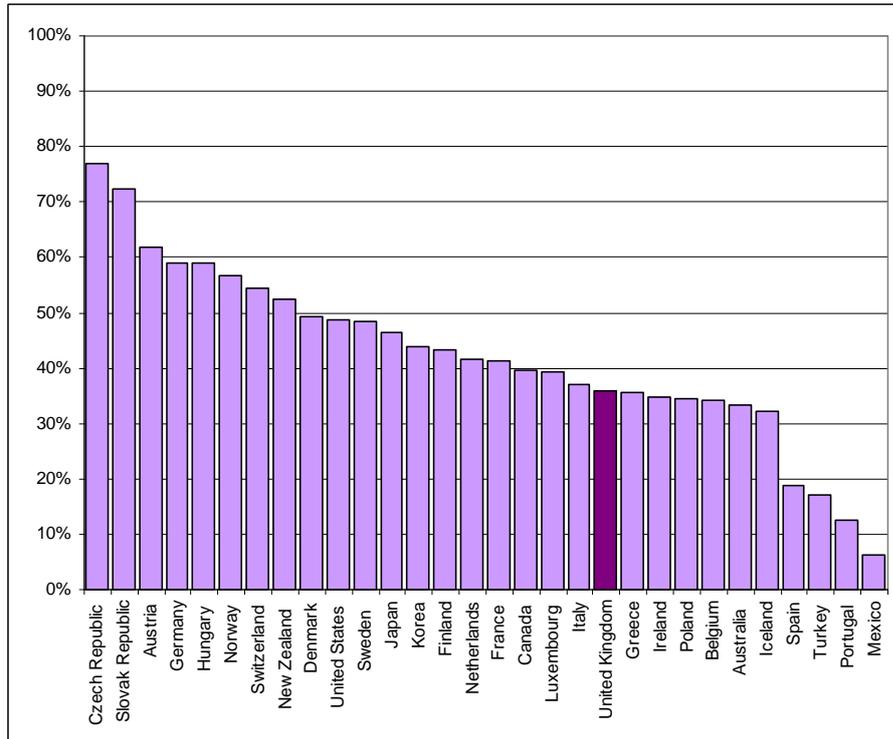


Figure 5.30: Comparison of international intermediate qualification profiles

Source: Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37)

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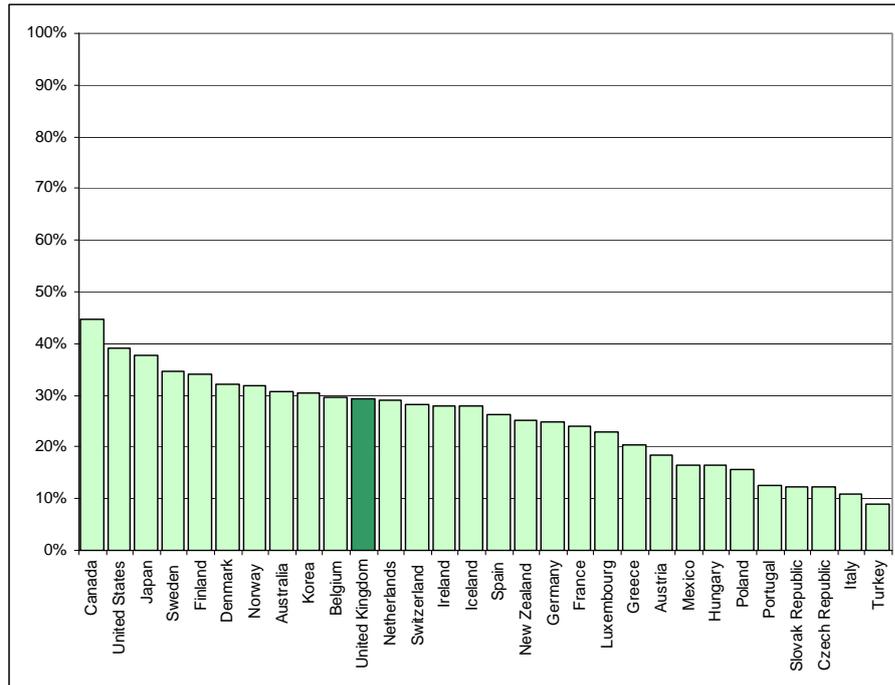


Figure 5.31: Comparison of international high qualification profiles

Source: Table A1.1a: Educational attainment: adult population (2004): Distribution of the 25-64 year old population, by highest level of educational achievement' (OECD, 2006: 37)

Source data available at: <http://dx.doi.org/10.1787/701655207564> (last accessed 09/07/2007)

Table 5.6: Comparison of Highest Qualification Levels

Sources: Based on: Beaven *et al.* (2005: 41, Table 5.7); and OECD (2006: 37 Table, A1.1a)

| Leitch Classification | NQF level | Beaven <i>et al</i> | | OECD | Beavan <i>et al</i> projections | | | |
|-----------------------|-----------|---------------------|--------|--------|---------------------------------|--------|--------|--------|
| | | 2004 % | 2005 % | 2005 % | 2014 % | 2020 % | 2014 % | 2020 % |
| High | 5 | 6.0 | 29.9 | 29.22 | 9.5 | 38.8 | 11.1 | 42.1 |
| | 4 | 23.9 | | | 29.3 | | 31.0 | |
| Intermediate | 3 | 19.7 | 41.8 | 35.86 | 24.5 | 44.7 | 26.2 | 44.8 |
| | 2 | 22.1 | | | 20.2 | | 18.6 | |
| Low | 1 | 17.8 | 28.3 | 34.92 | 13.8 | 16.4 | 11.3 | 13.1 |
| | 0 | 10.5 | | | 2.6 | | 1.8 | |
| | All | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Whilst the OECD (2006) report and Leitch (2005, 2006) provide an interesting insight they reveal nothing about comparative qualifications levels of the workforce in various industrial/commercial categories. Work undertaken by Beaven *et al* (2005) in support of the Leitch Review does however provide an insight into qualification levels of the workforce, both nationally and for various industrial/commercial categories, which can be compared to the Leitch/OECD classifications shown in Table 5.6 above.

Beaven et al (2005:41) comment that there will be a change

... in favour of those occupations which tend to employ better qualified people, i.e. those that have 'higher' qualification profiles... and a general shift ('improvement') of qualifications within all occupations in favour of higher qualified people.

However, it was found in Document 3 that construction companies seemed to place little real value on higher-level academic or professional qualifications amongst their construction managers. Evidence that little value is placed on qualifications in the construction industry is clearly shown by Beaven *et al* (2005) (see Table 5.7 below) as the construction industry is at the bottom of the league in terms of both growth in 'NQF level qualifications' and 'years of schooling'. Here it should be noted that these tables cover the entire industry, not just the management levels. However, the construction industry is shown by Beaven *et al* as faring better in terms of both employment gain and value added per job.

Table 5.7: Growth in Skills Indices by Sector, 1994-2004
Source: Based on: Beaven *et al* (2005:18, Table 3.5)

| | Industry | NQF level | Rank | Years of Schooling | Rank |
|-----------|------------------------------------|------------|-----------|--------------------|-----------|
| 1 | Agriculture | 2.0 | 4 | 0.4 | 12 |
| 2 | Mining & quarrying, utilities | 1.1 | 19 | 0.4 | 12 |
| 3 | Food, drink & tobacco | 1.8 | 6 | 0.5 | 6 |
| 4 | Textiles & clothing | 3.6 | 1 | 0.7 | 1 |
| 5 | Wood, paper, printing & publishing | 1.6 | 11 | 0.5 | 6 |
| 6 | Chemicals, & NMMP | 1.8 | 6 | 0.5 | 6 |
| 7 | Metals & metal goods | 1.7 | 9 | 0.4 | 12 |
| 8 | Engineering | 1.2 | 16 | 0.4 | 12 |
| 9 | Transport equipment | 1.7 | 9 | 0.5 | 6 |
| 10 | Manufacturing nes & recycling | 1.2 | 16 | 0.3 | 22 |
| 11 | Construction | 0.6 | 24 | 0.2 | 23 |
| 12 | Sales & maint. of motor vehicles | 0.9 | 21 | 0.2 | 23 |
| 13 | Wholesale distribution | 1.4 | 15 | 0.4 | 12 |
| 14 | Other retail distribution | 2.1 | 3 | 0.5 | 6 |
| 15 | Hotels and catering | 1.8 | 6 | 0.4 | 12 |
| 16 | Transport | 0.6 | 24 | 0.2 | 23 |
| 17 | Communications | 2.2 | 2 | 0.6 | 2 |
| 18 | Banking and insurance | 1.6 | 11 | 0.6 | 2 |
| 19 | Professional services | 1.2 | 16 | 0.4 | 12 |
| 20 | Computing services | 0.8 | 23 | 0.4 | 12 |
| 21 | Other business services | 1.1 | 19 | 0.4 | 12 |
| 22 | Public administration and defence | 1.6 | 11 | 0.6 | 2 |
| 23 | Education | 0.9 | 21 | 0.4 | 12 |
| 24 | Health and social work | 1.6 | 11 | 0.5 | 6 |
| 25 | Miscellaneous services | 1.9 | 5 | 0.6 | 2 |
| | All industries | 1.6 | | 0.5 | |

With an annual employment growth rate of 1.6% per annum, and an industry value added growth rate of 2.0% per annum the construction industry is third from bottom of the 'growth' league, and this is during times of the industry being in a boom phase of 'boom and bust' cycle for which it is renown. This is shown in Table 5.8 overleaf.

Felstead *et al* (2007) give a more detailed consideration of the skills and qualifications needed in the UK workplace and provide a more useful insight into the skills and qualifications supply and demand levels during the periods 1986-2006 and 2001-2006. Their study gives a quantitative analysis of the skills supply and demand, using the construction industry as one of the measurables and comparatives with other industries. Additionally, but unfortunately not on an industry-by-industry basis, changes in supply and demand for skills are considered for various types and levels of occupations through the use of three indices:

- Required Qualifications Index;
- Training Time Index; and
- Learning Time Index.

Felstead *et al* (2007: 38) define their indices from their survey findings as:

Required Qualifications Index is taken as the qualification level needed to get the job, being determined by:

$$Q_i = \sum_{r=0}^4 q_r$$

Where q_r is the proportion of qualifications required at each level where:

- q_0 = No qualification required;
- q_1 = NQF Level 1 qualification required;
- q_2 = NQF Level 2 qualification required;
- q_3 = NQF Level 3 qualification required;
- q_4 = NQF Level 4 qualification required.

Table 5.8: Growth in value added, employment and labour productivity by sector, 1994-2004
 Source: Based on: Beaven et al (2005:22, Table 3).

| Industry | 2004 | | | | | | | | | | Trend Growth (1) 1994 - 2004 | | | | | |
|--------------------------------------|-----------------|-------|------|----------------|-------|------|-------------------------------|------------------------|------|------|------------------------------|------|----------------|------|--------------------------------|------|
| | Value added (2) | | | Workforce jobs | | | Value added per workforce job | | | | Value added (2) | | Workforce jobs | | Value added per work-force job | |
| | £bn | % | Rank | '000 | % | Rank | £'000 | Industry average = 100 | Rank | % pa | Rank | % pa | Rank | % pa | Rank | % pa |
| 1 Agriculture | 9.6 | 1.0 | 22 | 426.3 | 1.4 | 20 | 22,502.5 | 68.4 | 21 | 0.6 | 18 | -3.2 | 23 | 3.9 | 3 | |
| 2 Mining & quarrying, utilities | 36.8 | 3.7 | 11 | 183.2 | 0.6 | 23 | 200,962.5 | 610.7 | 1 | 0.5 | 19 | -2.6 | 20 | 3.2 | 8 | |
| 3 Food, drink & tobacco | 23.5 | 2.4 | 18 | 457.6 | 1.5 | 19 | 51,399.3 | 156.2 | 7 | 0.2 | 21 | -0.5 | 17 | 0.7 | 19 | |
| 4 Textiles & clothing | 5.7 | 0.6 | 24 | 183.1 | 0.6 | 23 | 30,996.5 | 94.2 | 16 | -5.8 | 24 | -9.1 | 24 | 3.6 | 6 | |
| 5 Wood, paper, printing & publishing | 23.5 | 2.4 | 18 | 566.0 | 1.9 | 15 | 41,456.6 | 126.0 | 10 | 0.1 | 22 | -1.0 | 18 | 1.0 | 16 | |
| 6 Chemicals, & NMMP | 34.2 | 3.4 | 15 | 599.4 | 2.0 | 14 | 56,986.3 | 173.2 | 4 | 2.2 | 13 | -1.5 | 19 | 3.7 | 4 | |
| 7 Metals & metal goods | 16.2 | 1.6 | 21 | 469.9 | 1.6 | 18 | 34,437.7 | 104.6 | 13 | -1.3 | 23 | -2.8 | 22 | 1.6 | 14 | |
| 8 Engineering | 30.8 | 3.1 | 16 | 681.1 | 2.2 | 13 | 45,274.5 | 137.6 | 9 | 1.0 | 16 | -2.6 | 20 | 3.7 | 4 | |
| 9 Transport equipment | 20.1 | 2.0 | 20 | 361.9 | 1.2 | 21 | 55,597.9 | 168.9 | 5 | 3.2 | 10 | -0.2 | 16 | 3.5 | 7 | |
| 10 Manufacturing nes & recycling | 8.0 | 0.8 | 23 | 233.2 | 0.8 | 22 | 34,249.4 | 104.1 | 14 | 0.4 | 20 | 0.7 | 13 | -0.3 | 23 | |
| 11 Construction | 65.6 | 6.6 | 5 | 2,090.1 | 6.9 | 5 | 31,401.3 | 95.4 | 15 | 2.0 | 14 | 1.6 | 9 | 0.4 | 22 | |
| 12 Wholesale distribution nes | 71.5 | 7.2 | 3 | 1,910.1 | 6.3 | 8 | 37,426.5 | 113.7 | 11 | 2.6 | 12 | 0.1 | 15 | 2.4 | 10 | |
| 13 Other retail distribution | 60.9 | 6.1 | 6 | 3,144.5 | 10.4 | 2 | 19,369.6 | 58.9 | 22 | 4.5 | 6 | 1.6 | 9 | 2.8 | 9 | |
| 14 Hotels and catering | 36.0 | 3.6 | 12 | 1,961.8 | 6.5 | 7 | 18,361.3 | 55.8 | 23 | 2.7 | 11 | 2.0 | 6 | 0.7 | 19 | |
| 15 Transport | 46.2 | 4.6 | 10 | 1,286.2 | 4.2 | 11 | 35,918.9 | 109.1 | 12 | 6.5 | 3 | 1.7 | 8 | 4.8 | 2 | |
| 16 Communications | 34.7 | 3.5 | 14 | 526.9 | 1.7 | 17 | 65,939.4 | 200.4 | 2 | 3.4 | 8 | 2.5 | 3 | 0.9 | 17 | |
| 17 Banking and insurance | 66.4 | 6.7 | 4 | 1,161.7 | 3.8 | 12 | 57,137.9 | 173.6 | 3 | 7.2 | 2 | 1.0 | 12 | 6.2 | 1 | |
| 18 Professional services | 105.7 | 10.6 | 1 | 2,236.3 | 7.4 | 4 | 47,284.0 | 143.7 | 8 | 4.6 | 5 | 2.2 | 5 | 2.3 | 11 | |
| 19 Computing services | 29.6 | 3.0 | 17 | 550.3 | 1.8 | 16 | 53,739.8 | 163.3 | 6 | 11.6 | 1 | 9.2 | 1 | 2.2 | 12 | |
| 20 Other business services | 35.6 | 3.6 | 12 | 1,996.9 | 6.6 | 6 | 17,810.5 | 54.1 | 24 | 6.1 | 4 | 4.4 | 2 | 1.6 | 14 | |
| 21 Public administration and defence | 52.2 | 5.2 | 9 | 1,741.4 | 5.7 | 10 | 29,949.4 | 91.0 | 17 | 0.8 | 17 | 0.3 | 14 | 0.6 | 21 | |
| 22 Education | 56.8 | 5.7 | 7 | 2,442.7 | 8.1 | 3 | 23,238.8 | 70.6 | 20 | 1.2 | 15 | 1.9 | 7 | -0.7 | 24 | |
| 23 Health and social work | 75.3 | 7.6 | 2 | 3,223.6 | 10.6 | 1 | 23,369.7 | 71.0 | 19 | 3.5 | 7 | 1.5 | 11 | 1.9 | 13 | |
| 24 Miscellaneous services | 52.5 | 5.3 | 8 | 1,870.9 | 6.2 | 9 | 28,036.1 | 85.2 | 18 | 3.3 | 9 | 2.5 | 3 | 0.8 | 18 | |
| Whole economy | 997.3 | 100.0 | | 30,305.2 | 100.0 | | 32,909.2 | 100.0 | | 3.0 | | 1.2 | | 1.8 | | |

Notes:

(1) Trend growth is calculated by fitting $\log(q(t))=a+bt$ and computing from exponential growth rate, b, to a conventional growth rate, g, using the formula $g=exp(b)-1$

(2) Value added excludes ownership of dwellings and adjustment for financial services

Source(s): ONS, CE

Training Time Index is taken as being the length of post full-time education and training necessary to do the job, being determined by:

$$T_i = \sum_{r=0}^6 t_r$$

Where t_r is the proportion of time required at each level where:

t_0 = No time required;

t_1 = Less than 1 month required;

t_2 = 1 to 3 months required;

t_3 = 3 to 6 months required;

t_4 = 6 to 12 months required;

t_5 = 1 to 2 years required;

t_6 = more than 2 years required.

Learning Time Index is taken as the length of time necessary to become competent in the job, being determined by:

$$L_i = \sum_{r=0}^6 l_r$$

Where l_r is the proportion of time required at each level where:

l_0 = No time required;

l_1 = Less than 1 month required;

l_2 = 1 to 3 months required;

l_3 = 3 to 6 months required;

l_4 = 6 to 12 months required;

l_5 = 1 to 2 years required;

l_6 = more than 2 years required.

From this it can be seen in the distribution and trends of broad skills for each occupation (see Table 5.9 overleaf) that managers, professionals and associate professionals³ form the top three in each of the indices. Managers, (which includes construction managers, etc.) requiring less qualifications, training time and learning

³ For a definition of these terms refer to ONS(2006a, 2006b)

time than professionals (which includes architects, surveyors and engineers, etc.) and associate professionals (draftspersons, surveying and engineering technicians, etc.).

Table 5.9: Distribution and Trends of Broad Skills by Occupation
 Sources: Based on: Felstead *et al* (2007: 40, Table 3.2) – Broad distribution of skills by occupation, 2006
 Felstead *et al* (2007: 77, Table 3.2) – Pattern of change in the distribution of broad skills by occupation, 1986-2006

| Occupation | Required Qualification Index | | | | Required Training Time Index | | | | Required Learning Time Index | | | | | | | | |
|------------------------------|------------------------------|---------------|--------------|-------------------------|------------------------------|---------------|--------------|-------------------------|------------------------------|---------------|--------------|-------------------------|---|------|---|-------|---|
| | Rank 2006 | 1986- 2006 | Rank 2006 | Change 2001- 2006 | Rank 2006 | 1986- 2006 | Rank 2006 | Change 2001- 2006 | Rank 2006 | 1986- 2006 | Rank 2006 | Change 2001- 2006 | | | | | |
| Managers | 3 | 0.30 | 2 | 0.13 | 2 | 2.87 | 4 | 0.27 | 6 | 0.37 | 5 | 4.24 | 2 | 0.40 | 1 | 0.03 | 4 |
| Professionals | 1 | 0.01 | 9 | -0.04 | 5 | 3.75 | 1 | 0.63 | 4 | 0.14 | 8 | 4.87 | 1 | 0.12 | 6 | -0.02 | 6 |
| Associate Professionals | 2 | 0.26 | 3 | -0.08 | 7 | 3.42 | 2 | 0.24 | 8 | 0.26 | 6 | 4.16 | 4 | 0.01 | 9 | -0.08 | 7 |
| Administrative & Secretarial | 4 | 0.19 | 5 | 0.10 | 3 | 2.27 | 6 | 0.72 | 2 | 0.53 | 1 | 3.19 | 5 | 0.17 | 5 | 0.23 | 1 |
| Skilled Trades | 5 | 0.07 | 7 | -0.05 | 6 | 2.60 | 5 | -0.18 | 9 | -0.08 | 9 | 4.20 | 3 | 0.23 | 3 | -0.19 | 9 |
| Personal Service | 6 | 1.05 | 1 | 0.35 | 1 | 2.91 | 3 | 1.69 | 1 | 0.48 | 4 | 3.17 | 6 | 0.02 | 8 | 0.06 | 3 |
| Sales | 8 | 0.10 | 6 | -0.13 | 8 | 1.47 | 8 | 0.71 | 3 | 0.51 | 2 | 2.26 | 8 | 0.05 | 7 | -0.09 | 8 |
| Plant & Machinery Operatives | 7 | 0.24 | 4 | 0.09 | 4 | 1.67 | 7 | 0.44 | 5 | 0.51 | 2 | 2.92 | 7 | 0.22 | 4 | 0.00 | 5 |
| Elementary Occupations | 9 | 0.04 | 8 | -0.16 | 9 | 0.91 | 9 | 0.27 | 6 | 0.21 | 7 | 2.16 | 9 | 0.33 | 2 | 0.22 | 2 |

However, when it comes to consideration of broad skills by social class it can also be seen that the ‘higher managerial’ and ‘professional’ classes⁴ all require Qualification Indices greater than NQF Level 3; high Training-Time Indices equivalent to six to twelve months and three to six months respectively; and Learning-Time Indices equivalent to six to twelve months as shown in Table 5.10 below:

Table 5.10: Broad Distribution of Skills by Social Class

Source: Felstead *et al* (2007: 41, Table 3.3)

| Social class | Required Qualification Index | Training Time Index | Learning Time Index |
|---------------------------------------|------------------------------|---------------------|---------------------|
| Higher Managerial & Large Employers | 3.26 | 4.04 | 4.42 |
| Higher Professional | 3.56 | 3.54 | 4.75 |
| Lower Managerial & Professional | 2.97 | 3.30 | 4.33 |
| Intermediate | 2.08 | 2.66 | 3.43 |
| Small Employers & Own Account Workers | 1.78 | 2.16 | 4.38 |
| Lower Supervisory & Technical | 1.96 | 2.79 | 4.32 |
| Semi-routine | 1.09 | 1.84 | 2.70 |
| Routine | 0.80 | 1.37 | 2.69 |

The above analysis covers industry at large, but when individual industries are considered a different perspective begins to emerge with the construction industry rating sixth out of the eleven quoted industry classifications with a Required Qualifications Index of 2.01 (equivalent to NVQ Level 2) and Training Time Index of 2.61 (equivalent to one to three months), as shown in Table 5.11 overleaf. It is perhaps surprising to find the construction industry highest in terms of the Learning Time Index of 4.41 (equivalent to six to twelve months) with only the education industry also having a Learning Time Index greater than 4.00 at 4.29.

⁴ For a definition of these classes see ONS (2005)

Table 5.11: Distribution and Trends in Broad Skills by Industry.
 Sources: Based on: Felstead *et al* (2007: 42, Table 3.4)
 Felstead *et al* (2007: 78, Table 4.5)

| Industry | Required Qualification Index | | | | Required Training Time Index | | | | Required Learning Time Index | | | | | | | |
|-----------------------------------|------------------------------|----------|-------------|--------------|------------------------------|----------|--------------|-------------|------------------------------|----------|-------------|--------------|----------|----------|--------------|----------|
| | 2006 | Rank | 1986-2006 | Change | 2006 | Rank | 1986-2006 | Change | 2006 | Rank | 1986-2006 | Change | 2006 | Rank | 1986-2006 | Change |
| Manufacturing | 1.84 | 8 | 0.22 | -0.15 | 2.18 | 8 | 0.17 | 0.22 | 3.60 | 7 | 0.19 | -0.03 | 7 | 7 | -0.03 | 7 |
| Construction | 2.01 | 6 | 0.18 | -0.09 | 2.61 | 6 | -0.21 | 0.21 | 4.41 | 1 | 0.39 | -0.05 | 5 | 9 | -0.05 | 9 |
| Wholesale and Retail | 1.17 | 10 | 0.10 | -0.14 | 1.52 | 11 | 0.29 | 0.17 | 2.92 | 10 | 0.16 | -0.06 | 10 | 10 | -0.06 | 10 |
| Hotels and Restaurants | 1.08 | 11 | 0.50 | -0.03 | 1.55 | 10 | 0.86 | 0.36 | 2.34 | 11 | 0.26 | 0.09 | 6 | 3 | 0.09 | 3 |
| Transport and Storage | 1.35 | 9 | -0.04 | 0.02 | 1.83 | 9 | 0.12 | 0.28 | 3.09 | 9 | 0.19 | -0.03 | 7 | 7 | -0.03 | 7 |
| Financial | 2.59 | 2 | 0.30 | 0.23 | 3.05 | 3 | 0.31 | 0.49 | 3.93 | 3 | 0.44 | 0.35 | 4 | 1 | 0.35 | 1 |
| Real Estate and Business Services | 2.41 | 4 | 0.52 | -0.17 | 2.71 | 5 | 0.66 | 0.43 | 3.66 | 6 | 0.54 | 0.09 | 3 | 3 | 0.09 | 3 |
| Public Administration | 2.22 | 5 | 0.26 | -0.19 | 2.93 | 4 | 0.66 | -0.07 | 3.74 | 4 | -0.17 | -0.06 | 11 | 10 | -0.06 | 10 |
| Education | 3.15 | 1 | 0.70 | 0.19 | 3.39 | 2 | 1.21 | 0.46 | 4.29 | 2 | 0.66 | 0.09 | 2 | 3 | 0.09 | 3 |
| Health and Social Work | 2.59 | 2 | 0.33 | -0.17 | 3.52 | 1 | 0.84 | 0.34 | 3.70 | 5 | 0.17 | 0.03 | 9 | 6 | 0.03 | 6 |
| Personal Services | 1.95 | 7 | 0.77 | 0.04 | 2.40 | 7 | 0.75 | 0.15 | 3.48 | 8 | 1.28 | 0.21 | 1 | 2 | 0.21 | 2 |

It would have been invaluable to have had the ‘broad skills of industry’ subdivided by ‘the broad skills of social class’ and/or ‘the broad skills of occupation’ as this would have enabled comparative analysis with other studies. As Felstead *et al* (2007) do not do this it must be assumed that a far greater survey sample and response rate would have been required for such a level of sub-analysis to be possible or meaningful.

Bosch and Philips’ (2003) study of the regulation of construction labour markets in nine countries, five of which were European, placed the UK next to the bottom in the list of countries in terms of industry regulation, and bottom of the European countries studied (see Table 5.12 below).

Table 5.12: Order of Countries from More to Less Regulated Construction Markets
Source: Bosch and Philips (2007: 13 Table 1.2)

| Country under study | Labour-management cooperation | Collective bargaining | State codification of labour standards | Construction a typical or exceptional case |
|----------------------------|--------------------------------------|------------------------------|---|---|
| The Netherlands | Yes | Yes | Yes | Typical |
| Germany | Yes | Yes | Yes | Typical |
| Denmark | Yes | Yes | No | Typical |
| Quebec province of Canada | Yes | Yes | Some | Exceptional |
| Australia | Yes | Yes | Withdrawn | Exceptional |
| Spain | Limited | Limited | Limited | Typical |
| US | Varies by state | Varies by state and trade | On public works in some states | Varies by state and trade |
| UK | Limited | Limited | No | Typical |
| Korea | Very limited | Very limited | No | Typical |

A study by the European Institute for Construction Labour Studies (EICLR) (Cremers and Janssen, 2006) also found that the UK construction workforce was amongst the least regulated amongst the eleven European countries studied and also had the highest percentage of self-employed workers, much of which was believed to be false self-employment. Both the EICLR and Bosch and Philips (2003) noted that this lack of regulation and the ensuing fragmentation in both the industry and in the forms of subcontracting and self-employment had a damaging effect on the levels of education and training within the UK construction industry. Whilst both studies focussed primarily upon crafts and trades workers they are equally applicable to managers within the industry. Bosch and Philips (2003: 11) observe that:

the skills and knowledge that a construction worker acquires either through formal training or on-the-job experience, may be thought of as a form of investment in human capital. The time and expense involved in creating these skills is the investment, and the higher productivity and quality [of the work] are the payoff.

The lack of regulation tends to create an industry of small subcontracting firms with a large base of unskilled or semi-skilled unqualified workers that they cannot afford to train and invest in their (both subcontractor and employees) future and the workers themselves are unable to do so for themselves. Interestingly Bosch and Philips (2003) also lay part of the blame for the lack of investment in workforce training with the industry's clients themselves, noting that many construction clients are infrequent visitors to the construction marketplace. As training invariably takes longer than the duration of a construction project clients expect to have trained workers ready for their project immediately and not to train workers for other peoples' projects in the future. In so doing they are dependent on previously trained workers and are unwilling to make any contribution to training a workforce for the future in which they are unlikely to derive any benefit, thus contributing to the weakening of the industry's skills base.

The importance of skills, and having a strong skills base, is now widely recognised as essential to the performance of both the individual, the organisation and the nation (Grugulis & Stoyanova, 2006). It is therefore it would be at least feasible to suggest that increasing the skills base can raise an organisation's performance, however skills are just one way of competing and firms that have an emphasis on low skills-based performance can also achieve high performance levels (Keep, Mayhew & Corney, 2002). Proudfoot (2004: 14) identifies six barriers to organisations achieving optimum productivity:

- Insufficient management and planning 40% of productivity loss;
- Inadequate supervision 32% of productivity loss;
- Ineffective communication 9% of productivity loss;
- Poor working morale 8% of productivity loss;
- Inappropriately qualified workforce 8% of productivity loss; and
- IT related problems 4% of productivity loss.

Proudfoot highlighted the first two of the above items (i.e. poor management) as accounting for 72% of productivity losses. As Proudfoot (2004) and Leitch (2006) report, these problems are not unique to the UK, but are problems of most developed countries. Proudfoot (2004: 17) attributes much of this failure to deficient management organisation systems with the following contributory factors being identified:

- Measurement procedures (non-existent, poor or inappropriate);
- Objectives set too low, too high or against 'peers' rather than absolute;
- Problems ignored or not anticipated;
- Inadequate reporting;
- Key performance indicators not set or performance poorly measured;
- Planning from an existing (and often extremely flawed perspective) instead of from an optimum perspective; and
- Acceptance of a degree of failure as routine and therefore built into future plans.

In terms of poor supervision skills Proudfoot (2004: 19) reports the following observed problems:

- Absence of people skills;
- Too little time spent on hands-on operations and dealing personally with detail;
- Lacking understanding of the role as coach and facilitator;
- Poor communication skills;
- Unclear instructions;
- Accepts slack work ethic;
- Lack of urgency; and
- Inadequate management training.

Many of these problems have their roots in a lack of management training and development, i.e. supervisors have achieved their position through their performance at lower levels, but have not received adequate training and development for their current supervisory role. Mabey and Ramirez (2005) in their study of six European countries produced findings not dissimilar to those of Proudfoot, with management training and development often being undertaken on an ad-hoc basis that is invariably uncoordinated and ineffective (Storey, Edwards & Sisson 1997). An underlying and repetitive theme of many reports is that of skills (Campbell 2006, Leitch 2007, Felstead *et al* 2007), and more precisely the lack of skills in industry. Whilst many of these reports have a strong focus on crafts and trades skills shortages, management skills shortages are also highlighted. Campbell (2006) reports that 77% of construction companies report difficulties in recruiting workers at all levels as shown in Figure 5.32 below.

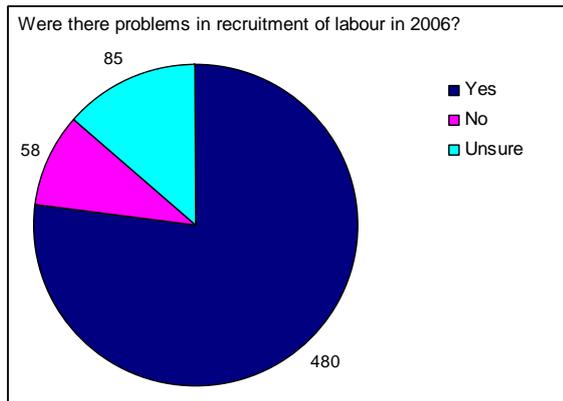


Figure 5.32: Contractors Reporting Recruitment Problems
 Source: Campbell (2006: 9)

In terms of management recruitment 75.6% of companies reported difficulties in recruiting senior management and 75.3% for middle management. This reduces to 57.2% for junior management and 66.8% for supervisory grades (see Figure 5.33 below).

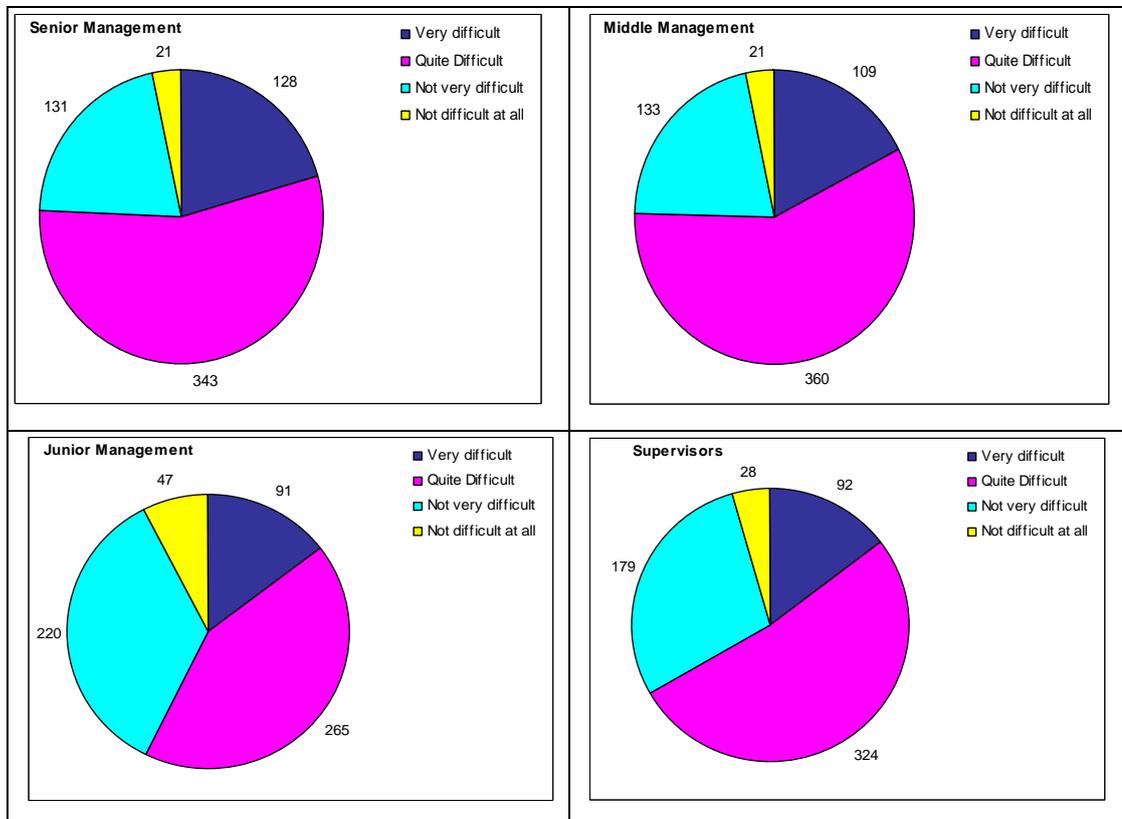


Figure 5.33: Recruitment difficulties for managerial/supervisory staff
 Source: Campbell (2006: 10-11)

However with crafts and trades 87.2% of employers reported difficulties. By contrast 16.2% of employers reported problems in recruiting administrative and clerical staff as shown in Figure 5.34 below.

Leitch (2006) notes that there was:

Too little investment by employers; and

Too little responsibility taken by individuals for their own learning.

This has in part contributed to the manifest problems employers are now having in recruiting staff, both in terms of numbers and quality, exacerbated by the flexibility demanded of the industry in coping strategies for the business cycles it encounters.

In this section it has been shown that the UK lags significantly behind many other less well-developed nations in terms of qualification levels, and within the UK the construction industry fares very badly against other industries with its poorly qualified workforce. Thus, governments have had good reason to be concerned about the performance of the construction industry and to press for an increase in the qualifications and skills levels of the entire workforce in an attempt to raise the industry's productivity levels.

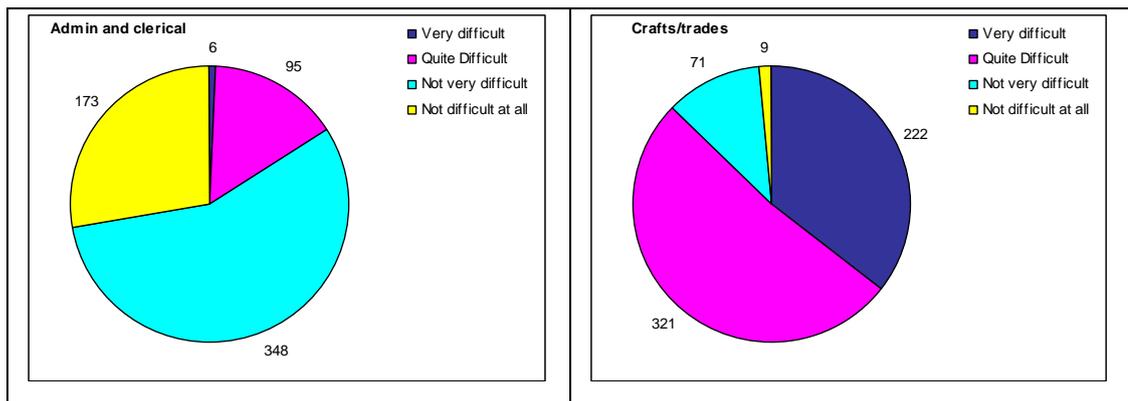


Figure 5.34: Recruitment difficulties for admin/clerical and crafts/trades staff
Source: Campbell F (2006: 12)

The problem of poor productivity is not confined in the UK to the construction industry but is endemic in many other industries. In an attempt to improve productivity the government has established twenty-five Sector Skills Councils

(SSCs) under the auspices and sponsorship of the Sector Skills Development Agency (SSDA). The SSCs currently represents around 85% of the UK workforce in matters of skills (ASSC, 2008). The employers rather than the government drive the SSCs and all SSCs have the same four goals:

- Reduce skills gaps and shortages;
- Improve productivity;
- Increase opportunities for all individuals in the workforce; and
- Improve learning supply.

ConstructionSkills, 2007c

The SSDA granted the licence for the construction industry SSC to ConstructionSkills in 2003. ConstructionSkills is a partnership between the CITB-ConstructionSkills (CITB-CS), the Construction Industry Council (CIC) and the CITB-Northern Ireland. Operating under the chairmanship of Sir Michael Latham. ConstructionSkills' mission for the industry is 'A fully skilled and professional UK construction industry working safely and delivering value' (ConstructionSkills, 2007d). Thus, as Larcombe (2005: 3) notes, the role of ConstructionSkills differs from the CITB in that

[whereas] the CITB had a remit to maintain and improve craft performance, ConstructionSkills is responsible for careers and competence of the crafts and professions across the supply chain. It covers the education, training and qualification for those engaged in the construction process... As such it covers everyone from unskilled labour and craftsmen through technicians and supervisors to managers and senior professionals.

A very wide remit indeed as the construction industry employs more than 2.1 million people or 1 in 14 of the workforce (ConstructionSkills, 2007e). Although ConstructionSkills has an all-embracing remit it recognises that if it is to begin to achieve its long term aims and objectives of having an all-qualified workforce in the construction industry by 2010 it must focus its attention on the areas of greatest needs.

In pursuance of its goal of achieving a minimum level of qualifications for the construction workforce ConstructionSkills published in 2007 its Sector Qualifications Strategy, more commonly referred to as the Construction Qualifications Strategy (CQS). The intention of the CQS is to ‘put together a new framework for future structure of qualifications’ for the construction industry CQS (ConstructionSkills, 2007h: 4). Amongst its aims the CQS (ConstructionSkills, 2007h: 4) includes:

- Identify the sector’s key requirements for qualifications, units and pathways, qualifications development and lifelong learning provision;
- Determine how existing qualifications, units and other lifelong learning provision meets identified sector needs.

Whilst the CQS framework is heavily grounded in skills training and development for construction trades it does nevertheless recognise the construction industry’s three major skills challenges as indentified by the ConstructionSkills SSA:

- Improve business performance, including supporting lifelong learning to raise the workforce’s skill level;
- Qualify the existing workforce, including developing flexible training and qualification structures and assisting the effective integration of migrant workers; and
- Recruiting qualified new entrants, including increasing apprentice completions and degree applications.

(ConstructionSkills, 2007h: 4)

In terms of education this means an immediate focus on achieving a minimum standard of NVQ level 2 in crafts and trades and ultimately NVQ level 3 (ConstructionSkills, 2007g, para. 2.5). In supervisory, management and professional grades ConstructionSkills suggest a minimum of NVQ level 4 as the ultimate goal through increasing recruitment on degree programmes and through expansion of the foundation degree programmes all of which are above NVQ level 4 and form a part of the Construction Qualifications Strategy (ConstructionSkills, 2007f, 2007g). One sector of the industry has had such a scheme in place since the late 1990s. The National House-Building Council (NHBC) in partnership with the CIOB ran site management courses for construction site supervisors at NVQ level 3, site managers

at NVQ level 5 and contracts managers at NVQ level 5 in response to the progressive closure of the CITB-CS courses for site managers (Gruneberg, 2006). Yet at the same time governments have recognised the necessity of the industry to remain flexible to cope with the cycles of demand, and the inherent problems this causes the industry (Phelps Brown, 1968). The nature of the flexibility and the effects this has on education, training and development is considered in following sections of this chapter.

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5.3.6 ConstructionSkills

The problem of poor productivity is not confined in the UK to the construction industry but is endemic in many other industries. In an attempt to improve productivity the government has established twenty-five Sector Skills Councils (SSCs) under the auspices and sponsorship of the Sector Skills Development Agency (SSDA). The SSCs currently represents around 85% of the UK workforce in matters of skills (ASSC, 2008). The employers rather than the government drive the SSCs and all SSCs have the same four goals:

- Reduce skills gaps and shortages;
- Improve productivity;
- Increase opportunities for all individuals in the workforce; and
- Improve learning supply.

ConstructionSkills, 2007c

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management courses for construction site supervisors at NVQ level 3, site managers at NVQ level 5 and contracts managers at NVQ level 5 in response to the progressive closure of the CITB-CS courses for site managers (Gruneberg, 2006). However Gruneberg acknowledges that a lack of qualifications in site managers does not imply that they are unable to do their jobs 'however without formal qualifications it is difficult to see how site managers can be fully aware of the technical, legal, safety and financial aspects of their work. Nor does lack of formal training equip managers in their day-to-day dealings with labour, subcontractors and suppliers. Formal training does not guarantee effective management' (p.143). However, as Gruneberg notes those that are trained are better able to deal with change, and adapt to new methods of working. Indeed Kayes (2002) places considerable emphasis on the value of experience as a basis upon which management learning should be built.

5.3.7 The Flexible Firm

As has already been shown, the cyclical nature of the construction industry both in terms of work-load and employment has led to a short-term approach'. Few firms seem to have long term development and expansion plans rather than plans for survival, with the principal preoccupation being that of maintaining continuity of workload (turnover). One of the widely adopted strategies that firms have for coping with fluctuating workloads is that of subcontracting, bona-fide in the letting out of specialist work packages to other specialist contractors, and non-bona-fide through the use of self-employment of personnel, the latter being a widespread practice within the industry.

Even if market conditions were stable, unaffected by cycles of boom and bust, construction companies would still need to have flexibility to be able to accommodate variations in workload that are an inevitable consequence of the competitive manner by which most construction firms obtain their work. For construction firms flexibility is required in the following areas:

- Workforce – the people needed to undertake the work;
- Finance – the money required to finance construction operations; and
- Structure – the organisational form required to undertake various types of construction projects.

Atkinson (1985) identifies these flexibilities as numerical, financial and functional (shown in Figure 5.35 below) and which are deemed necessary for firms to adopt if they are to be able to survive the variability and unpredictability of their respective market sectors.

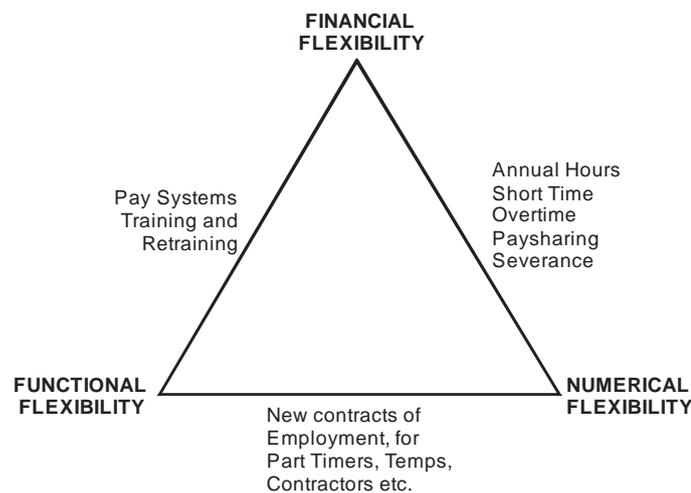


Figure 5.35: Corporate Flexibilities
Source: Adapted from Atkinson (1985: 13)

Atkinson's studies found that different market segments have different strategies for implementing this flexibility, but one factor was found to be common across all sectors, that of a 'division' of the firm into 'core' and 'peripheral' workers, in what he terms the 'flexible firm'. The emergence of the flexible firm is in response to a number of pressures in the business environment. Atkinson (1985) and Atkinson & Meager (1986a, 1986b) identify these pressures as:

- Economic uncertainty;
- The need to reduce labour costs;
- Labour market pressures;
- Reductions in working time; and
- Technological change in the industry.

These pressures act upon the management aims in the construction companies, particularly in cutting the costs of employment (as shown in Figure 5.36 below) through the extensive use of self-employment and agency working. These in turn put pressures on the permissive and constraining factors in the external and internal labour markets through the changes in working patterns, producing surges in self-employment, either directly or via employment agencies, or direct employment with the agencies (Hakim, 1988, 1990) resulting in the various outcomes with contractual relationships, pay-systems and spatial patterns of working being the most affected.

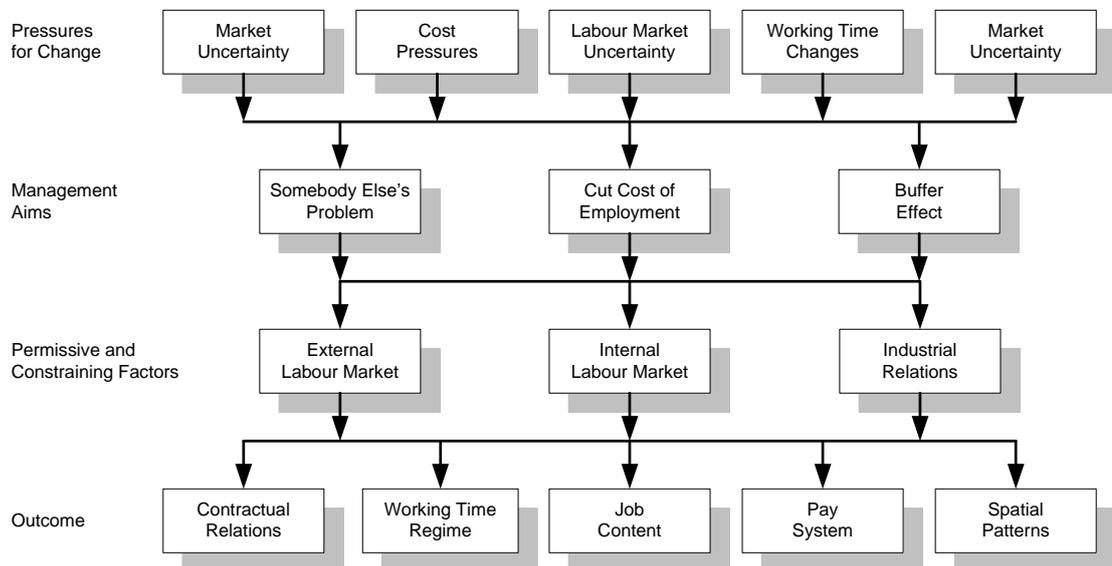


Figure 5.36: Determinants of Change in Work Organisation
Source: Adapted from Atkinson & Meager (1986a: 22)

In effect almost all construction companies have become 'flexible firms' with a retained core of permanent workers and a periphery of casual, self-employed and subcontract labour (Atkinson, 1985; Atkinson and Meager, 1986a, 1986b) as shown in Figure 5.37 below. Leopold (2002:33) provides a more useful adaptation of the Atkinson flexible firm model that is perhaps more appropriate to the construction industry arrangement, reflecting more up-to-date working practices and terminology, as shown in Figure 5.38 overleaf.

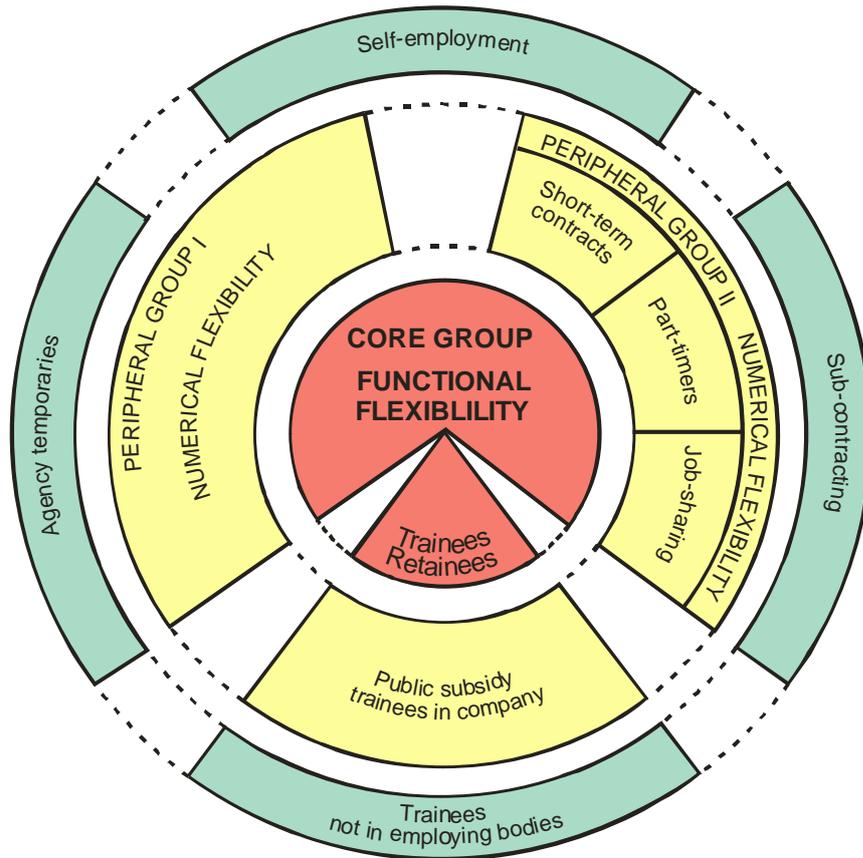


Figure 5.37: The Flexible Firm
 Source: Adapted from Atkinson (1985: 16); Atkinson and Meager (1986a: 5; 1986b: 4)

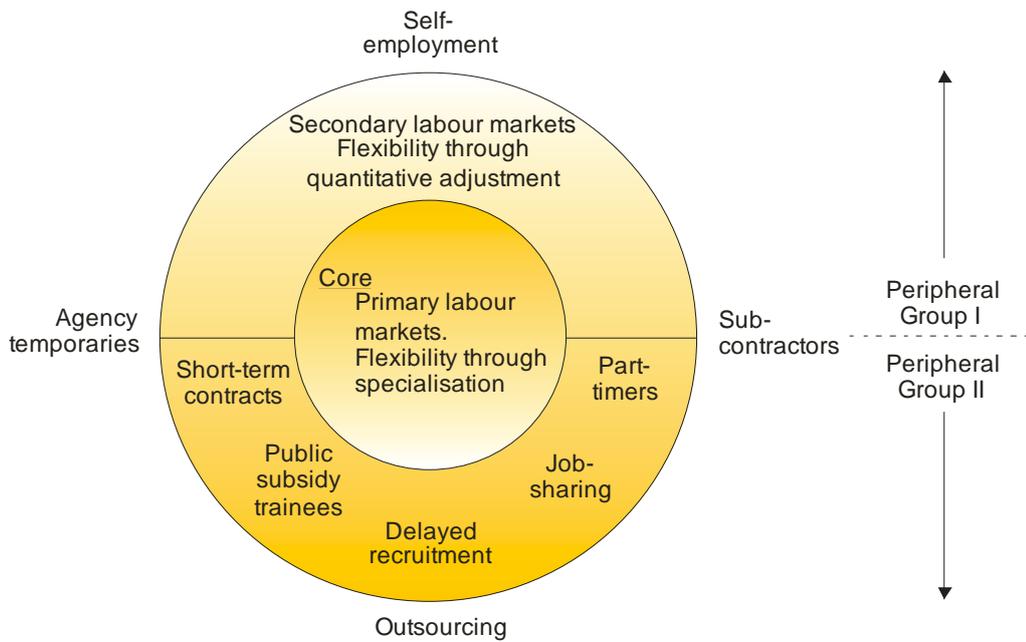


Figure 5.38: The Flexible Firm – Alternative Model
 Source: Adapted from Leopold (2002: 33)

This flexibility was often deemed essential to a firm's survival as it enabled them to both cut costs and to have a flexible labour force to meet workload demands (Dainty, Ison and Briscoe 2005). Thus the majority of the workforce has become a disposable asset in true Taylorist fashion (Harvey, 2003).

This duality of employment, with a permanent core workforce of directly employed staff, and a casually employed peripheral workforce of self-employed staff has become the *modus operandi* of most construction companies in recent decades (Nisbet, 1997). In the construction industry this form of organisation has been adopted and adapted, to emerge as what has become known as the 'pure project' form of organisation, as shown in Figure 5.39 below.

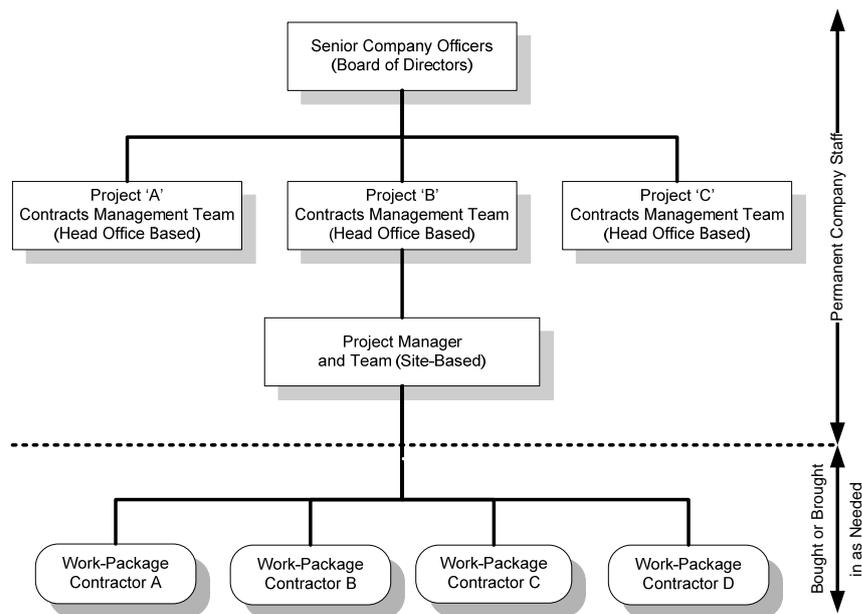


Figure 5.39: The 'Pure Project' organisation
Source: Unknown (adapted)

Here the permanent staff form the core, providing the management of the company and its construction operations, whilst the physical production work is carried out by various sub-contractors, in the form of other construction companies, self-employed workers and agency workers. Thus in these new types of organisational arrangements the role of the construction manager is changing. With almost all the

production work subcontracted out to other work-package contractors, a greater emphasis on project management skills is required, particularly in the areas of ‘soft skills’ that have been traditionally neglected in construction and engineering education as the focus is grounded in technical skills (Rethinking Construction, 2002).

5.3.8 Effects of Flexibility on Managerial Learning and Development

If flexibility enables an organisation to respond to a variable economic environment through expansion and contraction of its workforce, what becomes of the workforce subjected to flexible employment? The concept of the flexible firm seems to suggest little commitment to the workforce beyond the core workers, with the peripheral workforce being subjected to a ‘hire and fire’ culture. This then, must surely change the nature of the relationship between the employer and peripheral worker. In the core, the relationship is that of ‘normal’ employer-employee, but in the periphery that relationship, especially in the case of agency workers, becomes a tripartite relationship between the firm (the employer), the employing agency and the agency worker (peripheral employee). McKeown (2003) identifies these agency workers as having a ‘dual commitment’ to both the agency and to the host employer (firm), where commitment to the agency will be dependent upon the time registered with the agency and the number, length of assignment and continuity of work.

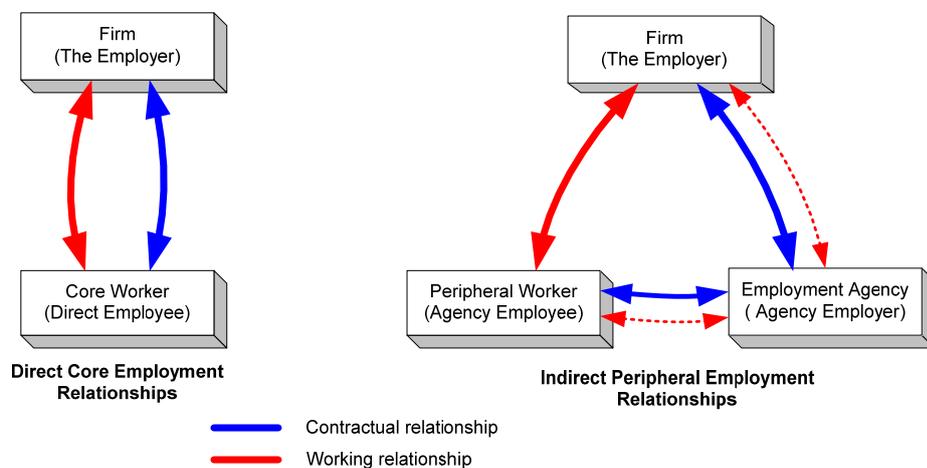


Figure 5.40: Core Employment v Peripheral Employment

Winch (1994: 594) argues that flexibility has three dimensions to it:

- Macro-economic – from the perspective of economic regulation;
- Industrial policy – from the perspective of forms of cooperation between organisations; and
- Organisational – from the perspective of appropriate organisational forms in an emerging economic climate.

The flexibility within organisations is in direct response to the pressures put upon it from its competitive environment.

The driver for flexibility in the construction industry has been economics, but in the case of those in the periphery that includes not only trades and crafts people but also growing numbers of professionals (Smeaton, 2003). A component of the economic drivers towards flexibility is the cost reduction brought to the employers, who beyond any statutory requirements, do not have the costs of training and developing their workforces as this becomes the personal responsibility of the self-employed and agency workers for their own education, training and development (Gallagher & Parks, 2001). However, Forde & Mackenzie (2005) argue that this is not the case. Drawing on the *Spring 2003 UK Labour force Survey* they highlight that, in terms of workers receiving job-related training in the thirteen weeks prior to the survey, 24.2% of direct employees had received job-related training. This compares to just 8% of self-employed workers and 16.2% of agency workers. In all cases this is below the national average for all industries as shown in Table 5.13 below.

Table 5.13: Workers Receiving Job-related Training:

Source: Adapted from Ford & MacKenzie (2005, Table 3) Job-related training by contract type, Great Britain 2003.

| Type of worker | Construction Industry | | | All Industries | | |
|---|-----------------------|---------------|----------------|-------------------|---------------|----------------|
| | Directly employed | Self-employed | Agency workers | Directly employed | Self-employed | Agency workers |
| Proportion of workers receiving job-related training in the last 13 weeks | 24.2% | 8.0% | 16.2% | 29.7% | 14.1% | 19.0% |

In the case of agency workers, there is more incentive to undertake training and development in order for them to remain registered with an agency together with the different pay structures; agency workers more usually being paid on hourly or daily rates rather than on priced-work that self-employed workers usually receive. There is also evidence of contractors using agencies in preference to self-employment as this passes almost all the administration to the agency, i.e. a single payment is made to the agency for (typically) the numbers of hours worked by each worker, rather than having to make individual payments to each self-employed worker enabling a tax loop-hole to be exploited (Richardson, 2006). Thus agency workers become pseudo-employees of the construction companies and are more likely to be offered and accept training and development opportunities beyond the statutory requirements, than self-employed workers. However, this is not without risk as recent reports suggest that some employment agencies now control such a large percentage of the labour markets in some specialised areas that they can effectively control the entire supply of labour to contractors, and are thus able to dictate the terms and conditions of employment to the contractors (Richardson, 2006). Where these have not been met, labour has been withdrawn from the companies, bringing construction projects to a standstill.

As shown above both self-employed and agency workers receive far less training than employees, and this is likely to be limited to statutory health and safety training. Employment agencies are not likely to provide other training and development opportunities as that is not usually their role or function. Thus for construction managers (and other construction professionals) that are employed through agencies undertaking education, training and development activities in the form of CPD becomes essential as it is almost the only way of maintaining their knowledge and skills base due to a potential lack of opportunity elsewhere. For agency and self-employed workers who operate in the peripheries of companies rather than the core, maintaining CPD will inevitably be more difficult. The flexibility of the employment can result in inconsistency and lack of continuity of employment and opportunity to undertake CPD activities. Thus, the burden placed on self-employed and agency workers to maintain their standards of competence would appear to be

more onerous than that placed upon directly-employed workers. In the next section the development and implementation of CPD in the construction industry is considered further with particular emphasis on construction managers.

5.3.9 Continuing Personal/Profession Development (CPD)

Earlier in this chapter self-managed learning and self-managed development were identified as important drivers in management development. In many literatures the terms ‘self-managed’ and ‘self-directed’ are used synonymously, and ‘self-managed’ will be used. In some literatures the terms ‘self-managed learning’ and ‘self-directed learning’, and ‘self-managed development’ and ‘self-directed development’ are also used synonymously. ‘Self-managed learning’ is a term that was devised by Cunningham and his colleagues (Cunningham, 1994) and is differentiated from self-managed development as having a narrower compass as “‘self-development’ has tended to become a catch-all term to include almost anything that is not traditional learning’ (Cunningham, 1994: 122). Both self-managed learning and self-managed development are key to the successful implementation of successful continuing professional development (CPD), which, although it encompasses traditional learning, mainly functions through self-managed activity. Indeed self-managed learning and CPD now have a central role in recent initiatives (Government led policy) for learners to take control of, and responsibility for their own flexible circumstances (Harrison R., 2000)

Poell (2005: 87-88) identifies three types of learning activities that play a crucial role in management development and which he describes as:

1. Implicit learning. ... ‘learning by doing’ or ‘everyday learning’, i.e. that learned by employees doing their job, with them not necessarily aware that they are learning;
2. Self-directed learning. ... learning activity [that] does require an awareness and an intention to learn as well as some form of pedagogical structuring on the part of learners; and
3. Guided learning. ... structured by an outside agent for the learning employee, i.e. education and/or training programmes.

Mintzberg (2004: 245) considers the question of when is the best time for management education? This, Mintzberg argues, presents organisations with a dilemma as shown in Figure 5.41 below. New managers have a greater propensity to learn. Often they are more ambitious, having careers in front of them and have more energy and enthusiasm, but lack, in Mintzberg's opinion, sufficient experience on which education can be built, thus education tends to be based around theoretical concepts and application. New managers also have the greatest potential for influence by an organisation and adaptation to new ideas.

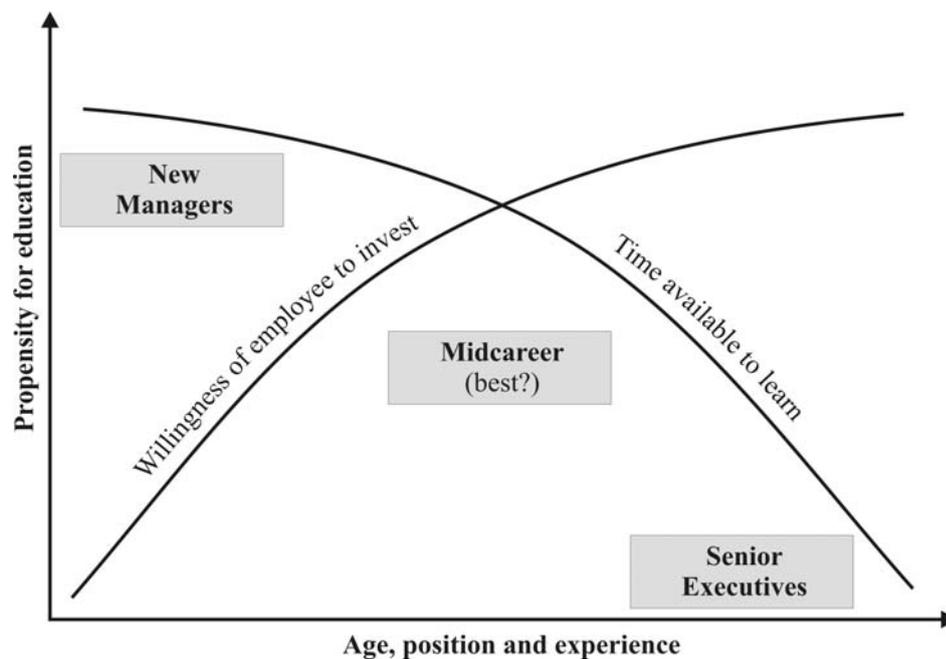


Figure 5.41: When is best for Management Education?

Source: Mintzberg (2004: 245, Fig. 9.1)

Midcareer managers on the other hand have experience upon which education can be based and still have sufficient potential for career advancement ahead of them to be motivated to learn. However, they often have a greater level of commitment and responsibility in the organisation, reducing the level of opportunity and availability for learning. Nevertheless, Mintzberg argues that this midcareer development is the best or optimum time for learning. In the case of senior executives having a high level of responsibility and commitment to the organisation, and having reached the senior position much later in their careers, have the least propensity for education as they have the least time available for learning. However, even senior executives still

have some capacity for learning even though, as Mintzberg comments (p.245), they may have too much experience for education to be fully effective.

The idea of continuing education, training and development is by no means new and is embedded in the concepts of CPD. CPD has been given two definitions, the most common and widespread in use is that of Continuous Professional Development, whilst a lesser used definition is that of Continuous Personal/Professional Development (Egan, 2002).

Professional development can be considered as undertaking development activities that will benefit the individual solely in the workplace, such as undertaking a course on construction contract law. At the other end of the continuum, personal development is the undertaking of activities that benefit the individual in a purely social environment such as undertaking a course on wine-tasting. Some activities can fall into both categories where the individual might benefit both in the workplace and social environments. An example of this might be undertaking a course to learn a foreign language which would benefit the individual both in dealing with overseas clients, and socially enjoying a holiday in that country. Thus, there is a continuum between the extremes of pure professional development, and pure personal development, as shown in Figure 5.42 below.

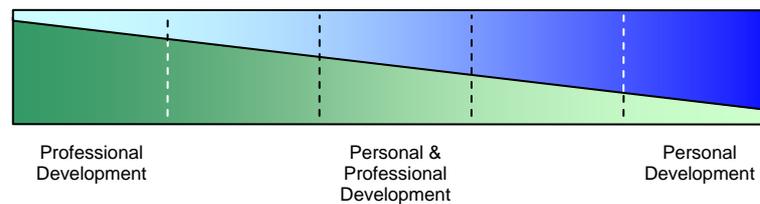


Figure 5.42: The CPD/CPPD Continuum

CPD is becoming embodied in the ethos of many professional bodies as a means of trying to ensure that their members' knowledge and skills are up to date.

EUSCCCIP (1998: 10) describes CPD as a system that:

Allows individuals to:

- review and explore their professional and personal careers/competencies;
- discover and set down their individual strengths and weaknesses;
- make use of a development plan; and
- record their intentions and provide verification that they have conformed to their plans and achieved their targets.

For many years a few professional bodies have recognised the value of CPD, whilst others are only now starting to recognise its value, and it is now becoming a widely incorporated requirement for continued membership of many professional bodies. However, in many instances its incorporation is rather in the word than in the deed.

EUSCCCIP (1998: 10) provides the following definition of CPD in the UK construction industry as:

The systematic maintenance, improvement and broadening of knowledge and skill and the development of personal qualities necessary for the execution of professional and technical duties throughout the practitioner's working life.

They qualify this definition by suggesting that

... for a practitioner to work properly, the systematic acquisition of knowledge, skills and personal qualities is essential ... [and] once acquired, the same knowledge, skills and personal qualities must be methodically kept up-to-date to maintain them at an adequate level. They must then be developed and broadened.

Both the above definition and qualification are adopted by the CIC in their CPD Best Practice Guide (CIC, 2006). The definition has also been adopted by many of the professional institutions including the ABE, IHIE, IHT, IMBM, RICS and RTPI, and is quoted in their websites and/or CPD literature.

EUSCCCIP (1998, 2) and subsequently the CIC (2004, 4) advocate that CPD should not be specified in terms of inputs, i.e. time - undertaking a certain numbers of CPD hours per year, but should be specified in terms of outputs, i.e. achieving 'standards of competence in employment'. Research undertaken for the Management Standards Centre by Boutall and Freeman (2007a, b, c) also makes the same recommendation

but in addition advocates that CPD should be linked to academic qualifications standards, i.e. NVQ levels, and, where possible, to National Occupation Standards (Boutall and Freeman, 2007c).

The CPD model developed by EUSCCCIP (Figure 5.43 below) has also been adopted by the CIC (Figure 5.44 overleaf). However this CPD model is an extension of the traditional personal development plan (PDP) model (as shown in Figure 5.45 overleaf) described by many authors (e.g. Stewart, 1999; Megginson and Whittaker, 2003; Mumford and Gold, 2004).

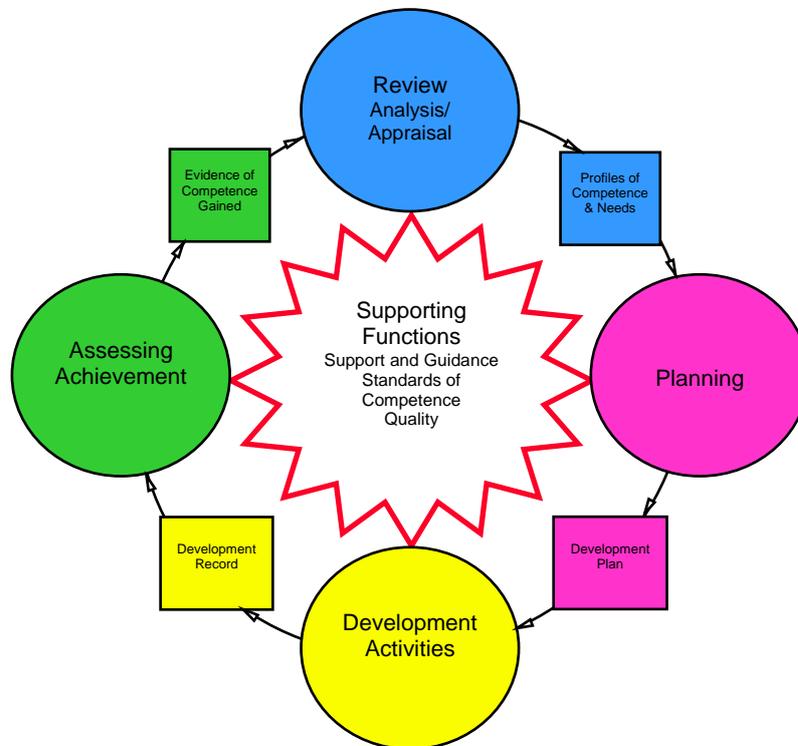


Figure 5.43: The EUSCCCIP CPD Model
Source: EUSCCCIP (1998)

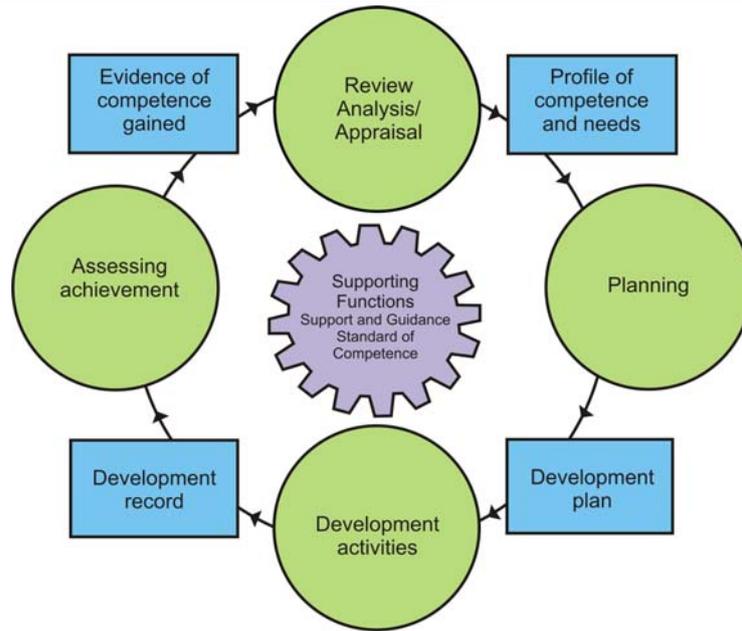


Figure 5.44: The CIC CPD Model
Source: CIC (2006: 14)

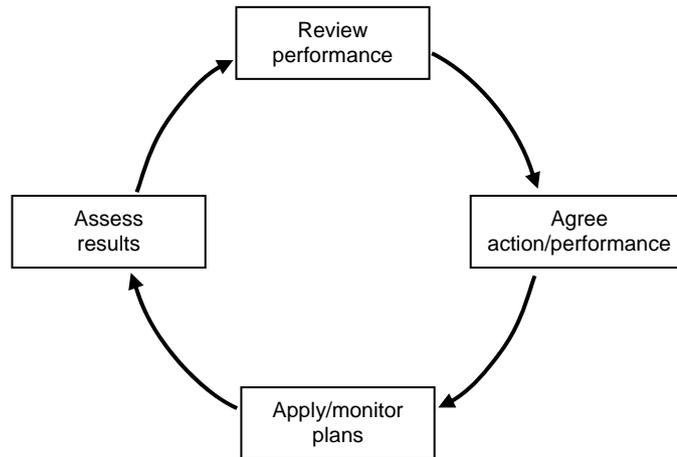


Figure 5.45: Traditional personal development plan model
Source: Stewart (1999: 137, Fig. 7.3)

Mumford and Gold (2004) make an important distinction in their model as they do not show or consider personal development as an endless cycle, but as an ever heightening spiral in which individuals, as they gain knowledge and skills achieve increasing heights of performance rather than maintaining the status quo (see Figure 5.46 overleaf).

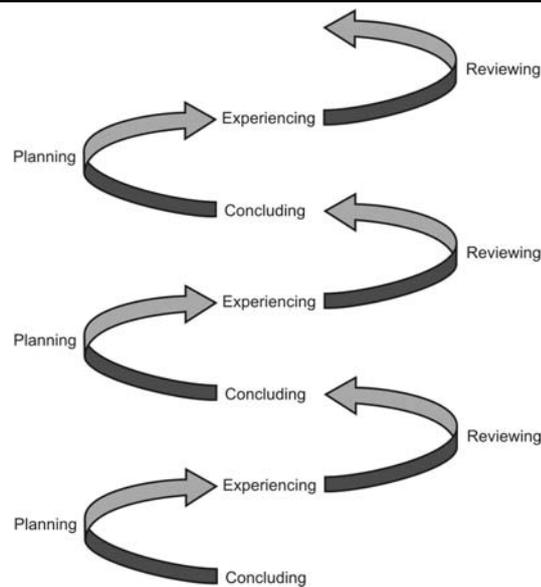


Figure 5.46: The Learning Spiral

Source: Based on Mumford and Gold (2004) 142: Figure 27

No matter which model is used there is one important distinction between the CPD model and PDP model; that of the central core of the supporting functions in the support and guidance, and in the standards of competence required. Interestingly the CIC have not explicitly incorporated the ‘quality’ aspect of the support function in their adoption of the model.

Even though the CIC’s CPD model was not introduced until late 2006, the concepts and importance of educating, training and developing staff are not new to industry, and certainly not manufacturing industries. The engineering profession of the engineering industry, which in many ways is allied to and parallels the construction industry, with some segments being considered a part of the construction industry, underwent a two year Government Committee of Enquiry chaired by Sir Montague Finniston from late 1977 to late 1979. The Committee of Enquiry had the following terms of reference:

To review for manufacturing industry, and in the light of national economic needs –

- (i) The requirements of British industry for professional and technician engineers, the extent to which these needs are being met, and the uses made of engineers by industry;
- (ii) The role of the engineering institutions in relation to the education and qualifications of engineers at professional and technician level;

- (iii) The advantages and disadvantages of statutory registration and licensing of engineers in the UK; and
- (iv) The arrangements in other major industrial countries, particularly in the EEC, for handling these problems, having regard to relevant comparative studies; and to make recommendations.

Finniston (1980: 1)

The Committee of Enquiry published its report in early 1980 entitling it 'Engineering our Future', a deliberate pun according to Finniston (1984), which was more commonly known as 'The Finniston Report'. This made a staggering eighty recommendations for the future of the engineering industry:

- 1 - 16 (16) for engineering in the UK economy;
- 17 - 23 (7) for the supply of engineers;
- 24 - 32 (9) for the employment of engineers;
- 33 - 36 (4) for changes to be made in schools;
- 37 - 52 (16) for the formation¹ of engineers;
- 53 - 59 (7) for the continuing formation of engineers;
- 60 - 67 (8) for the registration and licensing of engineers;
- 78 - 74 (7) for the role of the institutions;
- 75 - 76 (2) for engineers and trade unions; and
- 77 - 80 (4) for the [creation of the] Engineering Authority.

Like the construction industry the Committee recognised the importance and value of engineering to the UK economy and made many recommendations for the increase in provision and access to engineering education. It also recognised the importance of engineers maintaining their knowledge and skills:

The Government should introduce a statutory right of paid study leave for all registered engineers. (Para. 54).

All registered engineers should be required to commit themselves to maintaining their expertise as a condition of remaining on the register, and demonstrable failure to uphold this commitment should be grounds for deregistration. (Para. 55).

Finniston (1980: 168)

¹ Formation here means education, training and development

However when the Finniston report was presented to the House of Lords Select Committee on Science and Technology in 1982 they expressed considerable disappointment with the report for its lack of emphasis on continuing education:

The SRC welcomes the section in the report on “continuing formation” (4.103-4.117) but regrets that more attention was not given to this aspect in the Committee’s work.

Kingman, Oakley and Eggington (1982: 103, para. 5.1)

They continued, recognising some of the problems involved:

We have found that the central difficulty in continuing education arises because there is little social pressure either from individuals or employers to seek systematic continuing education in technological subjects.

Kingman, Oakley and Eggington (1982: 103, para. 5.2)

Four years after his original report was published Finniston commented:

Much of Britain’s industrial and social progress, even its survival, depends upon the rapidity with professional men and women to seek new solutions to develop new skills and prepare groundwork for others. It is in this area of continuing education and training that professional institutions can, through their organization and membership (who are practicing practitioners), make their greatest contribution to engineering and engineers (whether members or not), and not just through the exercise of existing facilities but through their extension through newer communication devices...

Finniston (1984: 67)

Finniston also noted that in 1984 only three professions had any form of formal requirement for CPD, these were accountants, [town] planners and surveyors, as by this time the medical profession had also dropped its formal requirement for CPD.

Whilst Finniston was concerned with the engineering industry a considerable segment of that industry might also be considered a constituent part of the construction industry. Some twenty years after Finniston’s Committee of Enquiry was sitting, Sir John Egan (1998) was finding similar problems within the construction industry that had been found in the engineering industry of the 1970s, yet noted the improvements made in engineering over the last decade or so with regard to performance, competitiveness and profitability.

Egan puts forward a number of drivers for change for the construction industry, the fifth of which is:

‘... a commitment to people: this means not only decent site conditions, fair wages and care for health and safety of the workforce. It means a commitment to training and development of committed and highly capable managers and supervisors...’

(Egan, 1998: 14, para. 17).

Expanding upon these drivers for change Egan explains:

- at the **top management** level , there is a shortage of people with the commitment to being best in class and with the right balance of technical and leadership skills to manage their businesses accordingly. The Industry needs to create the necessary career structure to develop more leaders of excellence;
- the key grade on site is the **supervisor**. The UK has one of the highest levels of supervision on site internationally but one of the poorest records of training for supervisors...;
- upgrading, retraining and **continuous learning** are not part of construction’s current vocabulary...

Egan (1998: 26, para. 55) {original emphasis}

In the follow-up study ‘Accelerating Change’ by the Strategic Forum for Construction, again chaired by Sir John Egan in 2002, the Forum made twenty-one recommendations to industry, amongst which are:

- All industry sectors identify how to demonstrate that they have a qualified workforce; and
- The professional bodies jointly with the CITB and other training bodies conclude as a matter of urgency issues of professional development for graduates into managerial roles.

(Egan, 2002: 9)

In the Forum’s vision statement for the future of the UK construction industry it foresees an industry in which, amongst many things, the industry has a respect for people including ‘an emphasis on education, training and development’ (Egan, 2002: 10). The forum notes that ‘getting the right people with the right skills is a priority for the industry, but so too is the updating and enhancing the skills, and where applicable, management abilities of its existing staff (Egan, 2002: 31, para 6.17).

Although not explicitly stated the Forum clearly has a vision of ‘an all qualified workforce’ (Egan, 2002: 32), i.e. a construction industry in which everyone is qualified, but it is very keen to stress that ‘... ‘all qualified’, goes far beyond simple health and safety knowledge’, stressing that ‘continuing personal and professional development is also relevant to all workers in the industry including designers and managers’ if they were all to keep up with the Forum’s proposals.

Following the Egan report the Movement for Innovation (M⁴I) was established to tackle some of the issues raised by Egan. Within the M⁴I a working group, Respect for People, was created to tackle concerns about the way people in the construction industry were treated. The Respect for People Working Group published its report ‘A Commitment to People “Our Biggest Asset” ’ in November 2000 (Rethinking Construction, 2000). The Working Group identified six themes or ‘action areas’, each of which needed ‘prompt attention’, one of these action areas being that of ‘Career development and Lifelong Learning’ (Rethinking Construction, 2000: 15). The Working Group who emphasise the importance of lifelong learning, not only for the employee being better able to contribute to the competitiveness of the firm they are working for, but also to enhance their own employability (Rethinking Construction, 2000: 32).

The Working Group also recognised that an important factor in the decline of applicants to construction industry degree programmes is that young people perceive a lack of career prospects in the industry, brought about by a lack of training and development opportunities. They also recognise a number of factors inherent within the industry that have to be overcome to achieve a goal of lifelong learning in the industry:

- Work patterns vary considerably and the workforce tends to reconfigure on a project-by-project basis;
- There are many small enterprises and sole traders;
- The short-termism of many employers, whose horizon tends to be the next project, is at odds with the long-term vision needed to drive lifelong strategies;
- The boom and bust cycle, which has tended to characterise the sector, causes instability in the workforce; and
- There is no tradition of career planning in the industry.

(Rethinking Construction, 2000: 32)

They further identify three conditions that have to be met for lifelong learning:

- Employers and individuals need to see the value of engaging in the process: there must be a perceived gain in making the investment in learning;
- Both parties need information in order to make choices about learning and careers even if, as a result, they choose to reject it as a result; and
- Learning must be more accessible in terms of time, cost and place. The easier and less disruptive the learning, the more likely it is to be taken up. This includes both formal and informal learning.

(Rethinking Construction, 2000: 32)

A number of factors are identified which are likely to encourage lifelong learning and development, these the Working Group describe as ‘pull’ and ‘push’ factors.

The ‘pull’ factors are identified as:

- Client demand;
- Investors in People;
- Work-based learning; and
- Demonstrating exemplary practice.

And the ‘push’ factors as:

- Client demand; and
- Statutory requirements.

(Rethinking Construction, 2000: 32-33)

In terms of the statutory requirements the Working Group acknowledge that there is little scope here for legislating for lifelong learning, beyond that of health and safety issues.

The most important issue raised here (in terms of this study) is that of the 'work-based learning' pull factor. Here Rethinking Construction (2000: 33) recognise that:

- The proximity of learning and work is very important since it not only demonstrates business relevance, but it requires the active involvement of employees;
- It should be recognised that there is a shared commitment from both employer and the workforce to promote continuous learning;
- Employers need to make time available for learning and training; and
- Individuals should actively seek to update their skills.

The working Group note that, for any organisation seeking to commit themselves to a programme of lifelong learning and career development, then a key component to this is CPD.

Following the M⁴'s Working Group's report the Working Group published, in October 2002 its follow-up report 'Respect for People: A Framework for Action' (Rethinking Construction, 2002). Here M⁴I expressed concern that 'little use is made of Continuing Professional Development (CPD) to enhance 'soft skills' [of management]' (Rethinking Construction 2002:32), noting that education training strategies, common in other industrial sectors, were 'still the exception rather than the rule' as such education, training and development that did exist tended to 'focus largely on technical issues'. Their report makes twenty-four recommendations that include:

- 21: A People Performance indicator that uses CSCS as its basis for the indicator of qualification/certification should be developed within the next two years;
- 22: The business case for training should be further developed;
- 23: Firms should equip the next generation of managers with skills to implement effective monitoring and develop programmes using people issues; and
- 24: Those responsible for craft training should also promote better health, safety and team working.

(Rethinking Construction 2002:32)

5.3.10 Work-Life Balance and Conflict

One of the potential problems identified by Rethinking Construction (2002) in implementing managerial development supported by continuing professional development is the conflict of work-life balance.

The construction industry already has a reputation for working long hours which are generally inflexible, and employees, especially those based on site, have enormous responsibility for ensuring the success of the project in terms of time, cost, quality and safety (Lingard and Francis, 2006). Frequently these pressures lead to work-family conflicts as work demands often encroach and impinge on family life, which invariably leads to negative outcomes for employee, family and employer (Wazir, 2008). These negative outcomes frequently manifest themselves in the form of job dissatisfaction, life dissatisfaction, problems with general well-being, psychological strain and psychiatric disorders, as well as substance abuse and drink-related problems (Lingard and Francis, 2006, 2009; Wazir, 2008). None of these effects can be considered as being conducive to the employee's acceptance of, or willingness to undertake CPD, especially when much CPD is expected to be undertaken outside the work environment and, frequently, in the employee's own time.

Many construction employees find that, due to the project-based nature of construction where there is an inherent concern about continuity of work as a consequence of the competitive way in which work is obtained, they suffer from a lack of job security and/or frequent relocation (Lingard and Francis, 2004). Lingard and Francis' studies were undertaken in Australia where the vast distances involved sometimes mean that in order to maintain continuity of work employees and their families may have to relocate as commuting is not a practical option. In contrast, the relatively small distances involved in the UK mean that relocation is less common, but commuting is commonplace, especially amongst site-based personnel. Commuting, where journeys of two hours or more each way are not uncommon, can create considerable stress levels, and leave little time, for either family or personal development activities.

Continuity of employment, especially amongst trades and crafts levels tends to be maintained on a local or regional basis by moving between employers, rather than remaining with a single employer. Professional level site staff will tend to stay with an employer for a longer period of time, and are generally prepared to commute more. Many professional/managerial level staff may commute daily to, from and between a number of construction projects, attending meetings, etc. Gustafson (2006) notes that even in 'old economy' sector industries such as construction where work-related travel and mobility of labour was the norm, especially amongst lower-skilled workers, professional workers were often prepared to travel far greater distances. However, this type of travel is not without its own problem – travel related stress – and can cause particular problems with work-family conflicts, especially for those with young families, and to some extent older workers with care responsibilities for elderly relatives. Situations such as these are not conducive to a willingness to then undertake CPD activities, or indeed any other form of education, training and development.

In terms of those working long hours Walsh (2005) reports that of workers working in excess of 48 hours per week managers and construction workers have the highest percentages of workers exceeding this time. The top four occupations and industries from a list of twenty-one are shown in Table 5.14 below. It could be assumed from this table that construction managers work the longest hours of all, but there is a danger of making a false assumption in this instance.

Table 5.14: Employees working over 48 hours per week
Source: extracted from Walsh (2005: 151, Table 6.1)

| Occupation | Male employees % | Female employees % | All employees % |
|--------------------------------------|-----------------------------|-------------------------------|----------------------------|
| Managers | 37 | 21 | 32 |
| Construction workers | 32 | 3 | 28 |
| Transport and communications workers | 29 | 5 | 24 |
| Professional | 24 | 17 | 21 |
| Average (of 21) | 22 | 5 | 13 |

Walsh notes that in the case of managers and professionals rarely are they reimbursed for this additional time and cite 'job commitment' for working such long

hours. In the case of construction workers and transport and communications workers it is noted that these are usually reimbursed either by hourly payment or production output (piecework or priced work).

Gustafson (2006) also draws attention to the problems of mental and physical health, and decreased performance caused by long hours. One of the consequences of the long-hours culture is that many young couples defer starting a family until they are older and more financially stable. This in turn leads to problems with a falling birth-rate and consequent drop in the supply of workers into the economy (Lingard and Francis, 2005a).

Smithers and Walker's (2000) study of factors that demotivate construction workers found that three out of the top four demotivators of construction workers were:

- (1) Long hours (> 50 hours/week);
- (3) Travel to and from work; and
- (4) Travel between work locations.

Smithers and Walker (2000)

With (2) being the stress caused by the nature of construction work itself. Smithers and Walker (2000) noted that long hours were far more of a demotivator for young workers than for older workers. Sturgess and Guest (2002) also report similar findings in their study, but note that other variables can also have an important influence on the degree of conflict and demotivation experienced, and that this can be significantly reduced by high levels of employer support, however in the case of non-core workers this support is largely absent. Sturgess and Guest's study focussed particularly on younger workers who were still establishing their careers and often worked the longest hours in an attempt to 'show' commitment to the organisation and climb the career ladder. Interestingly, Wazir's (2008) study also found that a contributing factor to the long-hours culture was a lack of management training. Yet it is at this stage in the younger manager's career that education, training and development can be crucial in developing new knowledge and skills necessary for any new role (Scott, Ponniah and Saud, 1997).

Felstead *et al*'s (2002) study reported similar findings regarding commitment and desire to impress and succeed. They also considered the aspect of organisational trust in work-life balance in the ability of workers to be able to work at home. Working at home would give workers the freedom and flexibility to arrange their work to suit family requirements that could also include education and development activities. Felstead *et al*, also note that working from home is best suited to non-team-working, however, construction is largely team-based working. Not surprisingly their study found the construction industry had the second lowest level of home working. Just 2.2% of workers in the study claimed that they had the opportunity to work from home, compared to 10.1% of workers in other manufacturing industries. In contrast only 4.5% of construction workers claimed that they had no opportunity to work from home compared to 13.5% in other manufacturing industries. Thus, it would seem that because of the long working-hours and visible commitment culture of the construction industry many workers choose not to work at home for fear of not being seen to be committed to the organisation, thus losing a potential opportunity for undertaking CPD activities.

However, it is also reported by Walsh (2006) the long-hours culture is the major cause of conflict between work-life and home-life. In addition to the long-hours culture, Loosemore, Dainty and Lingard (2003) state that an additional problem of erratic work schedules that the nature of construction works create often exacerbates this problem. Such conflict is commonly associated with 'psychological distress, including increased depression and other stress-related health problems' (Walsh, 2006: 155). These have damaging effects on both the employee's organisation in which they work and their families and home-life. This can lead directly to increased job-dissatisfaction and declining work commitment, increased absenteeism and labour turnover, and heightened risk of substance abuse, although it is generally recognised that many other work and/or family related issues besides long hours can also contribute to these problems. Such conflicts are hardly likely to be conducive to any worker undertaking, or wishing to undertake, any form of management education, training and/or development.

A study by Rose (2003) of job satisfaction in occupations placed construction work 18th out of 88 occupations; with a mean of 50% construction scored 58% with the highest scoring 75% (miscellaneous child care and related work) and the lowest scoring 23% (bus and coach drivers). However, Rose's study did not include issues relating to travelling to and between work as a factor in the job satisfaction survey. Other studies (e.g Lingard and Francis, 2005b) suggest that if this were to have been taken into account then construction would have scored considerably lower in the job satisfaction table. It thus becomes clear from the limited number of studies carried out that undertaking CPD activities in the construction industry is put in considerable jeopardy by the long-hours culture, and other work-life conflicts. Indeed the author has frequently encountered the effects of these conflicts through involvement in both professional courses for construction managers and part-time undergraduate construction management courses that suffer considerable rates of attrition, particularly amongst younger construction managers. This is manifested in absenteeism through over-riding work obligations, and/or missed assignment submissions through lack of time due to work and/or family demands. Wilton *et al* (2007) also found that younger managers were less willing to commit time to education and obtaining qualifications due to the commitment detracting from family life.

With the numbers of young people entering the industry in decline, and the inherent work-life conflicts younger workers face, the industry is increasingly looking to older workers to make up the deficiencies in numbers and skills, but not as core workers (Smith, 2008). The next section will therefore consider the case for the older worker, with particular reference to education, training and development.

5.3.10 The Case for the Older Worker

With the decline of young people entering the industry due to a falling birth-rate and people living longer leading to an increase in the average age of the workforce (Hakim, 1990; Taylor, 2002; McNair and Flynn, 2006). This, together with the introduction of new legislation 'The Employment Equality (Age) Regulations 2006'

(SI 2006 No. 1031) and ‘The Employment Equality (Age) (Amendments) Regulations 2006’ (SI 2006 No. 2408) based of the EC Directive 2000/78/EC outlawing age discrimination, including compulsory retirement below the age of 65, means that employers are likely to have to accommodate an increasingly ageing workforce. Employees, however, are not obliged to work beyond the normal retirement age, which has now become by default 65 years of age although they now have the right to request to work beyond the default retirement age of 65 if they so wish (SI 2006 No. 1031; Potbury, 2005). Furthermore over the next few years the numbers of workers retiring will exceed that of young people entering the labour market exacerbating the skills gaps and labour shortages (McNair and Flynn, 2006).

Whilst for some workers remaining in employment after normal retirement age is now a welcome opportunity as they are both mentally and physically fit, fully able and willing to work, for others this may not be the case. A study by Lissenburgh and Smeaton (2003a; 2003b) on behalf of the Joseph Rowntree Foundation considers the role that older workers can play in an organisation, particularly those in the periphery of the organisation rather than the core, for whom flexible employment may be the norm. Lissenburgh and Smeaton (2003b) identify a number of key issues for older workers:

1. For those workers who have been in their present employment for a long period, have accrued advantages such as savings and pension entitlements, and for those who have paid off their mortgages, then leaving work tends to be a positive choice.
2. For those with health problems, especially lower paid men, ‘early retirement’ is more likely to be through an inability to stay in work rather than a positive choice.
3. More advantaged older workers are more likely to enter flexible employment rather than leave the workforce when they depart full-time employment.
4. Self-employment provides the most comparable job quality to that of full-time employment. Temporary employment such as fixed-term contracts

provides the next best option rather than casual or agency work. Part-time work is the poorest option.

5. Women are apparently more successful than men in finding flexible employment for positive reasons but the quality of employment is often poor.
6. Policies were needed in the following areas:
 - a. To help older people with health problems stay in employment;
 - b. Counter age discrimination;²
 - c. Financial incentives for older people to stay in work; and
 - d. Better regulation of casual and agency work.

However both Lissenburgh and Smeaton (2003b) and Taylor (2002) identify that education, training and development opportunities are much less for the older worker and Lissenburgh and Smeaton (2003a: 21) comment 'As workers age they are decreasingly likely to be offered any work-related training, regardless of whether he or she is a full-time, temporary or part-time employee'. Lissenburgh and Smeaton (2003a) also highlight the high percentage of part-time and temporary workers who did not partake in any training opportunities, and were not offered any training opportunities; as shown in Table 5.15 overleaf. Here it would appear that older workers are less likely to be offered training. Yet it is these older workers that tend to hold more senior management and supervisory positions and are likely to be the ones most in need of development activities due to their reliance on past education and training and work-based training, all of which might well not be up-to-date, especially for those located in the periphery.

² It should however be noted that since their 2003 study legislation is now in place to counter age discrimination.

Table 5.15: Employment status by whether training offered (% of respondents *never offered* education or training).

Source: Lissenburgh and Smeaton (2003a: 23, Table 4.3)

| Employment status by whether training offered (% of respondents <i>never offered</i> education or training). | | | |
|--|-----------|-----------|-----------|
| | Full-time | | Part-time |
| | Permanent | Temporary | |
| All men | 49 | 70 | 71 |
| All women | 43 | 61 | 59 |
| Men over 49 | 52 | 74 | 68 |
| Women over 49 | 44 | 62 | 59 |
| <i>Sample:</i> Those not taking any job-related training in previous three months. | | | |

Lissenburgh and Smeaton's study (2003a, 2003b) highlights a wide range of training that takes place amongst employees, as shown in Table 5.16 below, and that this provision has not significantly changed in the last decade.

Table: 5.16: Workers who have undergone training in the previous three months (%)

Source: Lissenburgh and Smeaton (2003a: 22 Table 4.2).

| Workers who have undergone training in the previous three months (%) | | | | | | |
|---|-----------|------|-----------|------|-----------|------|
| | Full-time | | Temporary | | Part-time | |
| | All | New* | All | New* | All | New* |
| All men and women (30+) | 15 | 26 | 17 | 28 | 12 | 23 |
| Men aged 30-39 | 16 | 26 | 16 | 27 | 17 | 21 |
| Women aged 30-39 | 20 | 32 | 27 | 41 | 15 | 26 |
| Men aged 40-49 | 15 | 22 | 14 | 22 | 11 | 19 |
| Women aged 40-49 | 19 | 32 | 23 | 43 | 13 | 25 |
| Men aged 50+ | 9 | 15 | 9 | 15 | 6 | 14 |
| Women aged 50+ | 15 | 25 | 18 | 26 | 8 | 17 |
| *Note: New recruits who have been in their current job for less than one year | | | | | | |

In the case of the 50+ age group there is a distinct drop in the training provision which, with particular reference to the 50+ women's group, is attributed to:

1. The work is likely to be more menial and therefore training is not required. This would indicate a lower quality job;
2. Employers are far less committed to their part-time staff and deny them training opportunities that might otherwise permit progress within the organisation;
3. Older workers have plenty of experience with the sort of work they are undertaking and therefore simply do not need to be trained; and
4. Older workers do not want to undertake any training.

Lissenburgh and Smeaton (2003a: 22)

These findings simply serve to reinforce the findings of earlier studies (e.g. Hakim (1990) that employers make use of this group of workers to provide both numerical and temporal flexibility of the workforce necessary to respond to fluctuating workloads.

Rainbird (1991) highlights that in the construction industry there is an incentive not to train the peripheral workforce of self-employed and casual labour ‘... firms which do not train can undercut the costs of [those] which do train’ and in the highly competitive construction industry this cost differential could make the difference between winning competitive work and staying in business, or losing work and possibly not staying in business. Rainbird (1991) further points out that the majority of the peripheral workforce that are self-employed or casual workers are paid on a piecework basis and taking time out for training results in a loss of earnings.

Taylor (2002) however surmises that from studies conducted in other countries which have more advanced policies towards older workers:

- *First*, the abolition of mandatory retirement appears to have done little so far to change patterns of employment. Early retirement is still popular among older workers and employers find other ways of dismissing older workers.
- *Second*, despite their popularity with workers, employment subsidies seem to be of limited use, except where paid to the worker directly. Arguably schemes aimed at encouraging the employment of older workers through, for example, financial incentives and re-employment schemes, run the risk of deepening age prejudices still further and institutionalising discrimination against older workers. Whilst some have argued for schemes aimed at encouraging employers to hire older workers on temporary or part-time contracts, these may simply disadvantage those seeking permanent full-time positions and may encourage firms to consider reducing the wages of older workers in the expectation of obtaining a subsidy.

Taylor (2002: v)

If Taylor’s surmising is correct then the outlook for education, training and development opportunities for older workers is unlikely to improve, not least in the construction industry where low profit levels, high levels of competition, and a culture of flexible work-forces all work against the interests of the employee.

Knutt (2001), quotes an interview with Diana Worman of the CIPD who states that “employers think that salaries, perks and pensions will be more costly, or that they will invest in training without getting the long-term benefits”. Worman highlights that there is a mistaken belief that older workers, especially those over the age of 55, are more expensive to employ. For employers this older workforce age-group could provide a valuable and fruitful source of recruitment to help fill the shortage of workers. Hilliard (2004) notes that research commissioned by Tarmac found that:

Older people are in fact keener than young people to work in construction. 31% of people over the age of 65 said they would consider working in the construction industry, compared to just 30% of 16-24 year olds. 45-54 year olds were most likely to say they would consider a construction job.

Whilst this might make a welcome contribution to help reduce the shortage of workers in the industry Steer (2006) raises concerns about the effects on business and industry the legislation will have if workers who would normally have retired at the age of 55 or 60 now continue until 65 or beyond. Not only will succession planning be severely affected as more senior workers will stay in post longer, but also career development and progress of younger workers will be limited. This fear seems to be held in some sectors of industry; as one industry manager, in informal conversation with the author, likened the potential situation of “geriatric desk-blocking” to that of “geriatric bed-blocking” reported in NHS hospitals some years ago. These concerns were also noted by the author amongst younger and mid-career construction staff on both part-time undergraduate and postgraduate construction courses who saw older managers who stayed in post beyond their normal retirement age as potentially blocking the opportunity career for progression and advancement of younger workers, particularly themselves. Such fears may well originate in a lack of understanding of the new legislation and its potential effects which have yet to manifest themselves.

Steer (2006) also raises the concern that many organisations may have to provide financial incentives to those of or over normal retirement age to leave the organisation in order to prevent stagnation of the business. This could have serious

implications for continuing education, training and development, as Steer (2006: 30) comments:

... there is not a bottomless pit in our margin-conscious sector, so the money spent on retirements will have to be saved in the other areas such as training and development, the knock-on effect being that younger people will be less equipped to do the jobs in which they will need to work longer.

Leaviss *et al* (2008) also express concern that younger workers replacing older retiring workers lack the training and skills to replace them effectively, and that this is widening the skills gap.

Another important section of The Employment Equality (Age) Regulations 2006 (SI 2006 No. 1031) is that it addresses the issues of employee training. The studies by Lissenburgh and Smeaton (2003a; b) highlight the extent of discrimination that exists amongst older and/or non-core workers. The regulations clearly sets ‘contract workers’³ on an equal basis with employees in terms of age discrimination and in the provision of training. Under Section 2 Paragraph 7(2)(b) of the regulations it now becomes an offence to not provide the same benefits to all employees on the grounds of age ‘... in the opportunities which he affords him for promotion, a transfer, training, or receiving any other benefit’. Paragraph 9(1) makes it unlawful for a principal to discriminate against any contract worker including the provision of benefits different to those of ‘normal’ employees.

Although this new legislation has yet to be tested in the courts there are very clear implications here for the construction industry which relies heavily on the use of sub-contractors (contract workers), both for the undertaking of work packages by bone-fide contracting organisations as well as agencies supplying labour, and the self-employed, whether genuinely self-employed or otherwise.

³ Paragraph 9(5) of Part One (General) of the regulations gives the following definitions:
“principal” means any person (“A”) who makes work available for doing by individuals who are employed by another person who supplies them under a contract made with A;
“contract work” means work so made available; and
“contract worker” means any individual who is supplied to the principle under such a contract.

Contractors will now find that they have to extend the same benefits to these contract workers as to their own directly employed staff. Thus they cannot use agency staff or self-employed staff as a means of applying age restrictions to their employees either by setting minimum age limits or maximum age limits. The law also extends the provision of benefits which includes the provision of training and development opportunities.

5.3.12 Conclusions

This chapter began by setting out the critical realist approach to research being used in this thesis. Combining this with HRD literature directed our attention to six key areas of the literature that address key structural and agential features of the construction industry. As well as supplying material that corrects the relative neglect of this important industry in HRD literature, this section has also corrected the tendency of much HRD literature to focus on the agential dimension, important though this is recognised to be. A critical realist approach requires us to pay equal attention to structural and agential factors as follows:

- Firstly, the identification of structural aspects of the construction industry that, building upon earlier Documents 3 and 4, looked at the industry's composition in terms of its stratification in terms of main contractors and specialist trades contractors that invariably act as subcontractors to the main contractors together with the emergent properties that arise from the interdependencies between them.
- Secondly, identification of pertinent and salient internal mechanisms within and arising from the structure of the construction industry that significantly contribute to the identified effect of low standards of management that that have been recognised as being a contributing factor to the industry's poor performance and productivity; and
- Thirdly, the identification of other causal mechanisms forming part of construction companies' external environment and having an influence on education, development and training of construction managers.

The literature reviewed in the nine areas identified at the start of this chapter are important and contribute to the debate about productivity in construction organisations and the construction industry at large. Using the critical realist approach the relevant issues identified in this literature review pertinent to the research question are mapped in the model below.

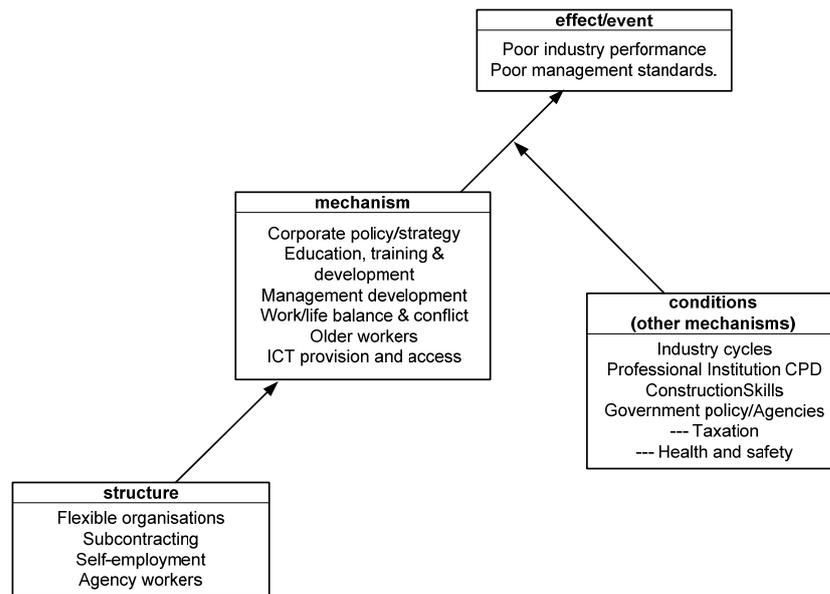


Figure 5.47: Critical Realist Model of Literature Review Outcome

The issues identified above will form the foundation of the research undertaken for this thesis as each addresses one of the research sub-questions for which the research methods are discussed in the next chapter.

- 1) Structure: This addresses the first research sub-question – ‘How does the structure of the construction industry affect continuing education training and development of construction management?’
- 2) Mechanism: This addresses the second research sub-question – ‘What continuing education, training and development of construction managers is currently undertaken by construction companies?’

- 3) Conditions (other mechanisms): This addresses the third research sub-question – ‘How do the professional institutions serving the construction industry influence the continuing education, training and development of managers?’

Nine major reviews and reports on the construction industry’s performance have been undertaken by the Government during the last sixty-five years, all of which have resulted in changes in various working practices within the construction industry, but not until Latham (1994) did these reports pay any real attention to people that make up the industry. Other reports including those by the OECD (2006) show that the UK compares favourably against other well developed nations in terms of qualifications and education attainment of its workforce, however the UK the construction industry fares poorly in comparison to other UK industries, thus construction is shown to be a poor performing industry.

In order that this can be begun to be deconstructed to expose its agential and structural properties literature has been reviewed to ascertain firstly the definitions and perceptions of education, training and development. This has been drawn from texts largely from the general HRD arena as, perhaps not unsurprisingly, comparatively little was found to have published directly addressing these issues in the construction industry. Notwithstanding this, literature generally concurred that without education, training and general personal development management development cannot take place. A review of management development literature set the background of the mechanisms of management development and its inter-relationship and inter-dependency with an organisation. This will be used to underpin areas of research via a questionnaire to try to determine the level to which management development is embodied in the corporate strategies of construction companies, i.e. the internal mechanism. It will also help ascertain the preferences for various modes of education, training and development in construction, and possibly determine some of the blocks to learning that inhibit management development and ultimately contribute to poor performance.

Compounding this situation in the external environment of construction companies is the nature of the construction industry itself with its notorious cycles of ‘boom and bust’ about which there is a considerable amount of published research and literature spanning many decades. Through processes of evolution in terms of responding to long-to-medium term variations in workload and changes brought about through response to changing legislation, construction companies have become increasingly flexible in order to adapt to their ever changing environment. However, this flexibility has created two ‘classes’ of workers – the small core of direct employees, and the large periphery of self-employed and agency workers, as well as short-term business focus in which education, development and training appears to be given a low priority, and in times of recession often cut out completely to save money. Thus alternative routes are required to raise standards of education, training and development of the construction workforce at all levels, not least with management.

In an attempt to provide an alternative route for education training and development for construction industry professionals the EUSCCCIP project developed its CPD model which could be adopted and implemented by any construction organisation, be they a construction company or professional institution. Research indicates that education, training and development is often driven by the CPD requirements of the professional institutions, yet the biggest inhibitors of CPD activities by construction managers are the ‘long-hours’ and ‘presence’ culture endemic in the industry, and the inherent conflicts of work-life balance that inevitably ensue. Yet despite the recognition of these problems there was found to be relatively little research carried out in these areas for the UK construction industry.

Whilst much of the focus of work-life balance is on career development for younger workers there is growing concern that the average age of the construction industry workforce is increasing due to its failure to attract young people into the industry and retain them. Thus emphasis on education, training and development has traditionally focussed on the younger worker. More effort is now being focussed on retaining the older worker, and even attracting older workers either back into the industry or into

the industry for the first time by retraining workers from other industries. Thus the construction industry will need to place a greater emphasis in maintaining, at the very least, the education training and development needs of these older workers. As Leavitt *et al* (2008) note there has been little or no research has been undertaken in the UK construction industry to determine the needs of the older workers.

In order to begin to understand the education, training and development needs of construction managers, be they young or old, it is firstly necessary to consider the structure of UK construction industry in which they work, and how that structure is changing. This is addressed in Chapter 5.5, whilst Chapter 5.6 will seek to establish the current state of education, training and development of construction managers in construction companies. Chapter 5.7 will then research the role of the professional institutions serving the construction industry in the adoption and implementation of CPD for education, training and development of construction industry managers. The findings and conclusions from these chapters will then be brought together in Chapter 5.9: Conclusions and Recommendations, to present a potential way forward for improving the standards of education training and development of UK construction managers. However, before this can be done the next chapter, Chapter 5.4: Research Methods, sets out the research methods to be adopted in order to address the research aims and objectives.

5.4 Research Methods

5.4.1 Introduction

This chapter introduces and considers the research methods of this thesis. The research philosophy adopted in Document 3 and Document 4 was that of critical realism. As discussed in the previous chapter, this philosophical approach is continued in this thesis to ensure that both consistency of method and compatibility of research with earlier documents is achieved. In considering any business or industry, it is essential to understand its structure, its culture, and the agency by which these are interpreted. Using the critical realist philosophy will enable this process to be undertaken as discussed in the previous chapter.

From the various structures and mechanisms identified in the previous chapter (see Figure 5.47) the areas taken forward for further research in this thesis are shown below in Figure 5.48. A more focussed approach will be adopted by reducing the numbers of aspects of structures and mechanisms to be investigated in this thesis.

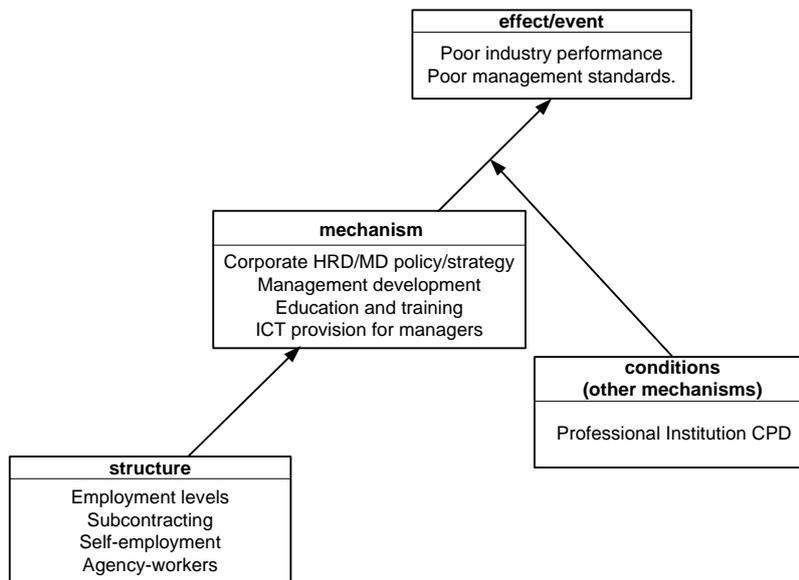


Figure 5.48: Critical realist research model of this thesis
Source: Adapted from Sayer (2000: 15, Fig 1.2)

The issues that are not going to be investigated further are still important and will be carried forward for future research. The issues selected for further research will allow identification of the structural and agential mechanisms that lead to the observed effects/events of poor performance and poor management standards in the construction industry.

Using the critical realist philosophy allows acceptance of the fact that multiple mechanisms may exist and that in order to mitigate the possibility of misattribution of causality will require both abstraction and research designed to facilitate the existence of multiple mechanisms (Sayer 2000). Sayer (1992, 2000) in consideration research design from a critical realist perspective provides the comparison of intensive and extensive abstraction shown in Table 5.17 below.

Table 5.17: Intensive and Extensive Research; a Summary
Source: Sayer (1992, 243; 2000, 21):

| | Intensive | Extensive |
|--------------------------|---|---|
| Research question | How does a process work in particular case or a small number of cases? What produces a certain change? What did the agents actually do? | What are the regularities, common patterns, distinguishing features of a population? How widely are certain characteristics or processes distributed or represented? |
| Relations | Substantial relations of connection. | Formal relations of similarity. |
| Types of groups studied | Causal groups. | Taxonomic groups. |
| Type of account produced | Causal explanation of the production of certain objects or events, though not necessarily representative ones. | Descriptive 'representative' generalisations, lacking in explanatory penetration. |
| Typical methods | Study of individual agents in their causal contexts, interactive interviews, ethnography, qualitative analysis. | Large-scale survey of population or representative sample, formal questionnaires, standardised interviews. Statistical analysis. |
| Limitations | Actual concrete patterns and contingent relation are unlikely to be 'representative', 'average' or generalisable. Necessary relations discovered will exist wherever their relata are present, for example, causal powers of objects are generalisable to other contexts a they are necessary features of these objects. | Although representative of a whole population, they are unlikely to be generalisable to other populations at different times and places. Problem of ecological fallacy in making inferences about individuals. Limited explanatory power. |
| Appropriate tests | Corroboration. | Replication. |

Thus a research design is required that will enable identification of the causal mechanisms at work in open systems as illustrated in Figure 5.49 below through both intensive and extensive research for as Sayer (1992: 242) notes:

The two types of design ask different sets of questions, use different techniques and define their objects and boundaries differently. In intensive research the primary questions concern how some causal process works out in a particular case or limited number of cases. Extensive research, which is common, is concerned with discovering some of the common properties and general patterns of a population as a whole.

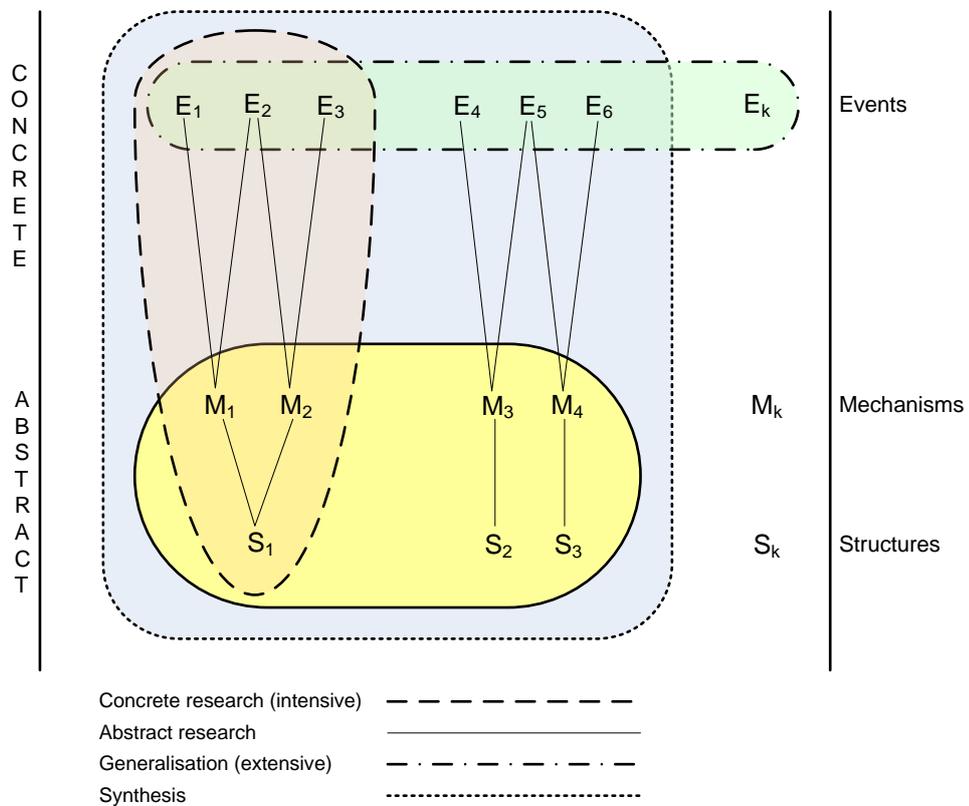


Figure 5.49: Types of Research
 Source: Sayer (1992: 237, Figure 12)

However, as Sayer (1992) observes, research projects can employ aspects of both intensive and extensive research approaches as a single approach in social science is rarely adequate and adopting a single approach can frequently lead to its own extension and misrepresentation. Indeed as Sayer notes it may well be necessary for a researcher to switch from approach to another as the research develops and as the situation demands.

Research will be undertaken to identify the structure, mechanisms and conditions:

1. Structure: A desk-top study of the structure of the construction industry to identify its composition and strata;
2. Mechanisms: A survey of current education, training and development of construction managers in industry, and of the status of associated corporate policy and strategy; and
3. Conditions (other mechanisms): A survey of CPD requirements of the principal professional institutions serving the construction industry.

Thus, the desk-top study and two surveys provide the three strands of the research to be undertaken and will employ aspects of both intensive and extensive research. The methods adopted for each strand are now described together with the methods used for data analysis and presentation.

In each case answers to the following would have to be found:

- What information is needed, i.e. what questions need to be asked?
- How best to obtain the information, i.e. data analysis and presentation?
- Whom to ask for the information or where to seek the information?

A key component of any research method is the way the data obtained will be analysed and presented, as different types of data and research methods require different analytical/statistical tools and presentation methods. The analysis and presentation methods used in this thesis are described in the relevant sections below.

5.4.2 STRUCTURE: The Structure of the Construction Industry

An industry that is large and complex as the construction industry can be analysed and represented in many structural forms, usually dependant upon the needs and requirements of the analyst or researcher. These analytical forms commonly use one or more of the following forms, either singly or in combination:

- **Financial** – typically using turnover, profit levels, or other common financial ratios. Analysis and comparison can be difficult due to accounting legislation and requirements particularly where conglomerates and groups of companies are involved;
- **Corporate structure** – typically by using the corporate status, such as public company (plc), private company (ltd), partnership, sole trader;
- **Trade or craft** – typically identifying companies by the principal trade or craft, for example, electrical, plastering, and roofing, using the Standard Industry Classification (SIC). Problems may arise when a company operates in more than one trade section, such as electrical and plumbing which can make attribution or categorisation difficult;
- **Market segment** – typically using the market or markets in which the company operates such as housing, general building, civil engineering, and maintenance and refurbishment. The problem here is that many companies operate in one or more of these segments, which can again make attribution or categorisation difficult;
- **Geographically** – typically by the region or regions of the country in which the firm operates;
- **Employment** – typically by categorising companies by the number of employees they have; and
- **Others** – these can include analysis and categorisation by factors such as gender, age distribution, and ethnicity.

The need here, from a critical realist perspective is to identify the underlying strata within the industry that give rise to its structural forms and the agential factors that determine those strata and the behaviours within them. It has already been established (see page 5.51) that it is unlikely that a single agential factor will be identified and that the structural form is the product of many causal factors acting upon and within the industry, i.e. systems of systems. The primary focus of this first aspect of research will be upon identifying:

- Employment levels within the industry;
- Subcontracting: Specialist trades contractors; and
- Self-employment and agency employment.

It is therefore necessary to gain an understanding of how the companies that employ construction managers are evolving within the industry as this will provide an indication of how the corporate environment in which the construction managers operate is changing as this may affect the education, training and development of construction managers.

5.4.2.1 Collection of Structure of the Construction Industry Data

For the purposes of this thesis, the construction industry will be considered in terms of its structure appertaining to employment and distribution of employment within the industry. This first strand of research data collection will be accomplished through the use of desk-top research, abstracting and collating data published in the Government's annual reports 'Construction Statistics Annual' (formerly 'Housing and Construction Statistics'), and the 'Annual Abstract of Statistics'. This will require determination of factors such as the:

- GDP/GVA contribution to the national economy;
- national and industry employment contribution;
- number of companies in the industry;
- number of people employed in the industry;
- numbers of companies by numbers of employees;
- numbers of companies by principal trade;
- numbers employed in companies by principal trade;
- numbers of employed workers (employees) and self-employed workers;
- gender composition of the workforce.

Thus, it will be possible to identify the historical and current trends and changes in the industry in which the managers have to operate.

5.4.2.2 Analysis and Presentation of Structure of the Construction Industry Data

All the data collected for the construction industry analysis is time-series based from Government statistical reports and publications. Such data can be analysed both longitudinally and cross-sectionally (Bryman & Bell, 2003) with the longitudinal analysis revealing trends over time, and the cross-sectional analysis revealing the composition of the variables used.

Longitudinal analysis will be used to establish the time-based trends of the various datasets to be compiled for variables such as employment, company sizes, gender composition, and workforce sizes. Cross-sectional analysis will be used to determine the variables such as trades of firms, numbers of employees in firms (group sizes), and male and female workers. Some of the cross-section analysis variables were themselves subjected to longitudinal analysis of their own time-series data.

With the longitudinal data and cross-sectional statistical data analysis using techniques such as trend analysis, regression analysis, and correlations can be undertaken. However, this will not be undertaken in this thesis as no attempt to produce forecasts and models of the construction industry is being undertaken.

Data from the longitudinal and cross-sectional studies is presented and illustrated using tables and derived graphical techniques such as line graphs, bar charts (both standard and stacked-percentage charts), histograms and area charts (both standard and stacked-percentage charts) as appropriate. The data tables are normally presented in the appendices, whilst the derived graphs are normally incorporated in the text.

5.4.3 MECHANISM: Current Education, Training and Development of Construction Managers

The second aspect of this research using the critical realist approach is to identify the internal mechanisms at work within the construction companies that contribute to the industry's poor performance. The internal mechanisms that are to be identified and investigated are those associated with education, training and development of construction managers and in order to gauge the extent of education training and development carried out in the UK construction industry it would be necessary to establish the views of those in the industry. Thus the second strand of research data collection would adopt two distinct and separate sections for the firstly the construction companies

As identified earlier, this chapter will focus upon the following causal factors (mechanisms) with regard to construction managers and poor performance:

- Corporate strategies and policies for human resource development and management development;
- Management development;
- Education, training and development; and
- ICT provision and access for construction managers.

5.4.3.1 Obtaining the survey information.

The consideration here is to how to obtain the desired information, given the various survey methods available.

The methods considered for use were:

- Personal interviews;
- Telephone survey interviews;
- Postal questionnaire survey; and
- Online questionnaire survey.

5.4.3.1.1 Personal interviews.

These were recognised as being the most valuable source of information but the method was quickly discounted as the resources required both in terms of time and money were simply not available. Even with companies located close to one another it would not be possible to do more than two interviews in one day. This assumes that it would be possible to make such an arrangement with the companies, and to survey 149 companies located the length and breadth of the UK was simply just not practicable or affordable in terms of the amount of travelling that would be required.

5.4.3.1.2 Telephone interviews.

This was the 'second best' alternative to personal interviews. Whilst this would not involve the cost of travelling, tracking down the target respondents for interview over the phone would be time consuming and laborious, if indeed telephone contact could be established. Conducting 149 telephone interviews would also take a considerable amount of time.

5.4.3.1.3 Postal questionnaire.

This was considered the most practicable form of collecting data from a large number of data providers. Bulk copying and mail-merge meant that the questionnaires could be sent with an individually addressed cover letter explaining the reasons for, and nature of, the survey. The questionnaire could then be completed at the respondents own convenience. A licensed-post reply-paid envelope would be included with the survey so that the respondent would not have the expense of posting the questionnaire back. The author would also not have to pay return postage on non-returned surveys, although the cost of having the licensed-post reply-paid envelopes still had be found.

The major concern with using this form of survey is the anticipated low rate of response. Easterby-Smith, Thorpe and Lowe (1991) suggest that a response rate of the order of 25-30% would be typical of industry, whilst Fellows and Liu (1997) suggest a response rate of 25-35% as being typical of construction companies. Bryman and Bell (2003) note that it is not unusual for response rates to postal

questionnaires to be low, citing examples from Curah and Cooper (2002) with 18% response rates, and more typically Bryman (1989: 44) with 21%-25% response rates. Thus, a high response rate could not be expected.

5.4.3.1.4 Online questionnaire survey.

The author did not opt for this method for a number of reasons:

- Lack of knowledge of how to create an online questionnaire;
- Insufficient information on company web-sites to enable target respondent to be identified in e-mail contact; and
- Companies would have to be written to in order to ask them to complete the questionnaire, whether on-line or not, so therefore just as easy to enclose paper-based questionnaire and freepost envelope for its return.

5.4.3.2 Designing the questionnaire

Information was required in three principal areas:

- Company policies towards continuing education training and development of managers, and methods used by construction companies for continuing education, training and development of managers;
- Company policies and attitudes towards links with Higher Education institutions; and
- ICT provision and access availability that could be used to support continuing education, training and development of managers.

The information sought was established using mind-mapping, which after a number of reviews and distillations resulted in the mind-map shown in Figure 5.50 overleaf. Having determined the information requirements questions were then devised that would, hopefully, produce that information. Figure 5.50 shows the overall arrangement of information wanted. To aid legibility each of the sections is shown separately at the start of each section

A key objective was to make the questionnaire as simple and as unambiguous as possible for the respondent to complete through simply having to tick the appropriate answer(s) for each question, whilst also allowing the respondent to comment on or clarify any answer if they so wished. As many of the questions were compound questions, i.e. they contained a range and/or variety of possible answers from which the respondent could select. Clarity and simplicity of layout would also be another key objective.

The style that was adopted consisted of:

- The question or statement to be considered;
- A range of possible answers together with an option to give additional ‘other specified’ answers by the respondent if needed and where appropriate as a means of capturing additional information that might have been overlooked in the question design; and
- An option for the respondent to give an explanation of, or comment upon any answer given should the respondent so wish.

Thus a layout and style for each question was developed and this is shown in Figure 5.50 below

| Question No. | Question or statement to be considered |
|--------------|--|
| | Area for possible answers |
| | Optional comments/explanations |

Figure 5.50: Basic Template for Survey Questions.

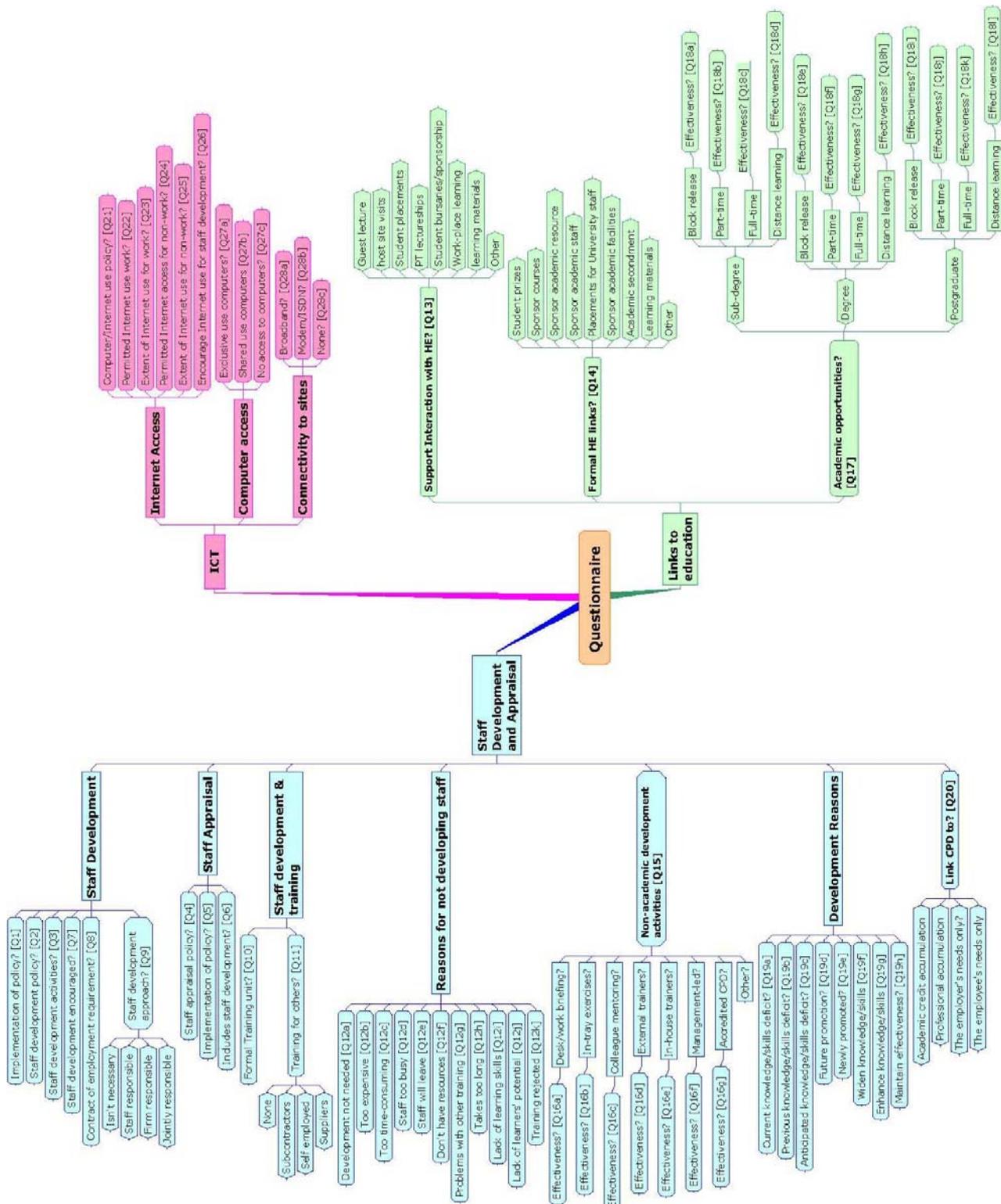


Figure 5.51: Mind-map for the design of the questionnaire

The questionnaire that was issued to the 149 construction companies is shown in Appendix 5.A.9.

5.4.3.2.1 Company policies towards continuing education training and development of construction managers and methods used by construction companies for continuing education, training and development of managers.

A key issue in the continuing education, training and development of managers in any company is that of the company's attitudes, and thereby policies, towards such issues. However, having a policy or policies does actually mean that any such policies are necessarily implemented in practice. Policies may be produced because there is a legal requirement to do so, as in the case of some health and safety legislation and some employment legislation. Other are produced because the organisation believe there is a need to have policy on a particular issue such as environmental aspects, or perhaps most importantly as a means of controlling organisational behaviour, i.e. the do's and don'ts of organisation life. But, it should be remembered, as Drucker (1955) is keen to point out, that policies are not the product of the organisation, but of the individuals within that organisation and may, therefore, reflect the beliefs and values of the originator rather than that of the organisation.

Key policy areas that will impact upon continuing education, training and development are:

- Staff development policies
- Appraisal policies; and
- ICT availability and usage.

Thus, it should be possible to determine the stage of management development each company has reached using the models developed by Burgoyne (see Figure 5.15)

and/or Mumford and gold (see Figure 5.16). This will be determined firstly by establishing the level of development and implementation of policies and opportunity for staff (management) development, appraisal, training and education; and secondly where possible determining the type of managerial development in accordance with Mumford's 'Types of Management Development' (see Table 5.3 and Figure 5.17) and, where appropriate, comparisons will also be made with Mumford and Gold's (2004) 'Stages in Management Development' (see Figure 5.16).

Information will be sought in this area in respect of the following:

- Staff development policies, implementation and opportunities;
- Staff appraisal policies, implementation and opportunities;
- Staff training and development units;
- Attitudes towards staff development (i.e. reasons for/for not doing it);
- Extent and use of non-academic activities for staff development;
- Reasons why they undertake development of their construction managers;
- Preferences for linking development to objectives.

Each of the above was then broken down into a further series of questions or statements in which the respondent was invited to state their assessments, views and opinions, normally through Likert Scales. A four-part Likert scale will be adopted for the questionnaire as using a scale of more than four does not significantly improve the accuracy of responses (Cox, 1980). A four-part scale also ensures there is no middle 'neutral' option as respondents must give a decisive opinion. Additionally, using a four-part scale will enable easy consolidation of data into a two-part scale for statistical testing where a four-part scale cannot be used. This is discussed in more detail later in this chapter. Figure 5.52 overleaf shows the arrangement of information sought in the areas above.

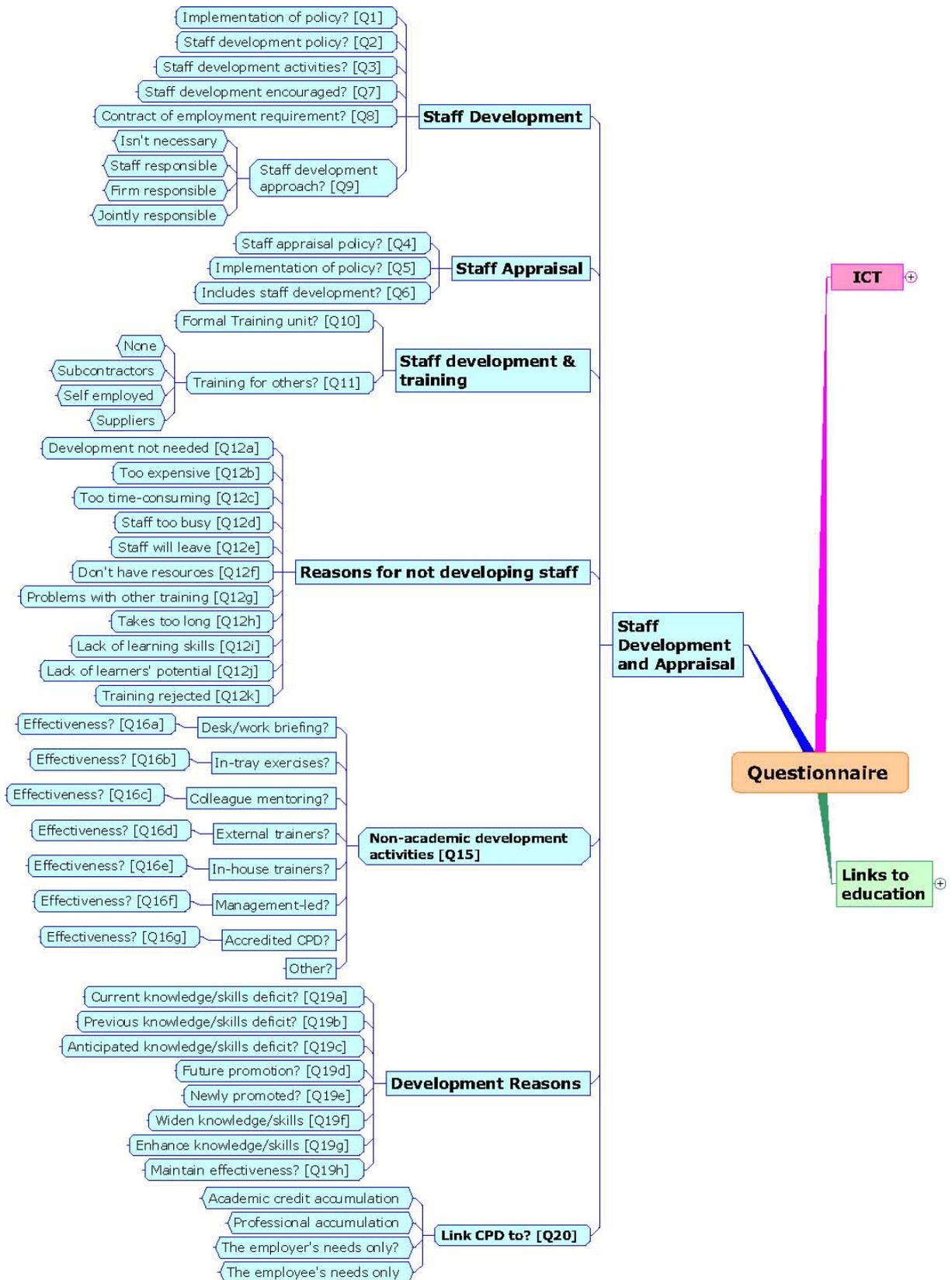


Figure 5.52: Mind-map for Staff Development and Appraisal Questions

5.4.3.2.2 Staff development policies, implementation and opportunities.

This section was sub-divided into six sub-sections each of which formed one of the survey questions, five of which were to be answered on a Likert-Scale rating and the sixth by selection of the applicable answer from four alternatives:

- To what extent do they have a staff development policy? It was important to avoid having a yes/no answer in order to ascertain not only those companies that do or do not have a staff development policy, but also those whose policies are not yet fully developed. This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘For some staff only’, ‘For most staff’, and ‘For all staff’. This question is aligned with Mumford and Gold’s (2004) ‘concern for task’ with responses for ‘for all staff’ indicating a ‘high concern for learning’ (i.e. a high concern for management development). This contrasts with the ‘not at all’ responses at the other end of the continuum indicating a ‘low concern for learning’ (i.e. a little or no concern for staff development). [Question 1];
- Does their staff development policy (if they have one) include provision for staff development activities? This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘Partly’, ‘Mostly’, and ‘Fully’. This question is aligned with Mumford and Gold’s (2004) ‘concern for task’ with responses for ‘not at all’ indicating a ‘high concern for task’, suggesting that these companies do not want staff development activities being a distraction from the focus of the task of production. This contrasts with the responses of ‘fully’ at the other end of the continuum indicating a ‘low concern for task’ as the requirement staff development may, at times, require focus away from the task of production. [Question 2];
- If they have a staff development policy then to what extent is it implemented in the company for construction managers? Many companies are known to have policies, but are those policies actually deployed and implemented? This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘Partly’, ‘Mostly’, and ‘Fully’. This

question is aligned with Mumford and Gold's (2004) 'concern for task' with responses for 'not at all' indicating a 'high concern for task', again an indication of the focus on task production not being interrupted by staff development activities. Again, this contrasts with the responses of 'fully' at the other end of the continuum indicating a 'low concern for task', thus staff development may subjugate the need for the focus on production at times. [Question 3];

- Does the company encourage staff development activities for construction managers? This question seeks to ascertain how much encouragement is given to staff development activity. Even though policies may be in place the level of encouragement provided will have a direct impact upon construction managers' motivation to undertake staff development, and to give staff development credibility. This was to be answered by means of a four-part Likert Scale with the options of 'Not at all', 'Partly', 'Mostly', and 'Fully'. This question is aligned with Mumford and Gold's (2004) 'concern for task' with responses for 'not at all' indicating a 'high concern for task', and contrasting with the responses of 'fully' at the other end of the continuum indicating a 'low concern for task' for reasons as discussed above. [Question 7];
- Is staff development a requirement for construction managers in their contracts of employment? Here the question seeks to ascertain whether or not contracts of employment include a requirement for staff development, indicating the development of contracts of employment in these areas. This was to be answered by means of a four-part Likert Scale with the options of 'Not at all', 'For some staff only', 'For most staff', and 'For all staff'. This question is aligned with Mumford and Gold's (2004) 'concern for learning' with responses for 'for all staff' indicating a 'high concern for learning' (i.e. a high concern for management development). This contrasts with the 'not at all' responses at the other end of the continuum indicating a 'low concern for learning' (i.e. little concern for management development). [Question 8]; and

- What approach does the company have towards staff development? Here the respondent has to select one of four options that reflects the organisations approach; [Question 9]:
 - Staff development isn't necessary,
 - Staff are responsible for their own development,
 - The organisation is responsible for staff development,
 - Staff and organisation are jointly responsible for staff development.

It should be noted that as the responses to this question do not form a Likert scale, but discrete preferences, no alignment can be made with the 'concern for learning' (Mumford and Gold, 2004) and therefore no comparison with their 'types of management development' can be made. However, some alignment may be made with Mumford and Gold's (2004) 'Stages in Management Development', albeit tenuously with responses for:

- 1) 'Isn't necessary' being aligned with Stage 1 'unplanned experiential management development';
- 2) 'Staff responsibility' being aligned with Stage 2 'unplanned reactive management development';
- 3) 'Organisation responsibility' and 'joint responsibility' being aligned together with Stage 3 'planned management development' and Stage 4 'planned strategic management development' as these two responses/stages cannot be differentiated here.

Megginson & Whitaker (2003) state that the most effective CPD is that which is undertaken with joint responsibility, as this provides the greatest level of commitment.

5.4.3.2.3 Staff appraisal policies, implementation and opportunities.

This section consisted of three questions, all of which were to be answered on a Likert-Scale. Staff appraisal is an important part of any staff development policy, so it was important to establish the level of staff appraisal within the companies' staff

development policies. It was anticipated that the development and implementation of staff appraisal policies would be less than that of staff development policies.

- To what extent do they have a staff appraisal policy? Again to avoid having a yes/no answer a Likert scale was used in order not only to ascertain those companies which do or do not have a staff appraisal policy, but also those whose policies are not yet fully developed. This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘For some staff only’, ‘For most staff’, and ‘For all staff’. This question is aligned with Mumford and Gold’s (2004) ‘concern for learning’ with responses for ‘for all staff’ indicating a ‘high concern for learning’ (i.e. a high concern for management development). This contrasts with the ‘not at all’ responses at the other end of the continuum indicating a ‘low concern for learning’ (i.e. a low concern for staff development). [Question 4];
- If they have a staff appraisal policy then to what extent is it implemented in the company for construction managers? Many companies are known to have appraisal policies, but are those policies actually deployed and implemented? This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘Partly’, ‘Mostly’, and ‘Fully’. This question is aligned with Mumford and Gold’s (2004) ‘concern for task’ with responses for ‘not at all’ indicating a ‘high concern for task’, suggesting that the focus is solely on production without the distractions of appraisals. Again, this contrasts with the responses of ‘fully’ at the other end of the continuum indicating a ‘low concern for task’ thus indicating that the need for appraisals may subjugate the production need from time-to-time. [Question 5]; and
- Does their staff appraisal policy (if they have one) include provision for staff development activities? This was to be answered by means of a four-part Likert Scale with the options of ‘Not at all’, ‘Partly’, ‘Mostly’, and ‘Fully’. This question is aligned with Mumford and Gold’s (2004) ‘concern for task’ with responses for ‘not at all’ indicating a ‘high concern for task’ again supporting earlier questions where the focus is on not

allowing staff development to distract from production. This contrasts with the responses of ‘fully’ at the other end of the continuum indicating a ‘low concern for task’ suggesting that staff development can subjugate the needs of production from time-to-time. [Question 6].

5.4.3.2.4 Staff training and development units.

Just two questions were included in this section to determine whether or not the organisation has a staff training and development unit, and whether training is limited to their own core-workers, or includes peripheral workers:

- Does the company have a formal staff training/ development unit? This is a simple ‘Yes/No’ question. Again, this question seeks to establish the extent to which training and development is embodied in the organisation, and the importance attached to it. Those that are most likely to have their own staff training and development units are those most likely to be most committed to it. This question can be aligned, albeit somewhat simply, with Mumford and Gold’s (2004) ‘Stages in Management Development’. Those responding with a ‘yes’ can be aligned with Stage 3 ‘planned management development’ and Stage 4 ‘planned strategic management development’, i.e. the higher stages of the management development model. Those responding with a ‘no’ can be aligned with Stage 1 ‘unplanned experiential management development’ and Stage 2 ‘unplanned reactive management development’. [Question 10]; and
- Does the company offer or provide staff development/training to non-employees such as subcontractors/suppliers’ staff? Respondents were required to indicate which of the following four options applied:
 - No;
 - Yes – subcontractors’ staff;
 - Yes – self-employed staff; and
 - Yes – suppliers’ staff

No simple alignment with Mumford and Gold’s (2004) ‘Types of Management’ can be made here but those responding ‘no’ may be

considered to be either at Stage 1 ‘unplanned experiential development’ or Stage 2 ‘unplanned reactive management development’. Those responding ‘yes’ may be considered to be at the higher Stage 3 ‘planned management development’ or Stage 4 ‘planned strategic management development’.

[Question 11]

The implications for training and development here are important as subcontractors and self-employed workers comprise a large part of any construction company’s peripheral workforce. As is discussed in Chapter 5.5 various bodies have differing definitions of what constitutes an ‘employee’ compared to ‘self-employed’, therefore the approach to non-core staff must be ascertained.

5.4.3.2.5 Attitudes towards staff development (reasons for not doing it)

It was identified earlier that learning often does not take place because of blockages that can occur. This it is important to identify the internal mechanisms, be they real (impediment) or imagined (i.e. excuses) that exist or are used to block learning. This section, therefore, consists of one question comprising of eleven sub-questions asking the respondent to state their company’s approach to the statement made. Seven of the sub-questions (‘b’, ‘f’, ‘g’, ‘h’, ‘i’, ‘j’ and ‘k’) were based on reasons stated by Doyle (2003: 222) for managers not accepting training solutions, whilst the remaining four sub-questions (‘a’, ‘c’, ‘d’, and ‘e’) are based on Loosemore, Dainty and Lingard (2003: 258). Each of the sub-questions is to be answered using a four-part Likert scale with the options of ‘Don’t agree’, ‘Partly agree’, ‘Mostly agree’ and ‘Fully agree’. The answer options were reversed in some questions to prevent respondents from simply ticking straight down a column of answers without giving consideration to each question. The sub-questions are:

- a) Our staff don’t need developing;
- b) Staff development is too expensive;
- c) Staff development is too time-consuming;
- d) Staff are too busy to undertake staff development;

- e) If we develop staff they will probably leave and go to another employer who would pay them more;
- f) We don't have the training resources available;
- g) It will stop and/or clash with other training;
- h) Staff development takes too long;
- i) Those needing to learn lack the skills necessary to learn;
- j) There is a lack of potential in those needing to learn; and
- k) Training is rejected by management, learners or the culture of the organisation.

[Question 12]

5.4.3.2.6 Extent and use of non-academic activities for staff development.

This section consisted of two questions. The first question has eight sub-questions including one of 'other' allowing respondents the opportunity to give details of anything not covered by the sub-questions. The question sought to elicit information about the types of non-academic training and development activities that the organisations used. Respondents were requested to tick all those that they used. The options were [Question 15]:

- Desk/work-place briefings;
- In-tray exercises;
- Colleague mentoring;
- External management/training consultants;
- In-house training and development staff;
- Management-led talks/seminars/workshops (non training and development staff);
- CPD accredited by professional institutions; and
- Other (to be specified by respondent).

The second question of this section sought to determine how effective each organisation found each of the above methods to be. This comprised a four-part Likert-scale of 'Not effective', 'Rarely effective', 'Mostly effective' and 'Fully effective'. [Question 16].

5.4.3.2.7 Reasons why they undertake development of their construction managers?

This section comprised a single question with eight sub-sections that sought to establish the reasons for the organisation undertaking staff development activities. This question was given a rider that the reasons given did not apply to trainees or induction of new employees. Each of the sub-questions is to be answered using a four-part Likert scale with the options of 'Never', 'Occasionally', 'Often' and 'Always'. The sub-questions were:

- a) To overcome current skills/knowledge deficit;
- b) In response to past problems of skills/knowledge deficits;
- c) To meet anticipated future skills/knowledge deficits;
- d) To prepare staff for future career advancement (future promotion);
- e) To enable staff to become effective in new roles (newly promoted);
- f) To widen staff skills/knowledge in existing roles;
- g) To enhance staff skills/knowledge in existing roles; and
- h) To maintain effectiveness of staff skills/knowledge in current roles.

[Question 19]

5.4.3.2.8 Preferences for linking development to objectives.

The final question of this section sought to establish organisations' beliefs about linking training and development activities to four options each of which consist of a four-part Likert scale of 'Don't agree', 'Slightly agree', 'Mostly agree' and 'Fully agree'. The four sub-question options were:

- a) Accumulating credits towards academic qualifications;
- b) Accumulating credits towards professional qualifications;
- c) Meeting the organisation's needs only;
- d) Meeting the employee's needs only.

[Question 20]

5.4.3.3 Company policies and attitudes towards links with Higher Education institutions.

The second section of the questionnaire investigates the nature of the links that construction companies have with higher education institutions that they might use for continuing education, training and development of their managers. This section is divided into three sub-sections:

- Support and interaction with HE institutions;
- Formal links with HE institutions; and
- Staff opportunities/support for FE and HE study.

The mind-map for this section of the questionnaire is shown in Figure 5.53 overleaf. Both the first and second sub-sections were constructed as single questions whilst the third sub-section consisted of a matrix of options.

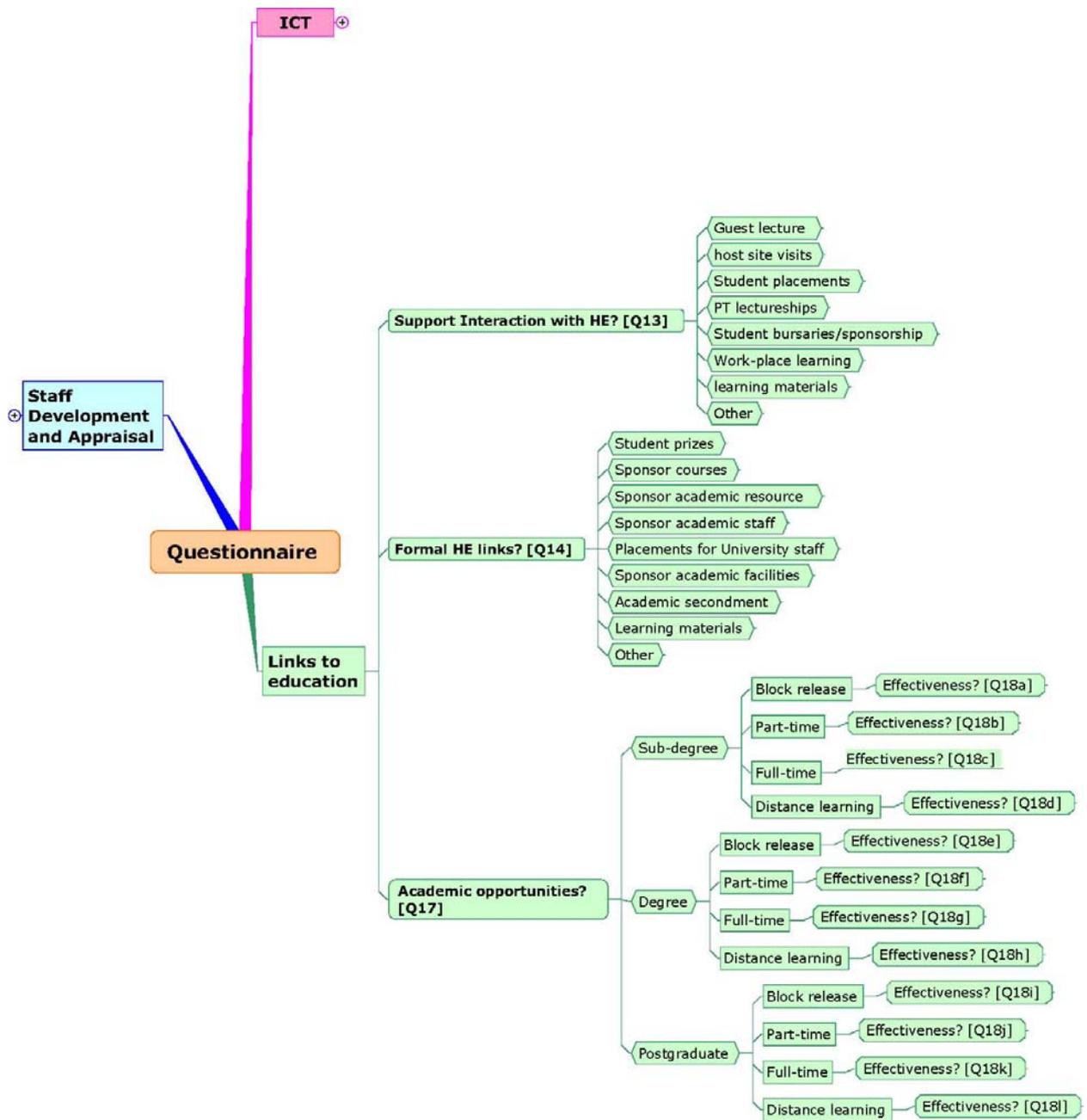


Figure 5.53: Mind-map for Links to Higher Education questions.

5.4.3.3.1 Support and Interaction with HE Institutions.

The first sub-section aimed to establish ways in which construction companies support encourage employees' interaction with higher education institutions. The respondents were given a list of seven ways in which they might interact, and an option to give details of any other interaction they might have that was not listed was also included. The options available were:

- Giving guest lectures/talks;
- Hosting site visits;
- Provide students with industrial placements;
- Part-time lectureships;
- Provide bursaries/sponsorships for students in higher education (universities);
- Provide students with work-place learning opportunities;
- Supply learning/support material to academic institutions, e.g. projects, reports, etc.; and
- Others.

Respondents were required to tick any/all those that applied. [Question 13]

5.4.3.3.2 Formal Links with Higher Education.

The second sub-section sought to establish the types of formal links that construction companies might have with HE institutions. The single question consisted of eight options, with the responded being asked to select all those that applied. Again an option to give any others that they might have was provided. The links specified were:

- Sponsoring prizes for students;
- Sponsoring courses;
- Sponsoring educational resources (computers, books, materials, software, etc.);
- Sponsoring academic staff;

- Sponsoring academic facilities (computer rooms, libraries, laboratories, resource rooms, etc.);
- Providing work-place secondments for academic staff;
- Allowing academic secondments for their own staff;
- Provision of learning/support materials to academic institutions e.g. projects, reports, etc; and
- Others.

[Question 14]

5.4.3.3 Staff opportunities/support for FE & HE study

The third sub-section consists of two questions. The first sought to identify the different forms of academic courses supported by construction companies at both Further Education level and Higher Education Level, on the basis that many FE institutions act as feeder institutions for HE institutions. The question consists of twelve options, which although arranged linearly, comprised a matrix arrangement (see Figure 5.54 below) of four modes of study (block-release, part-time, full-time and distance-learning) for three levels of study (sub-degree level at FE intuitions, degree level at HE Institutions and post-graduate level at HE institutions.) Respondents were asked to tick all those that they supported/used. [Question 17].

| | Sub-Degree Level at FE Intuitions | Degree Level at HE Institutions | Post-graduate Level at HE Institutions |
|------------------------------|--------------------------------------|------------------------------------|--|
| Block-release Courses | | | |
| Part-time Courses | | | |
| Full-time Courses | | | |
| Distance-learning Courses | | | |

Figure 5.54: Course/Level support matrix

The second question of this sub-section then asked the responded to rate the effectiveness of each of the twelve arrangements above using a four-part Likert-Scale

comprising 'Not effective', 'Rarely effective', 'Mostly effective' and 'Fully effective'. By arranging the section in this manner respondents were given the opportunity to give their opinion of the effectiveness of arrangements they did not use, as well as those they did use. [Question 18, parts 'a' to 'l'].

5.4.3.4 ICT provision, availability, and access that could be used to support continuing education, training and development of construction managers.

This section of the questionnaire seeks to establish the levels of availability and access that construction managers have to ICT facilities to support their continuing education, training and development as Fox (2007) identifies this as an important issue that is often overlooked. It also seeks to establish company policies toward ICT use by construction managers for their continuing education, training and development as this too is an indicator in the level and type of management development. These are considered in three sub-sections:

- Access to the Internet;
- Access to computers & ICT facilities; and
- Connectivity of ICT systems to construction sites.

Each of these sub-sections was divided into a number of questions, as shown in Figure 5.55 overleaf.

An assumption was made that all the companies selected, because of their dominance in the construction market place, have corporate ICT intranets and internet access. This would be verified by the checks to be made on the internet for corporate contact information. However the existence of a corporate web-site is not necessarily either an indicator of the extent and level of ICT facilities within the company, or of the access available to them, as web-sites can be hosted by external organisations specialising in these services.

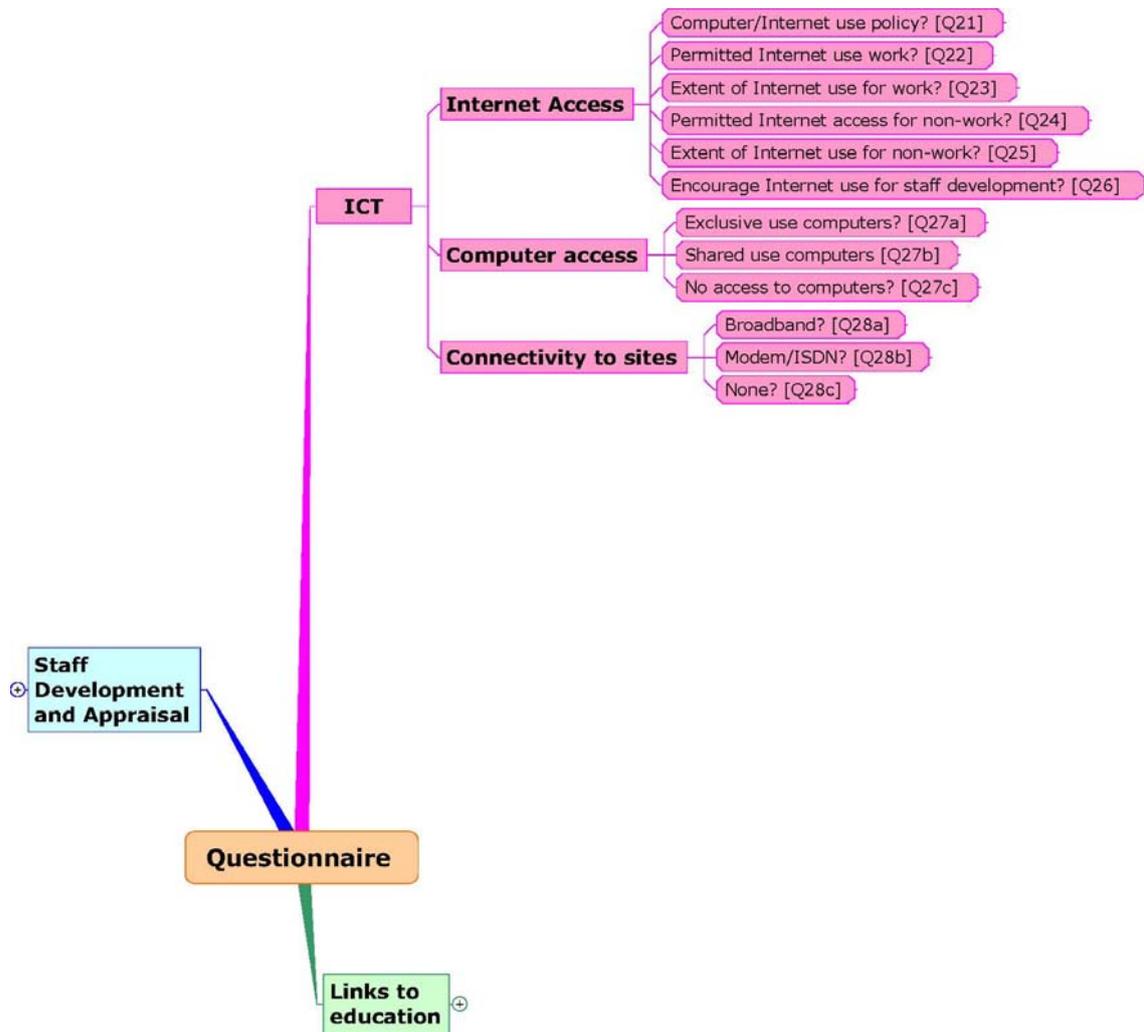


Figure 5.55: Mind-map for ICT questions.

5.4.3.4.1 Access to the Internet

This sub-section seeks establish the nature and extent of access that construction managers are permitted to have to the internet in their working environment. Access to the internet is an important facility in the pursuit of continuing education, training and development as it provides a gateway to numerous educational facilities, not only for access to a wealth of information, but also access to educational establishments and professional institutions. This sub-section consisted of six questions, each helping to establish a picture of each company's ICT facilities for the construction managers.

- Access to the internet will depend greatly on the companies' policies of computer usage and internet access. It was therefore necessary to establish whether or not the companies had a formal policy or policies in respect of these matters. This was to be established with a simple 'Yes/No' question. [Question 21];
- Even though internet access might be available to the construction managers, to what extent are they permitted to use it? Limited/restricted access could have implications for continuing education, training and development if they were subject to severely restricted access. This information would be sought by means of a four-part Likert Scale, comprising 'Not at all', 'Restricted use', 'Few restrictions' and 'Unrestricted'. [Question 22];
- If internet access is available, then how much use of it do construction managers make for work purposes? Respondents were asked to indicate this on a four-part Likert Scale, selecting from 'Little or no use', 'Moderate use', 'Frequent use' or 'Extensive use'. [Question 23];
- In important consideration in any work culture is that of attitude to non-work activities, particularly in respect of Internet use. Some aspects of continuing education, training and development might well be considered as non-work related activity; therefore, it was necessary to establish company attitudes in this respect. Respondents were again required to

indicate the extent to which non-work use of the internet was permitted with a four-part Likert Scale giving the options of ‘Not at all’, ‘Restricted use’, ‘Few restrictions’ or ‘Unrestricted’. [Question 24];

- In conjunction with the above, is the consideration of how much access to the internet do staff make for non-work purposes? Again, a four-part Likert scale was used comprising ‘Little or no use’, ‘Moderate use’, ‘Frequent use’ or ‘Extensive use’. [Question 25]; and
- The final piece of information required from this section was the extent construction managers were encouraged to use the internet for staff development purposes. This information would be sought by means of respondents with a four-part Likert Scale, comprising of ‘Not at all’, ‘Restricted use’, ‘Few restrictions’ and ‘Unrestricted’. [Question 26].

5.4.3.4.2 Access to computers & ICT facilities

Many construction managers spend a great deal of time away from their head office or regional office, with many being based on site full time, particularly on large construction projects. Others will work from their head office or regional office spending a large part of their working week out of their office dividing their time between a number of projects, where they may also have site-based offices. This sub-section therefore seeks to establish the level of access construction managers have to computer facilities. This was undertaken using a single question comprising three sections seeking to establish:

- a) The percentage of staff that have exclusive access to/use of a personal computer (including laptops / notebooks);
- b) The percentage of staff that have shared access to/use of a personal computer (including laptops / notebooks); and
- c) The percentage of staff that do not have any access to/use of a personal computer (including laptops / notebooks).

[Question 27]

This question and the next departed from the format of previous questions in that

they comprised an eleven point rating scale from 0% to 100% in ten percent increments, and that the respondents were requested to give an approximation.

5.4.3.4.3 Connectivity of computing systems to construction sites.

The final question leads on from the last and seeks to establish the level of IT connectivity that exists between construction sites and their head office, and the nature of the connection. Given the remote nature of many construction sites from the head office or regional office the question considered the use of publicly available connectivity using public utility connections rather than dedicated infrastructure connections. The implication of this question is that the nature of the ICT connection (if any) will determine the nature of communication that can be achieved, and thus the usability of the system. This sub-section consisted of a single question comprising three sections:

- a) The approximate percentage of construction sites with broadband connections;
- b) The approximate percentage of construction sites with telephone based (modem) connections, including ISDN; and
- c) The approximate percentage of construction sites that had no IT connection.

5.4.3.5 Analysis of the Questionnaire Survey Data

A key component of any research method is the way the data obtained will be analysed and presented, as different types of data and research methods require different analytical/statistical tools and presentation methods. The analysis and presentation methods used in this thesis are described below.

In order to record and analyse the data from the responses to the questionnaires a series of spreadsheets were created using MS Excel[®]. A workbook was created consisting of a worksheet for each question, twenty-eight in all. As the completed questionnaires were received, data was abstracted from them and recorded in the spreadsheets. Although the construction of the spreadsheets had commenced at the

same time as the questionnaire the structure of the spreadsheets was amended and revised many times as the data was added to not only reflect variations in responses, but the evolution of the data processing itself. The spreadsheets were also used to provide an initial data abstraction to enable the data from the spreadsheets to be copied into SPSS[®] (v.15) in the requisite format to enable more sophisticated cross-tabulated data statistical analysis to be carried out.

The most significant of the enhancements added was the creation of a number of Visual Basic macros to assist with the analysis of the data. Although the author has Visual Basic (VB) programming qualifications at basic and intermediate level this was the first time that that programming Excel spreadsheets had been attempted, which, when coupled with the fact that no serious attempts at VB programming had been undertaken for several years, and that much had been forgotten, a rapid re-learning curve was faced. Once the realisation had occurred that each cell in a spreadsheet acted as a programmable ‘object’ with its accompanying ‘properties’ the task became relatively easy. Macros were created to provide the data matrices from which the bubble-diagrams were derived.

5.4.3.5.1 Sample size required, and confidence limits.

An important issue in any survey is the determination of the sample size necessary to produce results with an acceptable level of confidence of being representative of the population. This can be determined by using an on-line sample-size calculator such as that available at <http://www.raosoft.com/samplesize.html> designed to determine the required sample size for a given population size, level of confidence and acceptable margin of error. This is given by:

$$n = \frac{Nx}{((N-1)E^2 + x)}$$

where:

$$x = Z\left(\frac{c}{100}\right)^2 r(100-r)$$

Where:

n = sample size (greater than 30, normally distributed);

E = margin of error;

N = population size;

r = fraction of response of interest; and

$Z\left(\frac{c}{100}\right)$ is the critical value for the confidence level c.

$$E = \sqrt{\frac{(N-n)x}{n(N-1)}}$$

Table 5.18: Sample size requirements
Source: www.raosoft.com/samplesize.html

| Number of responses required; population = 150 | | Confidence Limit | | | | |
|--|-----|------------------|-----|-----|-----|-----|
| | | 99% | 95% | 90% | 85% | 80% |
| Margin of Error | 20% | 33 | 21 | 16 | 12 | 10 |
| | 15% | 49 | 33 | 25 | 20 | 17 |
| | 10% | 77 | 58 | 47 | 39 | 33 |
| | 5% | 118 | 104 | 94 | 85 | 77 |
| | 2% | 138 | 135 | 132 | 129 | 125 |
| | 1% | 141 | 140 | 140 | 139 | 138 |

Thus for a population size of 150 companies and a recommend confidence limit of 90% with a margin of error of 10% a response rate of 47 questionnaire replies is required, a response rate of 31.33%, as shown in Table 5.18 above. This process can also be reversed to determine the confidence level for a given response rate from a known sample size.

Fellows and Lui (1997) suggest that for the construction industry an expected response range of 25% to 35% can be expected for a postal questionnaire, whilst for general business research Easterby-Smith, Thorpe and Lowe (1991) suggest a typical response range expected for a postal questionnaire is 25% to 30%. From Table 5.18 above it can seen and/or extrapolated for a 10% error rate and a population size of 150 that:

| <u>Response rate</u> | <u>Questionnaire responses</u> | <u>Confidence Limit</u> |
|--|--------------------------------|-------------------------|
| <u>Fellows and Lui:</u> | | |
| 25% to 35% | 38 to 53 | 83% to 92% |
| <u>Easterby-Smith, Thorpe and Lowe</u> | | |
| 25% to 30% | 38 to 46 | 85% to 90% |

Thus using a mean of 30% response from Fellows and Lui, and Easterby-Smith, Thorpe and Lowe a response rate of around 46 questionnaires is required to satisfy the 90% confidence limit that the sample of questionnaires return is representative of the 150 top UK construction contractors.

5.4.3.5.2 The Likert Mean

For the majority of questions that comprised a four-part Likert Scale the data for each response was summed for each response, and the percentage response rate calculated and tabulated. An important aspect of the data analysis is the determination of the mean for the Likert-scale responses. This was done using the following formula:

$$R = \frac{1(A_1) + 2(A_2) + 3(A_3) + 4(A_4)}{r_n}$$

Where R = Mean

A_x = Sum of responses (Answers) to each Likert scale point x

r_n = number of respondents

Where cross-tabulations are made of two sets of responses the data will be subject to the Chi-square Test (χ^2) for parametric data. This will establish the level of confidence in the relationships between the two sets of responses, based on the null hypothesis theory (H_0) that there is no statistically significant relationship between the two sets of responses (Buglear 2001, Curwin & Slater 2002, Bryman & Bell 2003, and Saunders *et al* 2003).

5.4.3.5.3 Type I and Type II Errors

It is also important to understand that two types of error can occur when testing for statistical significance; these are known as Type I error and Type II error. A Type I error occurs when a null-hypothesis is rejected when it should have been accepted, i.e. it is falsely concluded that a relationship exists when in fact there is no relationship in existence. A Type II error occurs when a null-hypothesis is accepted

when it should have been rejected, i.e. it is falsely concluded that a relationship does not exist when in fact there is a relationship in existence.

The probability of an error occurring (significance level of the test) ρ is normally set at either 5% ($\rho < 0.05$) or 1% ($\rho < 0.01$) prior to the test being carried out for business type investigations (Curwin & Slater, 2002). A Type I error is more likely to occur when $\rho < 0.05$ is used as there is a greater risk of rejecting the null-hypothesis when it should have been accepted as $\rho < 0.05$ is equivalent to a 5% error rate, i.e. 1:20 chance of H_0 being true. A Type II error is more likely to occur when $\rho < 0.01$ is used as there is a greater risk of accepting the null-hypothesis H_0 when it should have been rejected as $\rho < 0.01$ is equivalent to a 1% error rate, i.e. 1:100 chance of H_0 being true. The characteristics of Type I and Type II errors are shown in Figure 5.56 below.

| | | Error | |
|--------------|------|---|--|
| | | Type I (risk of rejecting the null-hypothesis when it should be confirmed) | Type II (risk of confirming the null-hypothesis when it should be rejected) |
| ρ level | 0.05 | Greater risk | Lower risk |
| | 0.01 | Lower risk | Greater risk |

Figure 5.56: Type I and Type II Errors
Source: Bryman & Bell (2003: 252, Table 11.11)

5.4.3.5.4 The Chi-Square (χ^2) Tests

Both Buglear (2001), Curwin & Slater (2002) and Saunders *et al* (2002) emphasise that for the Chi-square test to be effective large data-samples (populations) are necessary. Due to the low response rate expected for the questionnaire survey insufficient data might be yielded for the Chi-square Test to be effectively carried out as Saunders *et al* (2002: 358) explain:

The test relies on:

- The categories used in the contingency table being mutually exclusive, so that each observation falls into only one category or class interval.

- No more than 20 per cent of the cells having expected values of less than 5. For contingency tables of two rows and two columns no expected values of less than 10 are preferable (Hays, 1994)

If the latter condition is not met then the accepted solution is to combine rows and/or columns such that the condition is met. Buglear (2001) and Curwin & Slater (2002) comment similarly that any contingency table cell with a value of less than 5 might not produce dependable results, with Buglear (2001: 286) further commenting that any contingency table with a cell value of less than 1 will produce a test where ‘the results are useless’.

Thus with an anticipated low response rate for the questionnaire it might be necessary to consolidate the contingency table to provide either two-by-three cell, three-by-two cell or two-by-two cell contingency tables for a valid Chi-square Test to be carried out, although it is usual to use only the two-by-two cell contingency table. However, instances may occur where consolidation of the contingency table might still not meet the necessary criteria and yield ‘useless results’.

Field (2000) and Kinnear and Gray (2006) echo the problems of the Chi-square Test when small data samples are used, but draw attention to a number of other tests of association that can be used, especially with two-by-two cell contingency tables. These tests fall into two categories of association, Chi-square Tests, and Symmetrical Measures tests:

Chi-Square Tests (χ^2)

- Yate’s continuity coefficient;
- Likelihood Ratio (Λ); and
- Fisher’s Exact Test.

Symmetrical Measures tests

- Phi (ϕ) coefficient;
- Cramér’s V ; and

- Contingency coefficient (Cc)

The Chi-square tests are all variants or improvements on Pearson's original Chi-square test but for a particular situation, however, all produce a Chi-square (χ^2) statistic for comparison. Interpretation of the χ^2 statistic is by consideration of the probability of the results not occurring purely by chance, denoted by ρ , and the number of degrees of freedom (v) of the contingency. Thus a result of $\rho < 0.050$ means there is a greater than 95.0% probability that the results did not purely by chance, and a result of $\rho < 0.010$ means there is a greater than 99.0% probability that the results did not purely by chance. A result of $\rho < 0.001$ means there is a greater than 99.9% probability that the results did not purely by chance. Saunders *et al* (2003) draw attention to the fact that when interpreting the output from computer programs such as SPSS attention must be paid to rounding of decimals, thus an output result of $\rho = 0.001$ indicates that $0.0014 \geq \rho \geq 0.0005$. A $\rho \leq 0.05$ is regarded as being statistically significant, whilst a $\rho > 0.05$ is regarded as statistically insignificant (Saunders *et al*, 2003: 357).

The number of degrees of freedom of the contingency table is determined by subtracting 1 from both the number of rows (R) and the number of columns (C) and multiplying the two together:

$$v = (R - 1) \times (C - 1)$$

thus for a four-by-four contingency table

$$v = (4 - 1) \times (4 - 1) = 3 \times 3 = 9$$

and for a two-by-two contingency table

$$v = (2 - 1) \times (2 - 1) = 1 \times 1 = 1$$

The corresponding χ^2 statistics and ρ for the above are shown in Table 5.18 below.

Table 5.19: Percentage points of the χ^2 distribution.
 Source: Adapted from: Murdoch & Barnes (1986: 17) Table 8

| Contingency Table cells | ρ | 0.05 | 0.01 | 0.005 | 0.001 |
|----------------------------|---------|--------|--------|--------|--------|
| | df | | | | |
| 2 x 2 | $v = 1$ | 3.841 | 6.635 | 7.879 | 10.827 |
| 2 x 3 3 x 2 | $v = 2$ | 5.991 | 9.210 | 10.597 | 13.815 |
| 2 x 4 4 x 2 | $v = 3$ | 7.815 | 11.345 | 12.838 | 16.268 |
| 3 x 4 4 x 3 | $v = 6$ | 12.592 | 16.812 | 18.548 | 22.457 |
| 4 x 4 | $v = 9$ | 16.919 | 21.666 | 23.589 | 27.877 |

5.4.3.5.5 The Symmetrical Measures Tests

The Symmetrical Measures tests give values that indicate the likely strength of association between two variables. An output value of 0.000 would indicate that there is no association between the two variables, whilst an output value of 1.000 would indicate perfect association between the two variables. The Symmetrical Measures tests outputs also provide a ρ statistic to indicate the degree or certainty for the statistic in the same manner as the chi-square test. When using two-by-two cell contingency tables both the Phi (ϕ) test and Cramér's V test produce the same results, thus a ϕ coefficient or Cramér's V statistic of 0.640 with $\rho = 0.000$ indicates a strong association between the two data sets with greater than 99.95% probability that the results did not happen by chance (Field, 2000: 67).

As all of these test are readily available in SPSS (v.15) that will be used to perform the statistical analyses for the cross-tabulation of the question response data. The relevant output tables will be incorporated into the appendices (Appendix 5.10) with the survey results.

5.4.3.5.6 Ranking Tests

Where tests of association are not appropriate, tests to rank the sets of responses can be carried out. Whilst there are many forms of ranking tests the most appropriate for the type of questionnaire and responses proposed, i.e. a Likert Scale, is that of the Relative Importance Index (RI), or Importance Index, that can be used for evaluating the preferences of respondents (Kometa *et al* 1993, Tam *et al* 1999, Odusami 2002). The Relative Importance Index is also known as the Severity Index (S.I.) (Idrus and Newman, 2002).

The ranking will be undertaken by determining the Relative Importance Index for each response and ranking the Relative Importance Indices for each set of responses (El-Haram and Horner, 2002). The Relative Importance Index can be expressed either as a decimal or as a percentage as will be the case in this research.

The RI is determined by:

$$RI = \left(\sum_{i=1}^{i=n} w_i f_i \right) \frac{100}{i.n}$$

where:

- i = number of Likert Scale factors (4),
- w = weighting given to each scale factor (1 to 4),
- f = frequency of responses to each question,
- n = total number of responses.

The Relative Importance Index (RI) will then be used to rank the sets of responses in order of importance.

5.4.3.6 Presentation of Questionnaire Survey Data

Presentation of the survey questionnaire data is achieved by means of tables and bar charts for ease of comparison of the response elements. Stacked percentage bar charts are used to illustrate the percentages of each element of response. These are placed in Appendix 5.A.10 with the contingency tables, with some being reproduced in the text where appropriate for discussion purposes.

Where comparison has been made between two sets of responses bubble diagrams (a form of scatter diagram) have been used to depict the data as a stronger visual depiction of the responses to the two sets of Likert scales. As four-part Likert Scales have been used this produces a four-by-four matrix, which can be sub-divided into four major quadrants which have been colour coded to generally indicate (for example) the degree of progress found, using red (little or no progress), yellow and orange (some progress) to green (substantial or full progress) as shown in Figure 5.57 overleaf.

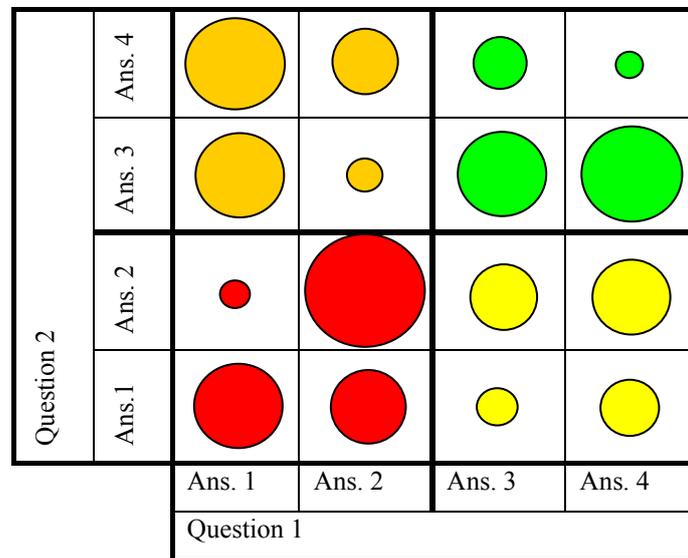


Figure 5.57: Bubble diagram based on a 4 x 4 contingency table.

The area of each bubble represents the relative number or proportion of responses in each element of the contingency table, thus a bubble representing four responses has twice the area of a bubble representing two responses. Whilst the bubble area representation is consistent within each diagram it is not consistent between different diagrams, as in each diagram the largest response is always represented by the same size bubble irrespective of the number of responses represented. Thus in one diagram for the largest response of two, would have a bubble the same size as one representing thirty responses in another diagram. The contingency tables in the appendices should be referred to obtain the relative response rates for each diagram.

Where there is insufficient data to process a four-by-four cell contingency table then it will be consolidated into a two-by-two contingency table, with a represented with a two-by-two bubble diagram as shown in Figure 5.58 overleaf.

All the tables for the responses rates have been taken from the original spreadsheets used to evaluate the data. It should be noted that in some instances where percentage response rates have been given due to rounding errors, the sum total of the percentages might not total 100% exactly. No attempt has been made to edit the figures in the tables to eliminate these occasional discrepancies.

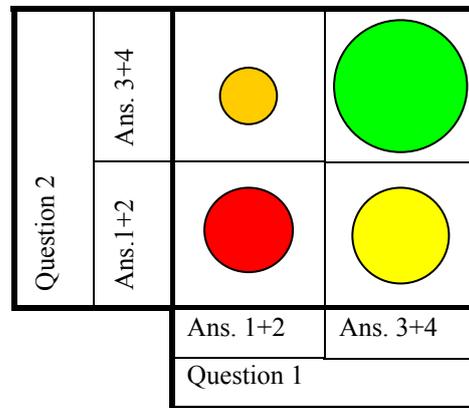


Figure 5.58: Bubble diagram based on a 2 x 2 contingency table.

5.4.3.7 Selection of the Construction Companies for Survey

The UK construction industry consists of some 660,000 companies, ranging in size from one-man operators to huge multi-nationals. The smallest operators are most likely to be working proprietors and partnerships, and therefore most unlikely to be engaged in any form of management education training and development, but the larger organisation were likely to be, and so it is their views that would be sought.

Whilst many of the names of the larger UK construction companies were already well known to the author, a more comprehensive approach was needed. The annual ‘Top Contractors’ lists produced by *Building* magazine (*Building*, 2006) (see appendix 5.A.7) was taken as a starting point. Here, firstly, the top 100 construction

companies were listed by size in terms of annual financial turnover, and secondly, the top 50 construction companies were listed in terms of annual profitability.

As only company names were given each had to be traced by conducting an internet search for their websites in order to obtain their contact details. Whilst this laborious process was being undertaken, another industry magazine, *Contract Journal*, was located which had published a supplement listing the top 100 performing contractors, and top 50 performing house-builders in alphabetical order complete with their addresses and telephone numbers (*Contract Journal*, 2005). These were matched against the *Building* magazine lists and consolidated into a single database, resulting in the contact details for around 135 companies. Of the 150 names and addresses obtained from the *Contract Journal Supplement* the author was suspicious that many of the names and addresses quoted were the companies' registered addresses, as distinct from their normal trading or head-office address, although in many cases they are the same.

Whilst this process was being undertaken a website, Top Companies (2006) was located. This website contained lists by industry and industry segment of the top 150 or 100 companies in each depending upon the size of industry or industry segment. Thus lists were available for the top house builder, civil engineers, building contractors, architects, consultants, etc. In order to maintain compatibility with the other lists the list of the top 150 building contractors was obtained and consolidated into the database to give a final list of 187 companies. However, one of the problems encountered with the *Contract Journal* and the Top Companies lists were that they were compiled from financial data obtained from the annual reports of the companies from different years. These lists were found to have been based on financial reports that were in some instances as much as three or four years old, i.e. dating from 2002 or 2003. During this time it was already known to the author that several of the companies listed had ceased trading, merged, been taken over, or were now trading under different names. Using internet search engines 162 of the companies were identified through either websites or web references as still trading.

One of the biggest problems encountered was finding the correct addresses for the companies. Systematic checking of the websites provided up-to-date addresses, as several companies had also relocated to new locations such as business parks. Out of the 162 companies researched, only two did not have websites, or at least one that could be found, using the Google[®] search engine. In many instances it was often found to be difficult to obtain the company's contact information from their websites. In the case of four websites only, were no contact details of any sort provided and these, it was noted, were those of house-builders. Contact details of sales offices of their developments were provided, but it would seem that they did not want anyone to know the location of the head office or to be able to contact their head office in any way. Many did not provide any e-mail contact details, although often a web-based query form was included in the website, or a 'click-here-contact' link was provided from which the e-mail address could be extracted. Many other company websites listed all their offices around the UK but without giving any indication which was their head office. A further seven companies were found to be part of conglomerates but still trading regionally under their original names. This resulted in a nett total of 149 companies to be surveyed. In the case of ten companies the author ended up with two different addresses, neither of which could be determined as being the head-office. In these instances questionnaires were sent to both addresses.

The most informative company web-sites not only gave full contact details, but also the contacts details for their senior staff, which was sometimes helpful in deciding which address was the head office as it could be matched to the telephone dialling codes.

In order to store the contact information the author constructed a MS Access[®] database to contain the following information about each company:

- company name;
- address;
- telephone number;
- fax number;

- e-mail address for general enquiries;
- web address;
- office details; i.e. registered office, head office or regional office;
- nature of business; i.e. building contracting, civil engineering contractor or house-builder; and
- name, position and e-mail address and phone number for two contacts in each company

The advantage of constructing the database was that not only does it allow the author to create and save the data in the format required, but also that it can be connected to MS Word[®] via the mail-merge facility to produce both individually addressed covering letters and addressed envelopes. Covering letters were to be sent out with the questionnaire, whilst addressed envelopes, produced either through direct printing of the envelopes or through the application of printed self-adhesive address labels (the latter being the easiest and preferred option) would be used to send out the questionnaires.

It was considered that the person in each organisation that would be most likely to be able to provide the desired information would be the head of training and development, be they the director of human resources, training and development director or whatever their job title might be, and it is to these persons that the questionnaire was addressed.

5.4.4 CONDITION: CPD Requirements of the principal professional institutions serving the construction industry

The third aspect of this research is to identify the conditions (other mechanisms), i.e. the causal agents in the industry's external environment that impact upon both the construction companies and their construction managers. Therefore, the third strand of the data collection process was the collection of data appertaining to the CPD

requirements of the principal professional institutions that serve the construction industry.

The CIC (2006:12) identify the following professional institutions or similar bodies operating in the Built Environment as having websites giving the CPD requirements of that organisation. These are shown in Table 5.20 overleaf.

Table 5.20: CIC Full-members with CPD requirements.
Source: CIC (2006:12)

| Name of Organisation | Web address |
|--|--|
| Association for Project Management | www.apm.org.uk |
| British Institute of Facilities Management | www.bifm.org.uk |
| Chartered Institute of Architectural Technologists | www.ciat.org.uk |
| Chartered Institute of Building | www.ciob.org.uk |
| Chartered Institution of Building Services Engineers | www.cibse.org |
| Engineering Council UK | www.engc.org.uk |
| Institute of Clerks of Works of Great Britain | www.icwgb.org |
| Institute of Highways Incorporated Engineers | www.ihie.org.uk |
| Institute of Maintenance and Building Management | www.imbm.org.uk |
| Institute of Plumbing and Heating Engineering | www.iphe.org.uk |
| Institution of Civil Engineering Surveyors | www.ices.org.uk |
| Institution of Civil Engineers | www.ice.org.uk |
| Institution of Highways & Transportation | www.iht.org |
| Institution of Structural Engineers | www.istructe.org.uk |
| Landscape Institute | www.l-i.org.uk |
| Royal Institute of British Architects | www.riba.org |
| Royal Institution of Chartered Surveyors | www.rics.org |
| Royal Town Planning Institute | www.rtpi.org.uk |

However, not all the organisations within list operate entirely within the construction industry. Having investigated the websites of each of the above it was decided that two of these would have their details noted but would not be given further consideration within this thesis. These were:

- The Association for Project Management (APM); and
- The Engineering Council (ECUK).

The APM, although concerned with the management of projects of which the construction industry is composed, is concerned with the management of projects across all industries and thus cover industries as diverse as aerospace, petrochemical, ship-building, health care, information technology, banking and finance, insurance

and automotive industries, all of which have their own distinctive characteristics. Likewise, the Engineering Council is concerned with all engineering disciplines whether part of the construction industry or other engineering industries such as automotive, aerospace, and ship building.

The website for each of the institutions listed in Table 5.18 would be studied in relation to the respective institutions' CPD requirements for its members and the extent to which CPD appeared embedded within the institution. Thus, answers to the following questions would be sought:

1. How many members does each institution have?
2. Was CPD a formal requirement of the institution and what are the CPD policies of the institute?
3. What level of investment in CPD was required by the member in terms of time, or otherwise?
4. What was the CPD requirement/undertaking by the member?
5. What type of CPD activities were acceptable to, or recommended by, the institution?
6. Was the CPD undertaken by the member formally monitored by the institution?
7. What sanctions, if any, would be imposed by the institution on the member for non-compliance with any CPD requirements?
8. Was information about the institutions' CPD requirements freely available on the institutions' website?
9. What type of information, if any, was made available about CPD on the website?
10. Is there any evidence relating to implementation of the EUSCCCIP (1998) recommendations in the institutions' CPD information?
11. Can members record their CPD undertakings on-line with the institution?

Where information about an institution's CPD requirements could not be fully ascertained from their website, or there was a need to clarify detail, then the

investigation of the website would be followed by a telephone enquiry to the respective institution in an attempt to resolve any outstanding issues.

Data collected from websites and from telephone interviews would be recorded on a pro-forma document created in MS Word[®] under the headings described above. Where possible text data from the websites and/or downloadable documents would be copied and pasted into the pro-forma, with additional data and notes being added from the interviews where necessary. The pro-forma created can be seen in Appendix 5.A.11 *et seq.*

5.4.4.1 Professional Institution CPD Survey Data

Data collected from the professional institutions about their current CPD requirements is mainly qualitative in nature. The only quantitative data that was obtained related to the numbers of members they have and the number of members sampled by their respective institutions for CPD compliance. Qualification data obtained will be tabulated and collected to determine basic information such as:

- Total number in professional/corporate grade membership;
- Numbers subject to various CPD regimes; and
- Evidence of CPD policies.

Most of these can be reduced to percentages for comparative purposes.

5.4.4.2 Analysis and Presentation of Professional Institution CPD Survey Data

No complex statistical analysis will be undertaken as the nature of the data, whilst considered reasonably accurate and up to date, has the embedded problem of members belonging to more than one professional institution. The only meaningful quantitative analysis that will be obtained will be the CPD sampling percentages of members. Where qualitative analysis is to be carried out data will be recorded and processed using Excel[®] spreadsheets. Presentation of quantitative data will be mainly by way of tables and simple bar charts.

Qualitative data obtained will consist of text abstracted from the institutions' web sites and/or online (downloadable) documentation appertaining to their CPD policies

and requirements. Data will be presented by means of completed pro-forma (see Appendix 5A.11) and discussion in the findings in Chapter 5.7.

5.4.5 Conclusions

This chapter has set out the research methods to be employed in each of the three strands of research in this thesis. Thus, the critical realist approach has facilitated the adoption of a multi-modal approach to the research for each of the three components of the critical realist research model as summarised below:

The first strand in this research to identify the ‘structure’ and seeks to address the first research sub-question ‘How does the structure of the construction industry affect continuing education training and development of construction management?’. It consists of a desktop study to determine the structure of the construction industry in terms of the numbers of companies and the employment distribution within those companies and the industry as a whole. This should reveal the strata and their emergent properties that develop as the industry evolves in response to the various cycles of economic ‘boom and bust’ it encounters that impact upon education training and development. It will also seek to determine how the structures and employment distribution in the construction industry is evolving. This research will be quantitative in nature. The findings from this strand of the research are presented and discussed in Chapter 5.5 ‘Structure: The Evolution of the Structure of the Construction Industry’.

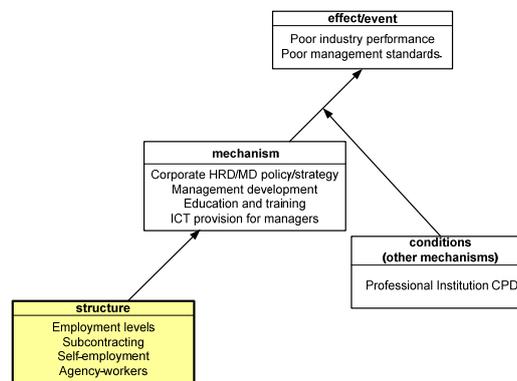
The second strand of this research to identify the ‘mechanism’, that provides the main focus of the research, and seeks to address the second research sub-question ‘What continuing education, training and development of construction managers is currently undertaken by construction companies?’. It will employ a postal questionnaire survey to determine the current status and attitudes towards education, training and development of construction managers in the top 149 UK construction companies. This will be a quantitative study. The importance of the findings lies not only in the responses to the individual questions but also in the cross-tabulations of

the responses. Statistical analysis will be employed to establish the statistical significance of the cross-tabulations of the responses based on the null-hypothesis theory. The findings of this survey are presented and discussed in Chapter 5.6 'Mechanism: Education, Training and Development of Construction Managers'.

The third and final strand of the research to identify the 'condition' is intended to provide a snapshot of the CPD requirements of the principal professional institutions serving the construction industry and seeks to address the third research sub-question 'How do the professional institutions serving the construction industry influence the continuing education, training and development of managers?'. This comprises a desktop study of the professional institutions' websites and downloadable documentation relating to CPD requirements. The study is largely qualitative in nature supported by quantitative analysis of membership numbers. The findings of this survey are presented and discussed in Chapter 5.7 'Condition: Professional Institution CPD Requirements'.

The next chapter, Chapter 5.5 Structure: Structure of the Construction Industry, is the first of the critical realist research model components and will seek to establish the structural strata of the industry in terms of its composite firms in the form of contractors and specialist trades contractors, and the nature of employment with the industry.

5.5 Structure: The Structure of the Construction Industry



5.5.1 Introduction

This chapter comprises the findings of the first element, ‘structures’, of the critical realist research model, and seeks to address the first research sub-question ‘How does the structure of the construction industry affect continuing education training and development of construction management?’

Earlier documents in this DBA programme have made references to the complexity of the structure of the construction industry, not only in terms of its size and composition, but also in terms of its economics. This chapter revisits these topics and considers how the emergent properties of these industry strata and their agencies impact upon management education, training and development within the industry and its construction managers. This will be considered primarily by examination of the levels and composition both within the industry and potentially from historical and contemporary perspectives.

The economic performance of the industry and the economy will also be considered, not least because employment levels and economic performance in the industry are inextricably interlinked. An in-depth analysis of the industry’s economic performance will not be undertaken as this is beyond the scope of this study. There have been over the years, a number of in depth studies of the UK construction industry, some of which have become seminal works in their own right, such as Hillebrandt’s ‘Economic Theory and the Construction Industry’ (2000).

The implications of the evolving structure of the construction industry will be considered in terms of its effects on management education, training and development.

5.5.2 Historical Trends in Employment

Although the construction industry is almost as old as mankind itself and has played a major part in almost every civilisation throughout history, the modern UK construction industry has its roots in the industrial revolution of the eighteenth and nineteenth centuries when the UK moved from a predominantly rural agricultural economy to a predominantly urban industrial economy, bringing with it a migration of population from the countryside to the new centres of industry and commerce. The expansion of existing towns and cities and the creation of others brought with it the need for not only new commercial and industrial buildings, but also a vast need for housing and other infrastructure works.

In the pre-industrial revolution era the construction industry was almost entirely craft based with skills either being passed down from father to son(s), or through the undertaking of formal apprenticeships and indentureships with master craftsmen. Many of the traditional construction crafts are still evident today in family names (surnames) such as Mason, Carpenter, Tyler, Dawber, Slater, Glazer, and Thatcher, although few people today, if other than by coincidence, have a family name that reflects their trade. A more comprehensive, but not definitive, list of names can be found in Appendix 5.A.1.

The extent of employment in the construction industry in pre-industrial revolution times is not known, and probably never will be known, due to a lack of records. Even with the advent of the National Census peoples' occupations were not recorded in the early days (Powell, 1980). However, sufficient detail is available to give an indication of the size of the industry in terms of its importance to the economy. Even so the census figures are reported as difficult to interpret due to the way occupations

were classified, for example, Powell (1980: 26) reports the 1851 census as showing 497,000 persons employed in the building and construction industry whilst Bowley (1966: 326) reports the same census as showing 390,000 persons employed. An additional problem is also the defining of the boundary of the construction industry, i.e. what is included within the industry and what is not included within it.

Bowley further reports that, in 1851, 1 in 46 persons of working age were employed in the industry and that by 1901 this had risen to 1 in 34. Attempts to establish the size of the construction industry in the First World War (WW1) era led to some interesting and innovative ideas such as those by Lewis (1965) in establishing the tax paid on construction materials such as bricks, glazing glass, timber imports, etc., or the use of census data to establish the number of new houses and other buildings constructed in the census period (Richardson and Aldcroft, 1968; Lewis, 1965; Powell, 1980). Even these attempts produced little more than indicative results, and even then they were principally concerned with the economic activity of the industry rather than employment, notwithstanding that the two are interdependent.

Despite the importance of the construction industry to the national economy it is not until 1923, when the Government publication 'Annual Abstract of Statistics' (AAS) lists those employed by building companies and public works bodies (local authorities and public utilities) for the first time, is a clear indication of the employment level in the construction industry obtainable. However, no detail is provided regarding the nature of that employment in terms of occupations and professions within the industry. Nevertheless, these statistics are still published annually by the Government and a consistent profile of the overall employment can be established from 1923 until the current year. Here the boundary of the industry is defined as those directly employed in the construction (building) process, and excludes those employed in materials manufacture and supply for the construction industry. The figures for the level of employment in the construction materials and supply sector cannot be ascertained from the AAS.

It can be seen from Figure 5.59 below that the UK workforce jobs level has been subject to a number of periods of expansion and contraction reflecting the varying fortunes of the national economy, highlighting the recessionary periods of the early 1970s, 1980s and 1990s, the latter two being very pronounced. Figure 5.59 also shows the percentage of the UK workforce contributed by the construction industry.

Clearly the period of WW2 (1939 – 1945) and the immediate post-war period saw considerable changes to the workforce of the UK as mobilisation of the armed forces and the accompanying period of conscription (and national service) saw many tens of thousands of workers leave their normal occupations to join the armed forces. As the construction industry was not, in the main, a reserved occupation, the effect of conscription is clearly visible as a large part of the construction workforce was conscripted. During this period of hostilities all but the most essential construction work ceased, and much of the construction work that did take place was either in the form of work for the armed forces such as construction of barracks, airfields, civil and military defences, and naval facilities, or in essential factory building and extension in preparation for war, and repair and maintenance work (Bowley, 1966).

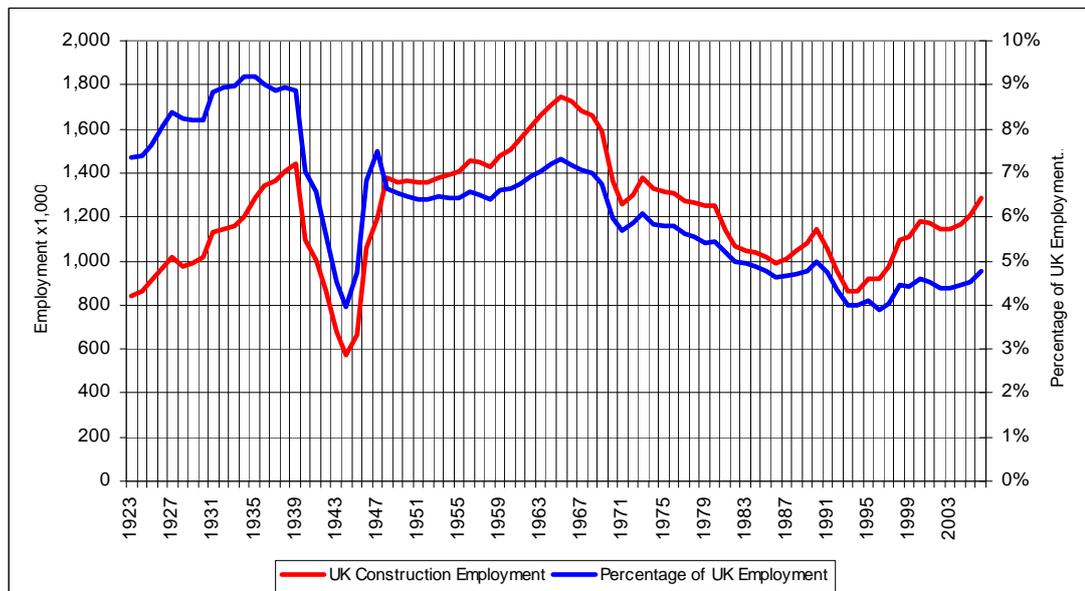


Figure 5.59: UK Construction Industry Employment 1923~2006

Source: Annual Abstracts of Statistics. Data: Table 5.A.2 in appendix 5.A.4

During the period of the mid to late 1930s, in the run up to the declaration of war, a period sometimes referred to as the 'phoney war' when tensions in Europe were building, the increase in construction work is detectable as a surge in the workforce as there is an urgency to construction military and civil defences, both in response to increasing threats from Europe and in the preparation for an impending war. Some of this expansion absorbed those who were unemployed. However, once hostilities had been formally declared and the armed forces mobilised all non-essential construction work ceased as the economy changed from that of a peace-time commercial economy to that of a war economy.

The construction industry, having a predominately male workforce saw 60% percent mobilised into the forces. Other major industries such as engineering switched or converted their production to military products, and needed to maintain if not increase their workforces. Like the construction industry the engineering industries also had a predominately male workforce which, where mobilised, was replaced by female workforce that took over the absent male workforce's jobs. This did not generally occur in the construction industry.

Once hostilities had ceased the need for a large military force diminished and the conscripted forces were progressively demobilised, enabling conscripts to return to their civilian lives and occupations. For the construction industry this presented a number of issues that had to be overcome. There was a vast amount of reconstruction and repair work to be undertaken including a large number of new houses that were needed as either replacement for those destroyed, or to accommodate returning forces, setting up home and starting families for the first time (the post-war baby-boom). In spite of this apparent demand there were considerable concerns over whether or not there were jobs in the industry for the workers to return to as all non-essential construction work had ceased during the period of hostilities. There were also many problems regarding skilled labour as during this period virtually no trainees and apprentices had entered the industry and a great many skilled workers had been conscripted into the armed forces. Many of these workers upon demobilisation did not return to the construction industry as, paradoxically, due to

severe rationing of building materials and a protracted licensing scheme to undertake building work there were, initially, few employment opportunities available. Furthermore, a large number of those being demobilised had not had civilian employment and had been either unemployed before the war, or had been conscripted as school leavers; now seeking employment many registered as construction labourers thus further increasing unemployment in the industry (Powell, 1980).

Following the post-war austerity period and the end of rationing the construction industry enjoyed steady growth and expansion as reconstruction and redevelopment began in earnest along with new construction and development work. In this era of economic optimism employment in the industry increased to reach an all-time high of 1.75 million in 1965. Since then the post-war repair and redevelopment work has ended and the construction industry has seen a steady decline in the workforce as the industry settles back to a more natural level of activity. However, during the post-war era the industry also saw a distinctive change in employment patterns, going through three distinct phases in parallel with government policy identified by Harvey (2003) as, firstly, a continuance of the crafts-based directly employed workforce with a substantial amount of the workforce in local authority employment engaged in social housing construction from 1945 to 1957/8 (Harvey, 2003: 189); Secondly, during the period 1957/8 to 1977 there followed a period of relative stability with a balance of public/private works, with much public/social housing works being undertaken by workers directly by local authorities in Direct labour Organisations (DLOs) acting in effect as contractors to themselves; Thirdly, during the period 1977 to 1997 Government policy then moved away from social housing towards private ownership (owner-occupiers) together with a gradual decline in local authority employment of construction workers in DLOs due to government austerity measures that eventually saw the privatisation of the DLOs and a virtual end to local authority employment of construction workers.

This era also saw a significant growth in speculative building and growth in subcontracting firms. This was in parallel to a government moratorium on the construction of local authority housing together with a policy of selling-off local authority housing to the tenants to reduce the social housing stock and financial liability on local authorities for their maintenance and upkeep, and to promote the government's policy of encouraging home-ownership (Harvey and Behling, 2008). Thus government policy saw the replacement of local authority housing with housing provided by housing associations, thus moving public housing into the private sector where the government believed competitive construction practices would result in lower cost provision of social housing.

Whilst the above provides a useful historical profile for the industry the employment level is not compatible with the employment levels given by the Construction Statistics Annuals and its predecessors (see Documents 2 and 4). Figure 5.60 overleaf shows a comparison of the two sets of employment data from 1969 onwards. There is a discrepancy in the reported levels of employment in the construction industry between the two report series where it can be seen (Figure 5.60 overleaf) that these vary from 15% to almost 40%. Some of the differences can be attributed to the following.

- AAS use Spring (Q1) employment levels whereas the CSA use either Autumn (Q3) employment levels, or reports employment levels for all four quarters;
- The AAS use seasonally unadjusted figures whereas the CSA does not; and
- The boundary of the construction industry used in the reports cannot be established, so therefore the AAS and CSA may be reporting differently bounded populations, thus highlighting the problem of defining the industry boundary, rather than errors in the statistics.

A further problem in establishing employment levels in the construction industry, and certainly applicable to the pre-Second World War (WW2) era is the high level of seasonal employment in the industry, especially amongst unskilled and low-skilled

workers, many of whom were itinerant workers. Even skilled workers were not immune to seasonal variations in employment (Wittcock, 1967). Modern construction methods and new technologies, as well as increasing financial pressures, have greatly diminished the seasonal variations in employment in the UK at least, but nevertheless, seasonal variations in employment do still exist in the UK construction industry.

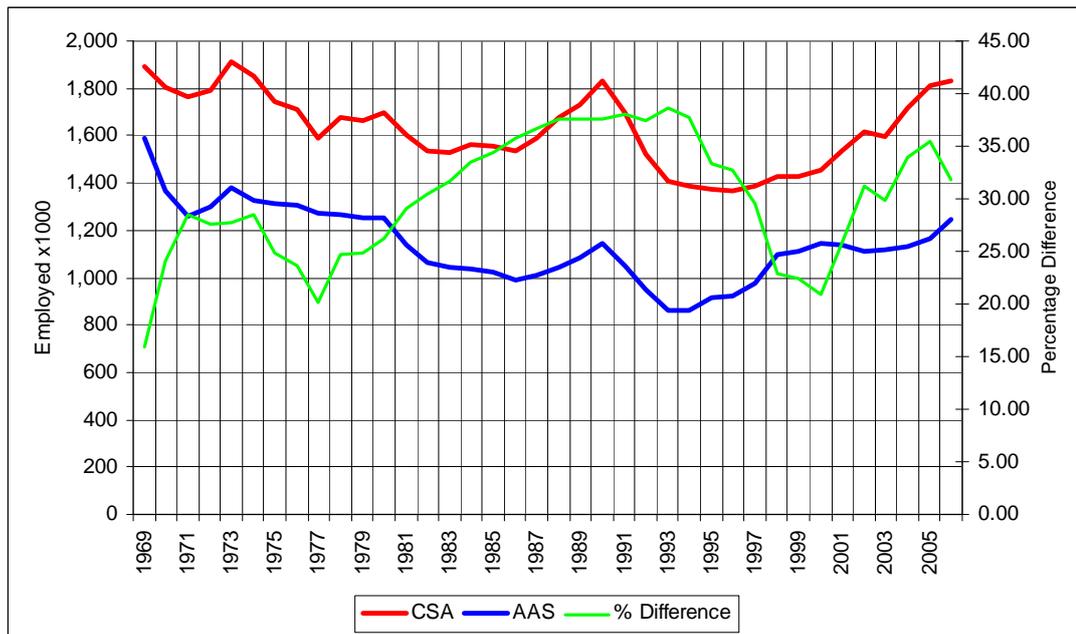


Figure 5.60: Comparison of AAS and CSA employment figures 1969~2006.
Source: Annual Abstract of Statistics and Construction Statistics Annuals

Figure 5.61 overleaf shows the seasonal effect of employment in the construction industry. Quarterly employment data was not published before 1983.



Figure 5.61: Quarterly Employment Levels in the Construction Industry 1983~2006.

Source: Construction Statistics Annual & Housing and Construction Statistics

Although the data in the above graph only covers the period since 1983, seasonal trends are very obvious. Inspection reveals that in times of either strong inflation or strong deflation (recession) little seasonal variation occurs with, respectively, either a steady increase or decrease in employment occurring. Only in times of relative stability when either the inflationary period has levelled out at the top of the cycle, or when the deflationary cycle has levelled out at the bottom of the cycle does any seasonal variation occur. The 'traditional' view of construction employment is that it is higher in summer when good weather means more work can be achieved, than in winter when bad weather results in less work being undertaken. However, these graphs suggest that the opposite is the case with employment being higher in the winter period than in the summer. One possible anecdotal explanation of this phenomenon is that many transient workers seek more lucrative seasonal work in other industries, such as tourism and agriculture, during the summer months, returning to the construction industry for the winter months when other work is not available.

In the previous documents, and in this document, where employment figures have been taken from the Construction Statistics Annuals the average annual employment levels have been used, these being an average of the four quarterly employment

figures given. The effect of this has been to eliminate the effects of seasonal variations in construction industry employment.

5.5.3 National Employment Trends

Consideration of the national employment trends will reveal whether or not employment numbers in the UK construction industry are changing with respect to the national employment pattern, and what, if any, trends in employment levels exist. It has already been shown in the earlier documents that the construction industry is subject to cyclical variations, but not whether these cyclical variations have any significant impact upon the national employment patterns. Therefore, consideration will now be given to the following aspects of employment and seek to establish what, if any, changes are taking place in:

- The number of people employed in the UK construction industry;
- The UK working population;
- Gender composition in the UK working population; and
- Gender composition in the UK construction industry working population.

5.5.3.1 The UK construction industry population

The historical employment trends within the construction industry have already been established, but what has yet to be established is the importance of the construction industry as an employer in terms of UK national employment. The employment data that has been used for this analysis has been taken from the CSA and, its earlier incarnation, the HCS. In order to make a more consistent comparison of working population and national population, data has been taken from the Annual Abstracts of Statistics which provides a detailed breakdown for all industries using the Standard Industry Classification¹ (SIC) 2003. Although it was found that the SIC has been revised three times (1992, 1997 and 2003) during the lifetime of the reports and reclassification has led to minor discontinuities in some of the population data collected. This is no more than a minor inconvenience, rather than a source of error in the data, as it is the overarching trends that are the important issue.

¹ The SIC was first introduced in 1948 and was been revised in 1958, 1968, 1980, 1992, 1997 and 2003.

As can be seen from SIC-2003 Section F.45 Construction (see Table 5.20 overleaf) that is often used to classify the boundary of the construction industry it is quite narrowly defined (Briscoe, 2006) with many other construction related activities being classified in different sections, for example, Section C includes quarrying and minerals (aggregates), Section D includes manufacturing of many building materials and components and section K includes real estate, renting (plant hire without operators) and distribution. The result of which is that, according to Briscoe (2006) the boundaries of the industry, in terms of the SIC-2003 classifications becomes blurred and indistinct making industry definitions and comparisons difficult in some circumstances, leading to questions as to whether or not the industry should be subject to a wider definition than that offered by SIC-2003 (Pearce, 2003).

As was demonstrated in the previous chapter there are considerable differences between the reported AAS and CSA statistics. The author chose to use the AAS figures for this part of the study as they are consistently reported within the series. An additional benefit of ASS statistics is the ability to determine trends in employment levels by gender as these have been reported since 1978, something not reported in the CSA.

Table 5.21: SIC-2003 Classifications for Construction

Source: SIC (2003: 34) Section F.45

| Section F | Construction |
|------------------|---|
| 45 | Construction |
| 45.1 | Site Preparation |
| 45.11 | Demolition and wrecking of buildings; earth moving |
| 45.12 | Test drilling and boring |
| 45.2 | Building of complete construction or parts thereof; civil engineering |
| 45.21 | General construction of buildings and civil engineering works |
| 45.21/1 | Construction of commercial buildings |
| 45.21/2 | Construction of domestic buildings |
| 45.21/3 | Construction of civil engineering constructions |
| 45.22 | Erection of roof coverings and frames |
| 45.23 | Construction of motorways, roads, railways, airfields and sports facilities |
| 45.24 | Construction of water projects |
| 45.25 | Other construction works involving specialist trades |
| 45.3 | Building installation |
| 45.31 | Installation of electrical wiring and fittings |
| 45.32 | Insulating works activities |
| 45.33 | Plumbing |
| 45.34 | Other building installation |
| 45.4 | Building completion |
| 45.41 | Plastering |
| | Joinery installation |
| | Floor or wall covering |
| | Painting or glazing |
| | Other building completion |
| 45.5 | Renting of construction or demolition equipment with operator |
| 45.50 | Renting of construction or demolition equipment with operator |

5.5.3.2 The UK working population.

The working population includes all those over school leaving age (currently 16 years old) in work and those who are theoretically available for work, i.e. those who are (as shown in Figures 5.62 and Figure 5.63 overleaf):

- In Employment;
- Unemployed; and
- In HM forces.

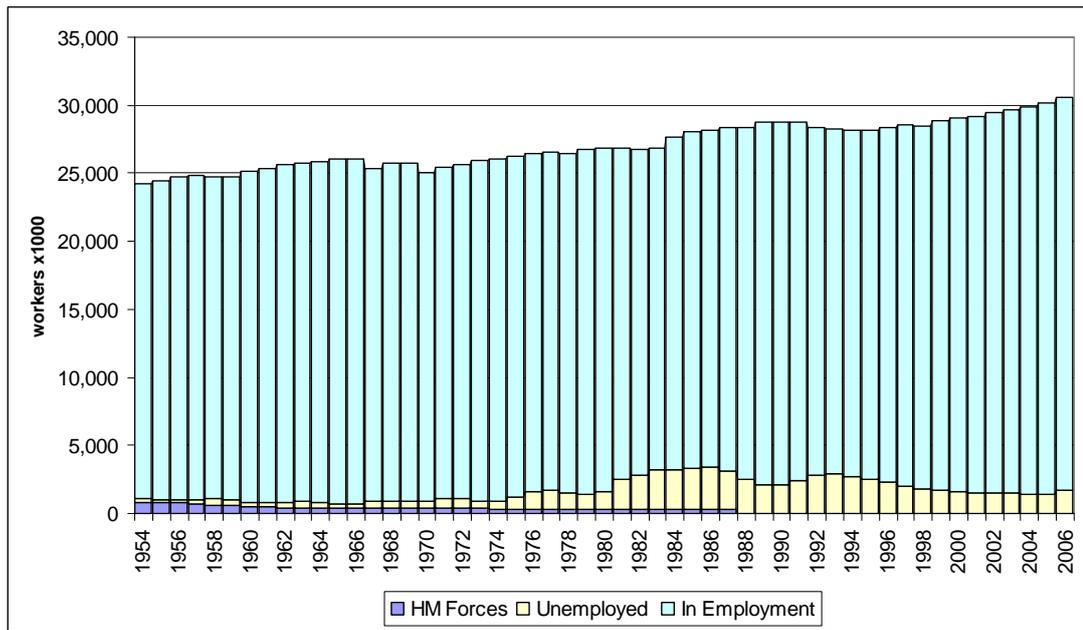


Figure 5.62: UK Working population 1954~2006
Sources: Annual Abstracts of Statistics

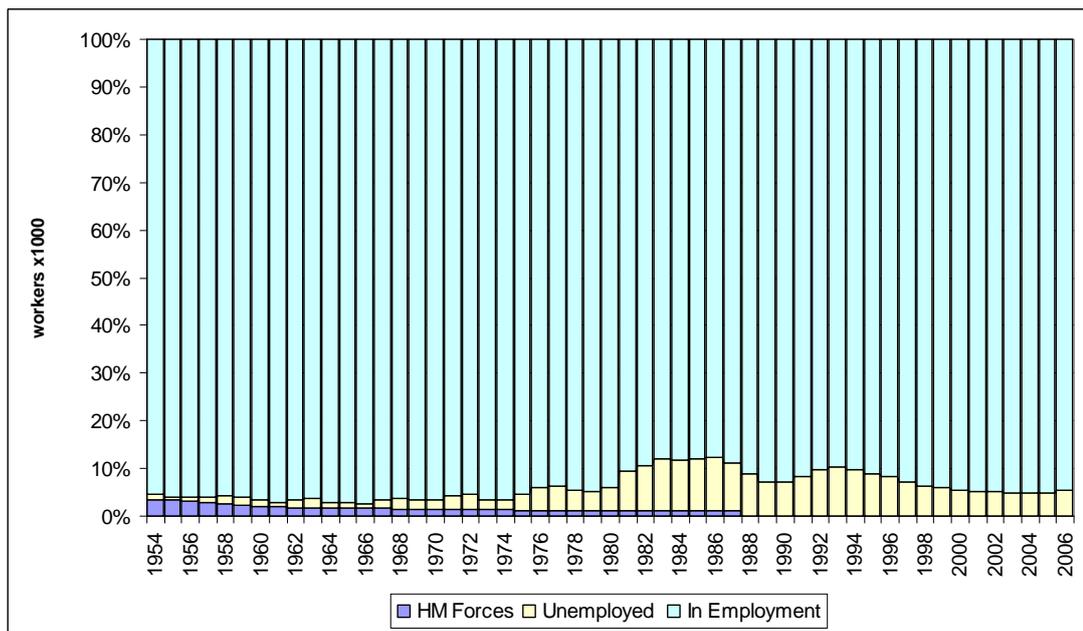


Figure 5.63: UK Working population percentages 1954~2006
Sources: Annual Abstracts of Statistics

However since 1988 those in HM Forces have been categorised as being in employment and those who are considered economically inactive have been added to the labour force. Figures 5.64 and 5.65 overleaf show the UK working population and its constituent parts.

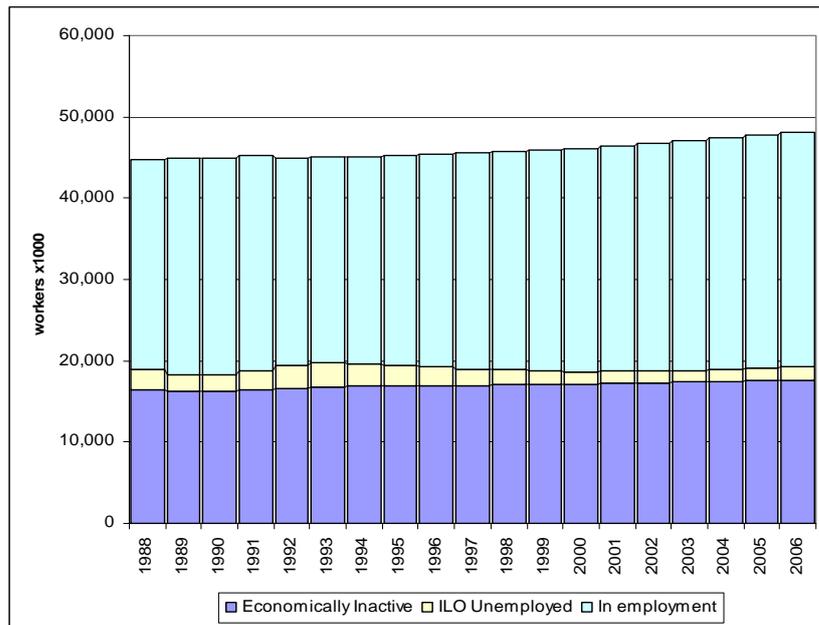


Figure 5.64: Working population of the UK 1988~2006
Source: Annual Abstracts of Statistics

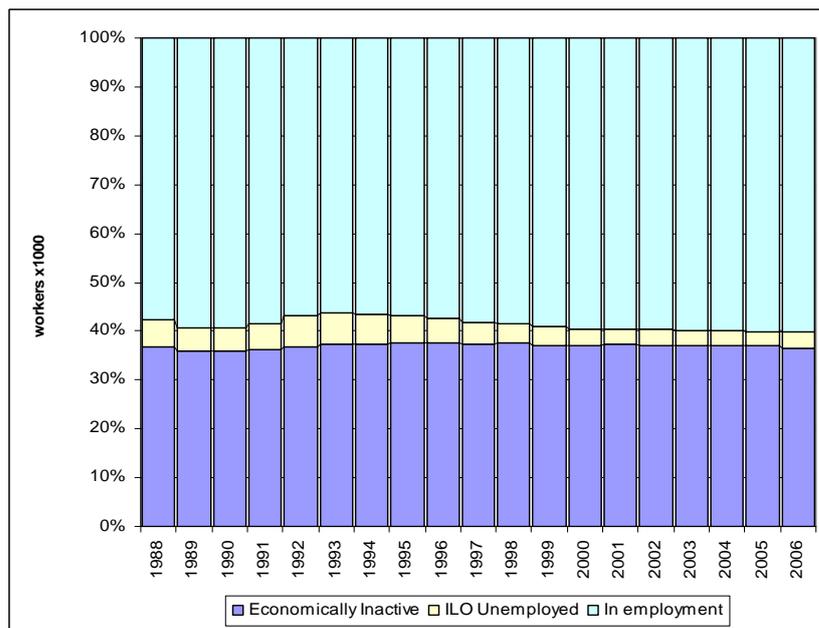


Figure 5.65: Working population percentages of the UK 1988~2006
Source: Annual Abstracts of Statistics

Within those in employment it is useful also to consider the gender composition of the workforce.

5.5.3.3 Gender Composition of the Workforce

As has been discussed earlier in this chapter, World War 2 saw many women taking over jobs that were traditionally considered ‘men’s work’. This included, in particular, taking over engineering jobs in factories, and elsewhere such as farming where the Women’s Land Army was established. Whilst these changes are well documented in many historical and social studies texts, little mention is given to the construction industry, largely because the men were not replaced; construction was not considered as vital to the war effort as engineering and agriculture.

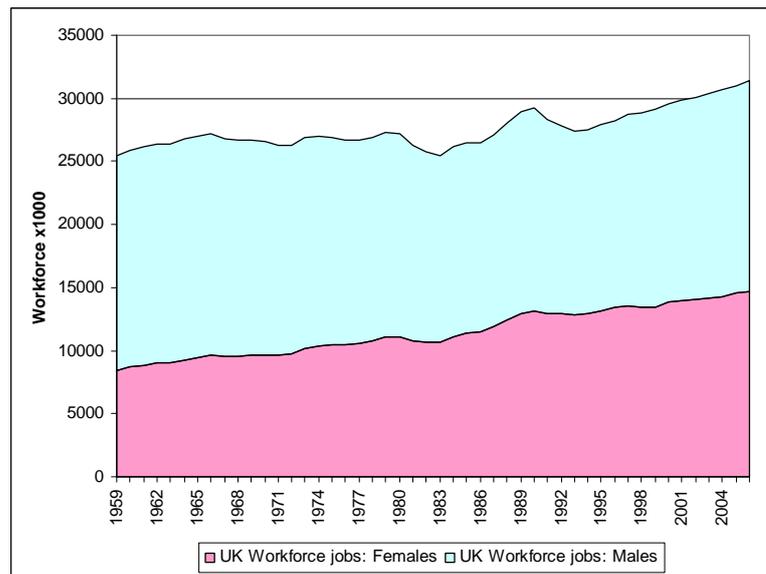


Figure 5.66: Gender Composition of the UK Workforce 1959~2006

Source: ONS Online

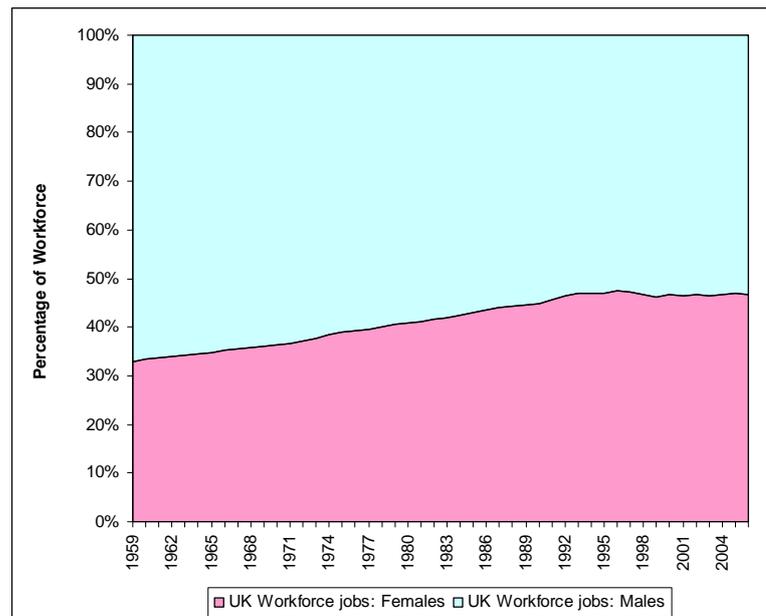


Figure 5.67: Percentage Gender Composition of the UK Workforce 1959~2006

Source: ONS Online

Since then the UK workforce has seen a steady increase in the working population of women to around 46% of the workforce in early 1990s, with this remaining relatively constant since then (see Figure 5.66 and Figure 5.67 above). The workforce composition in the construction industry shows a very different pattern. The male/female employment levels in the construction industry have only been published since 1978.

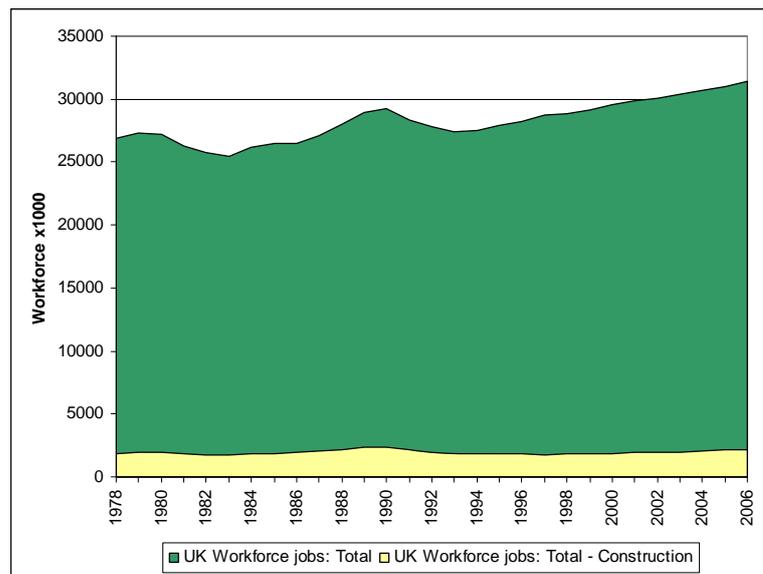


Figure 5.68: Contribution of Construction to the UK Workforce 1978~2006
Source: ONS Online

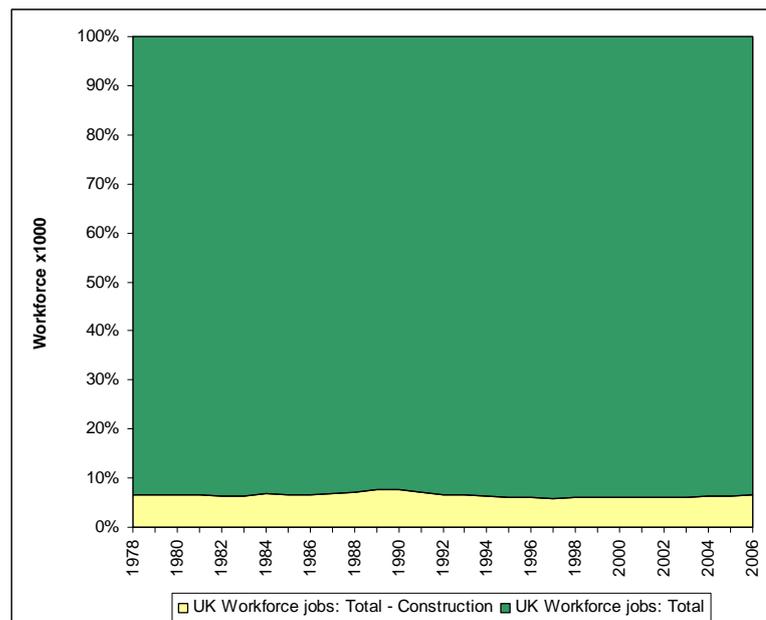


Figure 5.69: Percentage Contribution of Construction to the UK Workforce 1978~2006
Source: ONS Online

Despite the considerable fluctuations in employment levels in the industry the female component of the workforce does not show the same degree of fluctuation as the male workforce. Employment of females comprises around 8% of the construction industry workforce compared to 46% of the national workforce as shown in Figure 5.68 and Figure 5.69 above. This can be attributed to the fact that many females in the construction industry are employed in APTC roles which are less susceptible to changes in industry workload and employment levels than trades and crafts roles, as can be seen Figure 5.70 and Figure 5.71 overleaf.

Construction, it can be seen, has around 25% of the number of females working in it compared to other UK industries, and furthermore it has not shown any significant increase when compared to the national pattern.

5.5.4 Economic Contribution

Although this thesis does not intend to make an in-depth study of the economics of the construction industry its importance to the UK economy cannot be ignored or disregarded. The most commonly used indicator of the level of economic contribution to the national economy is that of Gross Domestic Product (GDP). GDP can be defined as:

The value of goods and services produced for final use in consumption, capital expenditure and exports.

(Harvey and Ashworth, 1993: 3)

However Cook (1996: 172) gives GDP as:

... a country's GDP is measured by estimating the value of the flow of goods and services it produces over a given period of time, usually one year. This makes no distinction between the output of domestic firms and that of foreign-owned firms operating within the domestic economy.

Cook's definition is equally applicable to an industry as well a country. GDP is a particularly useful measure for construction as a number of the UK's largest construction companies are or were foreign owned, for example: Bovis (Australian-

owned); Kvaerner (Norwegian-owned), Skanska (Swedish-owned) and Vinci (French-owned).

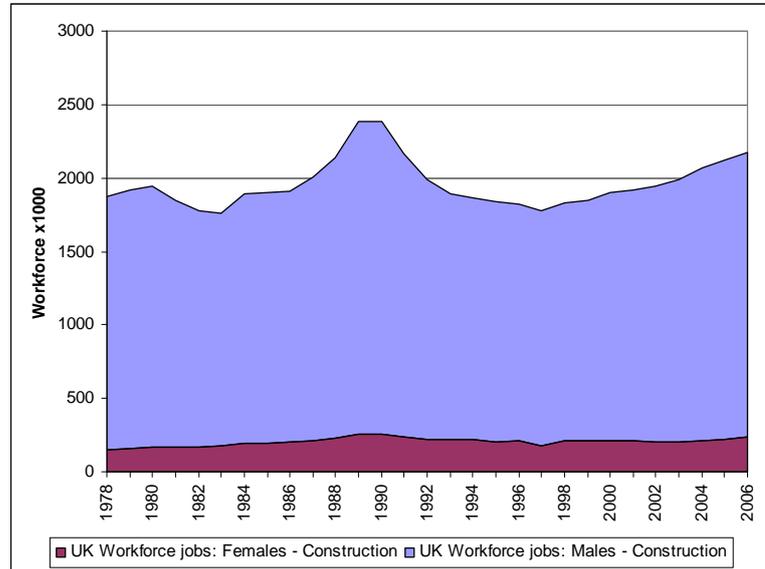


Figure 5.70: Gender Composition of the UK Construction Workforce 1978~2006
Source: ONS Online

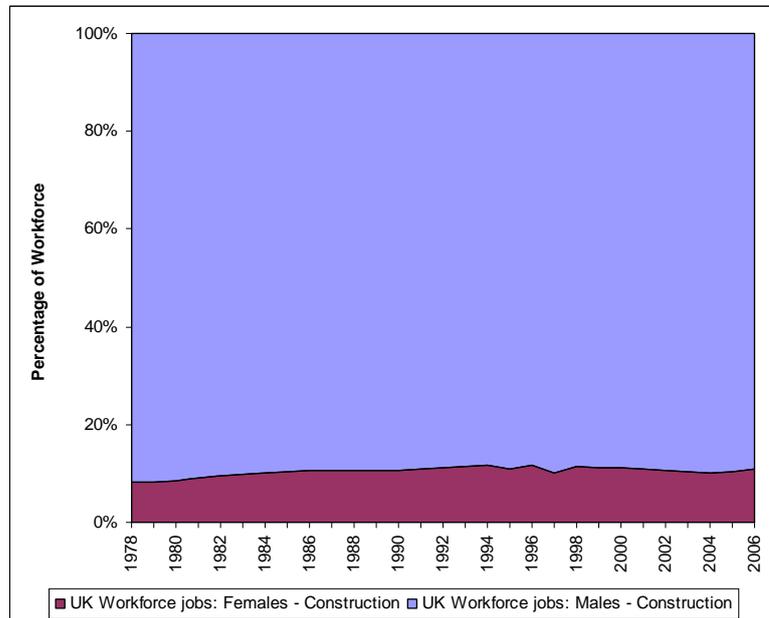


Figure 5.71: Percentage Gender Composition of the UK Construction Workforce 1978~2006
Source: ONS Online

Since 1989 new accounting standards have come into effect and in addition to GDP Gross Value Added (GVA) is now also reported. GVA is defined National Statistics (2002) as:

$$\text{GVA} = \text{GDP} - \text{taxes on products} + \text{subsidies on products}$$

or conversely

$$\text{GDP} = \text{GVA} + \text{taxes on products} - \text{subsidies on products}$$

Like employment GDP/GVA in construction is not easy to determine as the same problems in defining the boundary of the industry applies. Reference to the AAS enables GDP for both the nation and the construction industry to be established from 1948 onwards, as the concept of GDP was not devised until the 1940s. Many authors (e.g. Harvey and Ashworth, 1993; Hillebrandt, 1984) routinely report the GDP of the UK construction industry as being around 6% as this figure is often quoted as the GDP for the industry and that it is low in comparison to many other countries, even the USA at 9% (Hillebrandt, 2000). It is not that the output of the construction industry is low compared to other countries, but the GDP appears lower due to the UK's large earnings from the finance and banking markets, these being far less dominant in other national economies (Porter, 1990). Neither is the GDP constant at around 6%, but varies according to the state of both the national and industry economies (Ive and Gruneberg, 2000).

Figure 5.72 overleaf shows the GDP for the construction industry as a percentage of the national GDP. It should be noted that GDP for the construction industry is not reported after 1996 as it has been superseded by GVA, although GDP continues to be reported for the national economy. Both GDP and GVA are shown in Figure 5.72 overleaf.

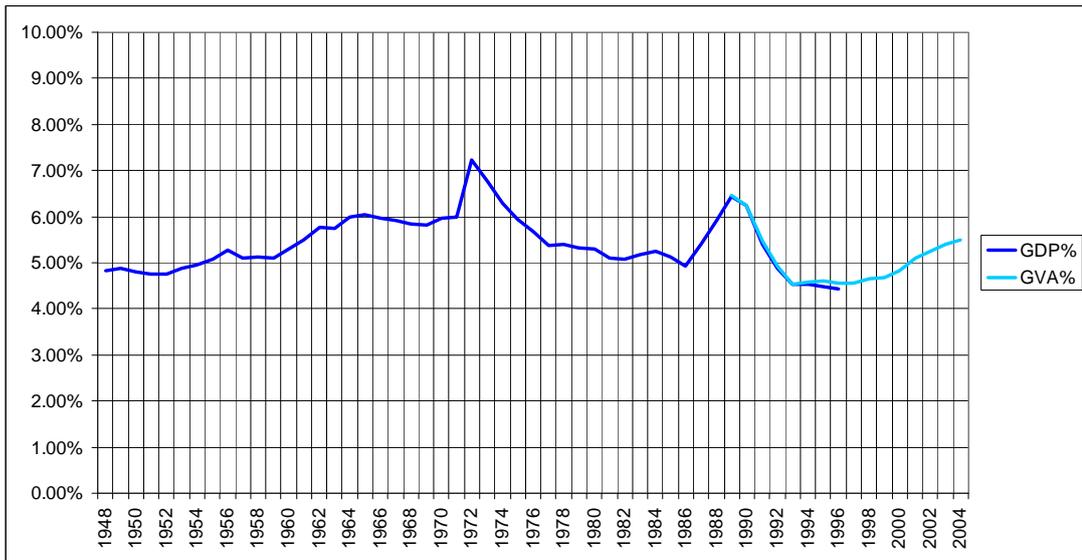


Figure 5.72: GDP/GVA percentage for the construction industry 1948~2004
 Source: Annual Abstracts of Statistics

In Figure 5.72 above and Figure 5.73 below GDP and GVA are shown as a percentage of the national GDP, rather than the actual amount. This overcomes the problem of performing complex indexing calculation adjustments to adjust for inflation to bring the yearly value to a common year basis.

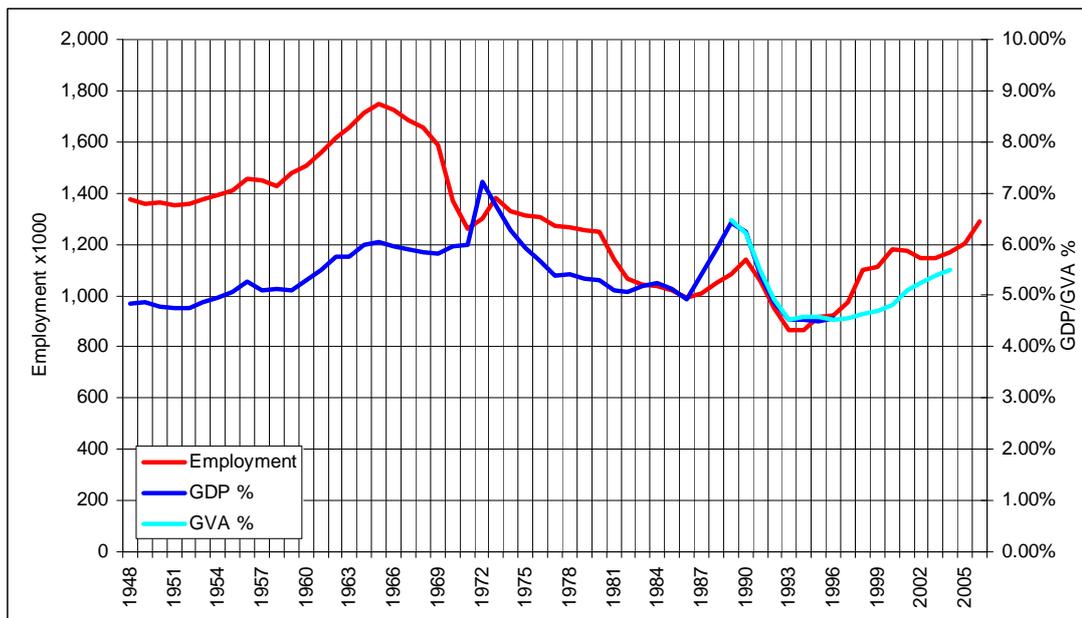


Figure 5.73: Construction Employment v. Construction GDP/GVA percentage 1948~2006.
 Source: Annual Abstracts of Statistics

The relationship between construction industry employment and GDP/GVA is shown in Figure 5.73 above. It should be noted that GVA figures are currently only available to 2004 whilst employment figures are available to 2006 (as at 31st December 2007).

One of the problems here is that GDP for the industry is an estimate, partly because of the problem in defining the boundaries of the industry and partly because of the problems of the 'hidden economy' of unrecorded work (Cook 1996), often 'cash-in-hand', a practice although disparaged within the industry is quite widespread in the small and self-employed sector of the industry.

Thus there is a seeming paradox between the importance of the construction industry to the UK economy and its apparent low contribution to the UK's GDP. Hillebrandt (2000) offers an explanation for this paradox through the consideration of the 'multiplier effects', that of the 'expenditure multiplier', and that of the 'employment multiplier'.

The expenditure multiplier is the number by which a change in expenditure must be multiplied to determine the resulting change in total output or gross domestic product (GDP). When a person is employed he spends much of his wages on goods and services from other sectors of the economy, which in turn generate employment and spending elsewhere thus starting an upward cycle of increasing employment.

The employment multiplier may be defined as the number by which an initial change in employment must be multiplied in order to determine the resulting change in total employment as a whole.

Hillebrandt (2000: 187)

These multiplier effects have immense significance for employment in the industry as they have regularly been made use of by governments, particularly in the 1960s and 1970s as a means of attempting to control the economy (Harvey and Ashworth, 1993). In terms of the expenditure multiplier, when workers spend their wages/salaries much of it is spent on goods and services in other sectors of the economy. This spending will in turn generate more employment, and subsequently further spending elsewhere, some of which will be in the construction industry in the

form of new construction projects, for example, housing, offices, and factories. Conversely, if these workers subsequently become unemployed then they do not have wages/salaries to spend elsewhere, thus a downturn in expenditure will result in less employment and less expenditure elsewhere. Increased expenditure results in a positive (increasing employment) cycle, whilst decreased expenditure results in a negative (decreasing) employment cycle.

As the UK construction industry could be considered to span all other industries and economics through the provision of infrastructure, building of offices, factories, and houses, and well as repair and maintenance works, Governments have found construction a useful industry to use to influence the economy through increasing or decreasing expenditure on construction projects. Around fifty percent of the industry's workload is directly or indirectly financed by the Government and its agencies. In an attempt to regulate the economy the Government can either increase or decrease public sector spending on, for example, road-building, schools, hospitals and social housing. Thus a Government can rapidly slow down an over-heating economy, if it so wishes, by cutting expenditure in these areas, or stimulate the economy by increasing expenditure in these areas. This process of economic regulation results in the construction industry being used and known as an 'economic regulator' for Government fiscal policy.

5.5.5 The Structure of the Industry.

In consideration of the structure of the industry three aspects will be considered in relation to the evolution of the industry:

- The number of firms,
- The size of firms,
- The growth of self-employment and subcontracting.

All three of these aspects are, as might be expected, interlinked but not necessarily interdependent.

5.5.5.1 The Number of Construction Firms

Previous documents considered only the numbers of employees in the industry as a measure of the level of activity in the industry. Another facet of the industry that is likely to vary according to the level of activity is that of the numbers of construction firms that are operating. The cyclical nature of the industry has already been discussed with regard to its effect on employment, but not how the changing levels of employment are reflected in the numbers and sizes of the constituent firms of the construction industry. Figure 5.74 below shows the numbers of construction firms.

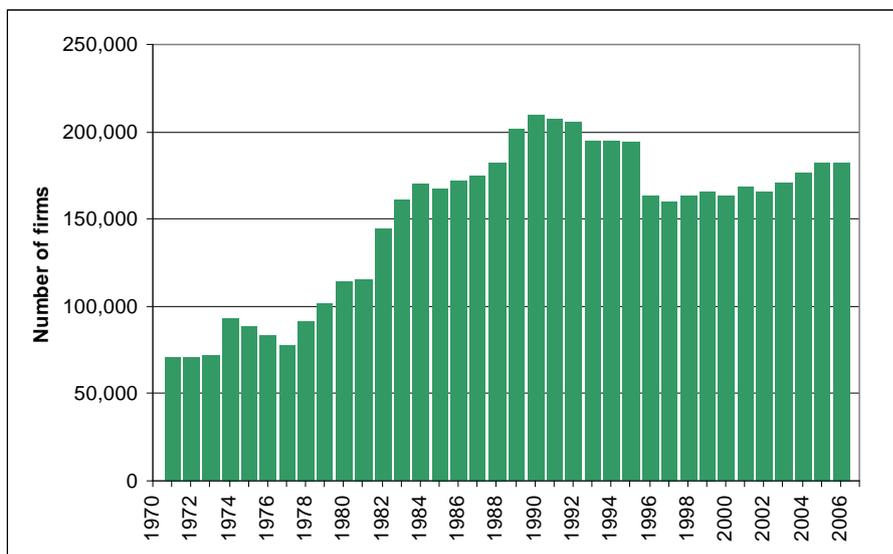


Figure 5.74: Private Contractors: Numbers of Construction Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals.

The numbers of construction firms shown above relates to ‘private contractors’, i.e. it excludes local authorities and public utilities, who are or were in themselves large employers of construction personnel. In recent years there has been a marked drop in the numbers of directly employed construction personnel in these organisations as they have, as a result of government policies, been required to open up their work to competitive tendering. This has often resulted in many of these organisations either privatising their own direct labour workforces, or closing them down entirely, contracting out all their works to the private sector. This has had little impact on either the numbers actually employed on local authority and public utility works, neither merely upon who actually employs the workers nor upon the numbers of construction firms.

One of the important considerations of the numbers of construction firms is the distinction made by the DTI and others between ‘main trades’ and ‘specialist trades’. Main trades firms includes the likes of general builders, house builders and civil engineering contractors, whilst specialist trades firms includes the traditional trades and crafts skills required to carry out construction works, often as subcontractors such as electrical, roofing, and glazing, to the main trades firms. This is discussed in more detail later in this chapter. Figure 5.75 below shows the numbers of main trades firms and specialist trades firms within the construction industry since 1971 when the first statistics were published by the DTI.

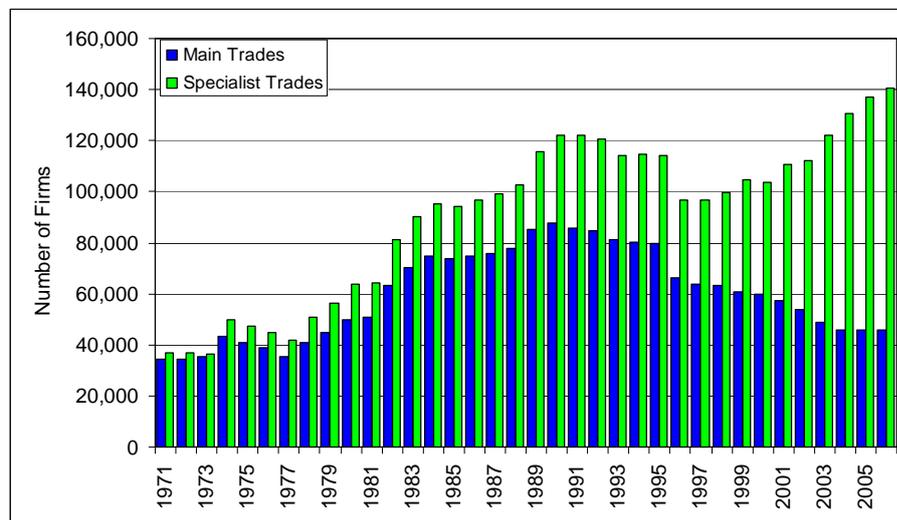


Figure 5.75: Private Contractors: Numbers of Main Trades and Specialist Trades Firms 1971~2006
Source: Housing and Construction Statistics, and Construction Statistics Annuals.

In Figure 5.75 above it can be seen that since 1971 the numbers of specialist trades firms has been steadily increasing relative to the number of main trades. By considering the relative percentages of each within the construction industry the cyclical effects of the construction industry economy can be mitigated, showing a change from 51.72% specialist trades firms in 1971 to 74.98% in 2005, as shown in Figure 5.76 overleaf.

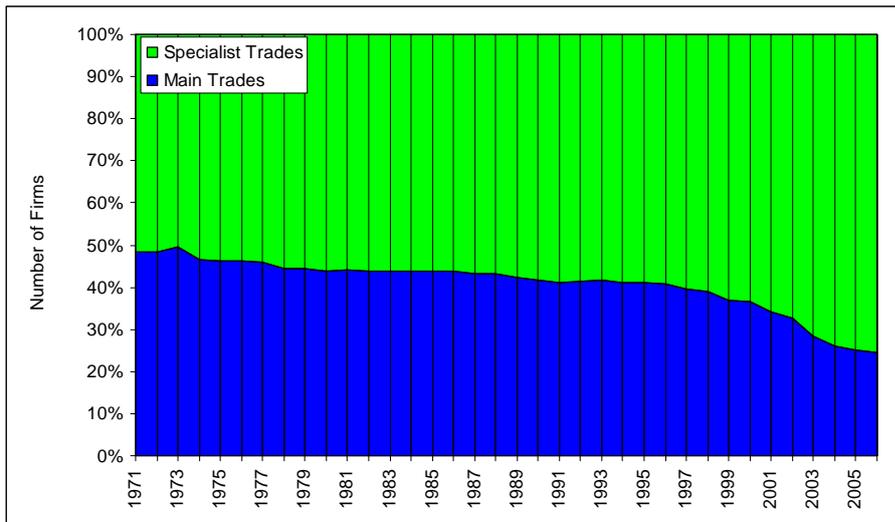


Figure 5.76: Private Contractors: Percentages of Main Trades and Specialist Trades Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals.

The corresponding changes in employment levels in both main trades and specialist trades firms is shown in Figure 5.77 below and Figure 5.78 overleaf. Here it can be seen that employment in main trades declined significantly in the period up to the mid 1990s whilst the growth in employment with specialist contracts increased only marginally. In the post recession period from the mid 1990s onwards the growth in employment in specialist trades contractors has significantly outstripped that of the main trades.

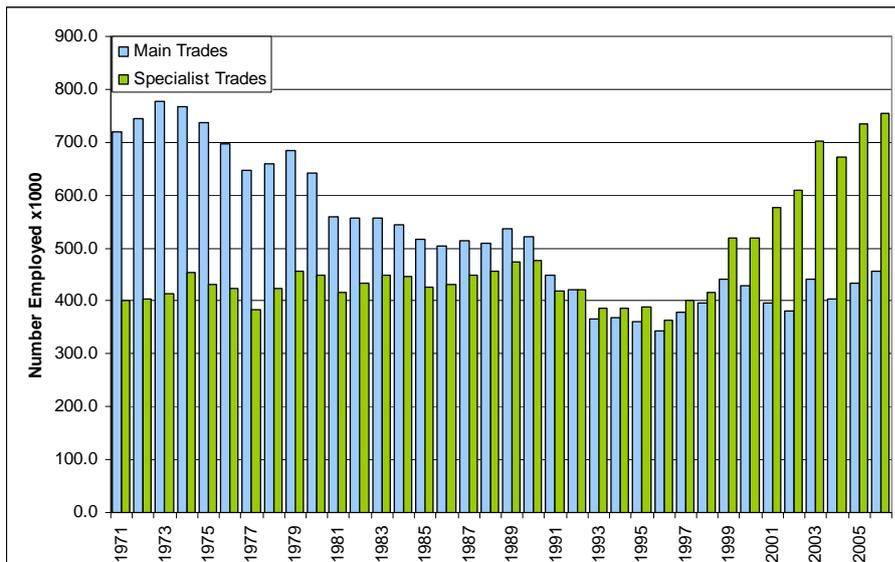


Figure 5.77: Private Contractors: Numbers Employed in Main Trades and Specialist Trades Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals.

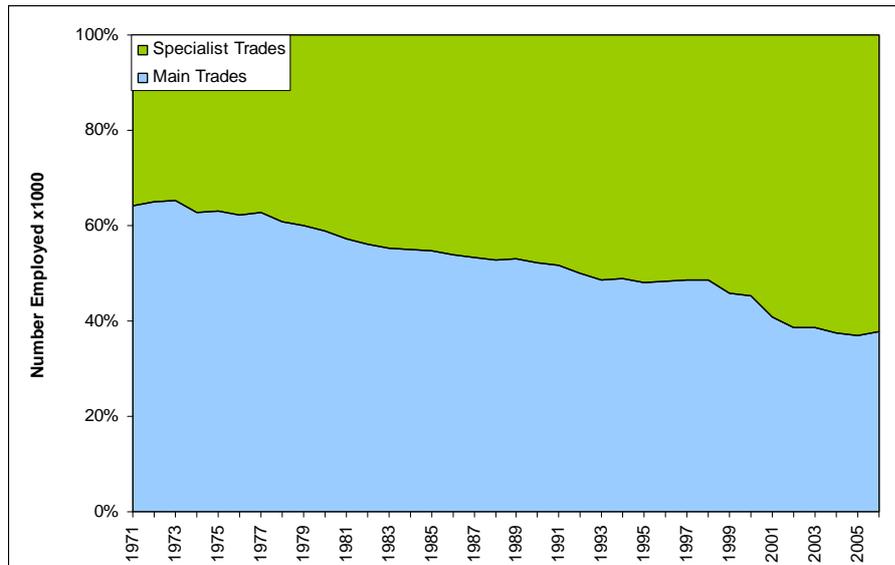


Figure 5.78: Private Contractors: Percentages Employed in Main Trades and Specialist Trades Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

However, the overall trend shows a significant migration from employment in main trades contractors to employment with specialist trades contractors, i.e. subcontractors.

Reasons for this changing composition include:

- Low market entry and exit barriers,
- Increased use of subcontracting and self-employment, and
- Changes in taxation legislation.

These issues are discussed below.

5.5.5.2 Market Entry and Exit Barriers.

Due to the very low capital requirement needed to operate a construction company (Ive and Gruneberg, 2000) the construction market, in comparison to many others, is a very easy market to enter and to exit, i.e. it has very low entry and exit barriers, particular at the 'bottom end' of the market where the small contracting companies are to be found (Dainty, Green and Bagihole, 2007).

One of the effects of this relatively easy market entry and exit is that when the industry is experiencing strong growth entrepreneurs can enter the market, setting up new companies. Either these entrepreneurs can be new entrants to the market or those already employed in the industry setting out on their own and setting up new companies, often becoming self-employed or working proprietors rather than employees, believing they can operate more efficiently than the existing market players (Hillebrandt, 2000). However, many of these new entrant businesses fail quite quickly and lead to an increase in the numbers of insolvencies and bankruptcies. Thus in times of an upward cycle in the industry the numbers of firms in the industry will increase. Those already in the market might be expected to increase their employment levels and expand as more work becomes available, although this is not always the case as many firms adopt policies of non-expansion, maintaining a steady, consistent and manageable size, thus attempting to avoid the risks of over-expansion. The upward cycle can also attract overseas contractors who may choose to enter the market with very low margins in order to penetrate it (Hillebrandt and Cannon, 1990). This policy can also result in undercutting the existing market players who in turn may be forced to reduce their margins in response to the new market entrants, adding to the cycle of undercutting, in effect a 'price-war', leading to an increased risk of insolvency, or vulnerability to takeover.

When the cycle changes to that of recession the numbers of firms in the industry decreases as some of the entrepreneurs leave the market seeking their fortunes elsewhere, whilst others go into receivership (voluntary or otherwise) in the case of firms, or bankruptcies in the case of the self-employed, and cease trading, often because they are unable to obtain sufficient work to remain solvent. Many of those firms that survive recession do so by reducing their workforce to match available workload. Larger contractors might also try to move into overseas markets to maintain their workload (Hillebrandt and Cannon, 1990).

This creates many problems in terms of education, training and development of staff. Those moving into the industry in buoyant times will seek to recruit only experienced and qualified staff from within the industry, and will not seek to invest

in education, training and development of their workforce in the full knowledge that they are likely to withdraw from the industry when conditions become unfavourable. Whenever price-cutting starts to occur the margins are severely squeezed and costs must be reduced accordingly. Here too education, training and development costs are vulnerable due to the ease in which they can be reduced by simple cessation of these services as they are inevitably not deemed a core activity necessary for short-term business survival. Similarly in times of recession when the workforce is being reduced, there is much anecdotal evidence to suggest that the first areas to be cut to save costs were training and development departments, and expenditure on education, training and development.

Large firms also respond to recessions by moving into the market of smaller projects, taking on smaller projects with lower margins that they would not normally have considered, using their financial reserves to sustain them. This then creates problems for the smaller market players as they are undercut and squeezed out of their traditional markets by the larger contractors who are better placed to sustain the losses. Others respond by trying to move into different market sectors, for example - general contractors move into facilities management, small repair and maintenance works.

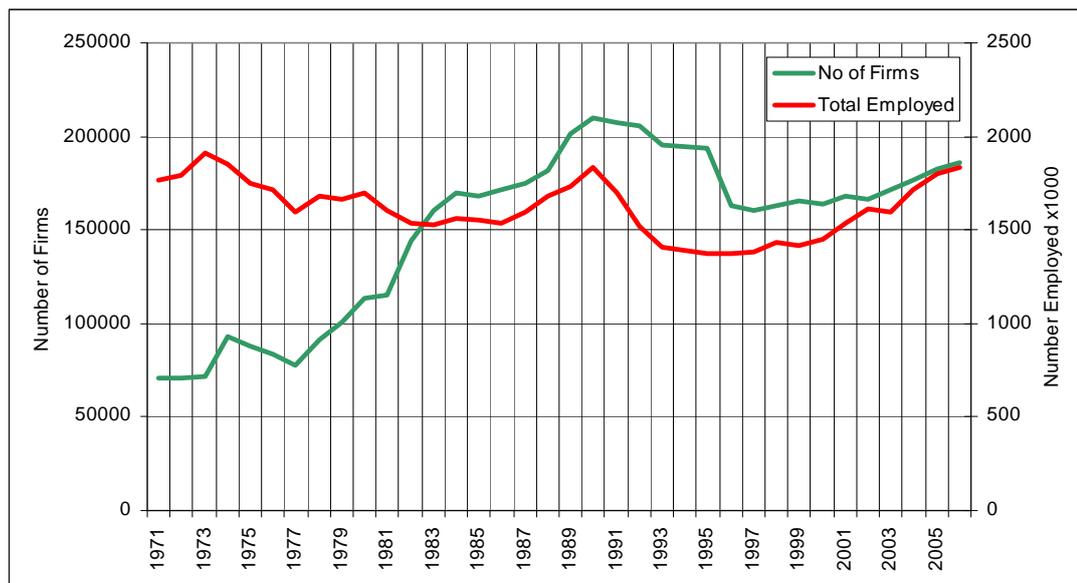


Figure 5.79: Numbers of Construction Firms v. Number of Employees 1971~2006
Source: Housing and Construction Statistics, and Construction Statistics Annuals.

However, this reveals little about the nature of employment in the industry as it is necessary to consider the size of each company in terms of the numbers they employ. Figure 5.79 above shows the numbers of registered firms (including self-employed) operating in the UK construction industry.

It might be a reasonable conclusion, from the graph shown in Figure 5.80 overleaf that the construction industry has enjoyed a period of considerable growth between 1972 and 1990 as the number of construction firms has almost tripled from 71,240 in 1972 to 209,793 in 1990, yet from the numbers of people employed in the industry this is known not to be the case, even though the number of firms declined by 21% to 160,148 in 1997. For this to have occurred there must have been some structural changes within the industry and within the firms themselves to bring about this seemingly contradictory state where the numbers of construction firms seems to bear little or no correlation to the numbers of construction employees in the 1970s and early 1980s.

In order to understand this phenomena it is necessary to consider the composition of employment in the industry through, firstly, the size of the companies in terms of employment and the numbers of firms of a particular employment size; and secondly, what those firms actually do, i.e. their principal trade.

Table 5.22: Classification of Firms by Number of employees

| Number employed | Increment |
|-----------------|-----------|
| 1 | 1 |
| 2 – 3 | 2 |
| 4 – 7 | 4 |
| 8 – 13 | 6 |
| 14 – 24 | 11 |
| 25 – 34 | 10 |
| 35 – 59 | 15 |
| 60 – 79 | 20 |
| 80 – 114 | 35 |
| 115 – 299 | 185 |
| 300 – 599 | 200 |
| 600 – 1,199 | 600 |
| 1,200 and over | >600 |

The CSA and HCS use the divisions shown above in Table 5.22 above for classifying the size of firms and furthermore categorise firms by the type of work (trades/crafts) undertaken as shown as Table 5.23 below.

Thus the diversity of specialisations, and hence fragmentation, within the industry can be seen, with those in the ‘specialist trades’ category invariably acting as subcontractors to those in the ‘main trades’ category, although many ‘specialist trades’ will also trade directly, not as a subcontractor, in the general open market.

Table 5.23: Categories of Construction Firms

Source: Housing and Construction Statistics, and Construction Statistics Annuals

| Classification 1971 ~ 2001 | Classification 2001 ~ |
|--|--|
| • Main Trades | • Main Trades |
| ○ General Builders | ○ General Builders |
| ○ Building and Civil Engineering Contractors | ○ Building and Civil Engineering Contractors |
| ~ | ○ Non-residential Building |
| ~ | ○ House-building |
| ○ Civil Engineers | ○ Civil Engineering |
| • Specialist Trades | • Specialist Trades |
| ○ Constructional Engineers | ○ Constructional Engineers |
| ○ Demolition Contractors | ○ Demolition |
| ○ Reinforced Concrete Specialists | ○ Reinforced Concrete Specialists |
| ~ | ○ Test Drilling and Boring |
| ○ Roofers | ○ Roofing |
| ○ Asphalt and Tar Sprayers | ○ Asphalt and Tar Sprayers |
| ~ | ○ Construction of Highways |
| ~ | ○ Construction of Water Projects |
| ○ Scaffolding Specialists | ○ Scaffolding |
| ○ Electrical Contractors | ○ Installation of Electrical Wiring and Fitting |
| ○ Insulating Specialists | ○ Insulating Activities |
| ○ Plumbers | ○ Plumbing |
| ○ Heating and Ventilating Engineers | ○ Plastering |
| ○ Plasterers | ○ Joinery Installation |
| ○ Carpenters and Joiners | ○ Flooring Contractors |
| ○ Flooring Contractors | ○ Floor and Wall Tiling Specialists |
| ○ Floor and Wall Tiling Specialists | ○ Floor and Wall Covering |
| ○ Painters | ○ Painting |
| ○ Glaziers | ○ Glazing |
| ○ Plant Hirers | ○ Plant Hire (with operators) |
| ○ Suspended Ceiling Specialists | ○ Other Construction Work and Building Installation and Completion |
| ○ Miscellaneous | |

Figure 5.80 overleaf shows the numbers of registered firms categorised by the number of employees each has. In this figure an ‘area chart’ has been used in preference to the more traditional ‘bar chart’ as it shows more clearly the growth in

company numbers. The actual numbers of firms can be found in Table 5.A.4 in Appendix 5.A.6.

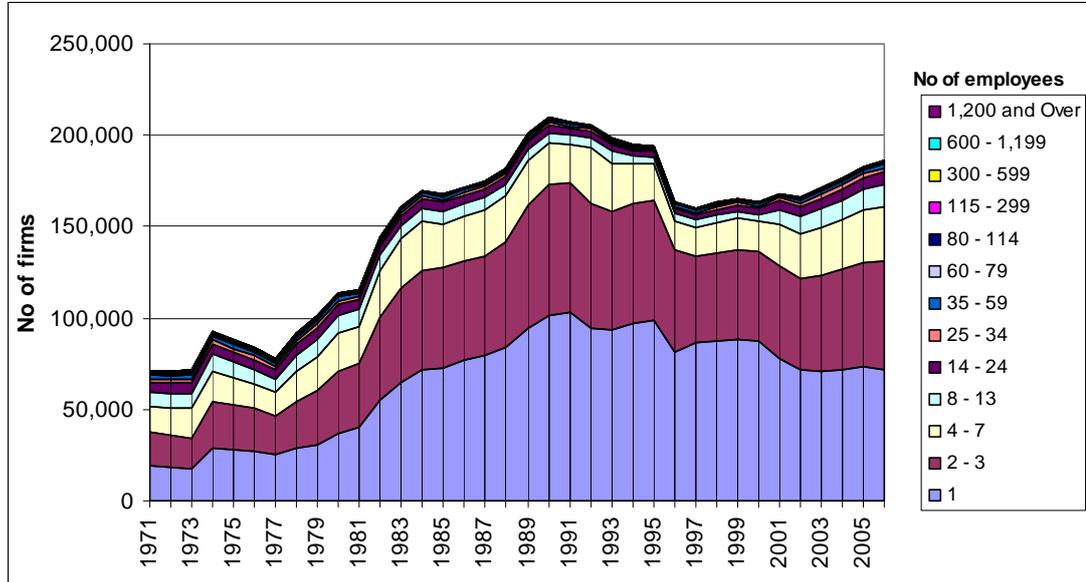


Figure 5.80: Numbers of Construction Firms by Numbers of Employees 1971~2006
Source: Housing and Construction Statistics, and Construction Statistics Annuals

It now becomes apparent that the growth in the number of firms between 1971 and 1990 is largely due to considerable expansion in the numbers of self-employed workers and small enterprises consisting of just two or three employees. Whilst the numbers of firms employing four to seven people has increased slightly the numbers of firms employing larger numbers has decreased. Figure 5.81 overleaf shows the numbers of firms by numbers of employees as a percentage of the total number of firms in the industry.

5.5.5.3 Main Trades and Specialist Trades

As has been seen above the industry is divided into 'main trades', i.e. that segment of the industry that undertakes construction work directly contracted to the client sponsoring the project, and into 'specialist trades', those who largely work as subcontractors to the main contractors. Data for the numbers and composition of both main and specialist trades has been published since 1971, although in 2001 the trades were reclassified in accordance with the Standard Industry Classification (SIC) which has led to some discontinuities in the reported figures as some previous

categories were merged, whilst other new ones were introduced (see Table 5.23). Additionally, for the period 1996 to 2000 inclusive, no breakdown of the composition of the main trades was published.

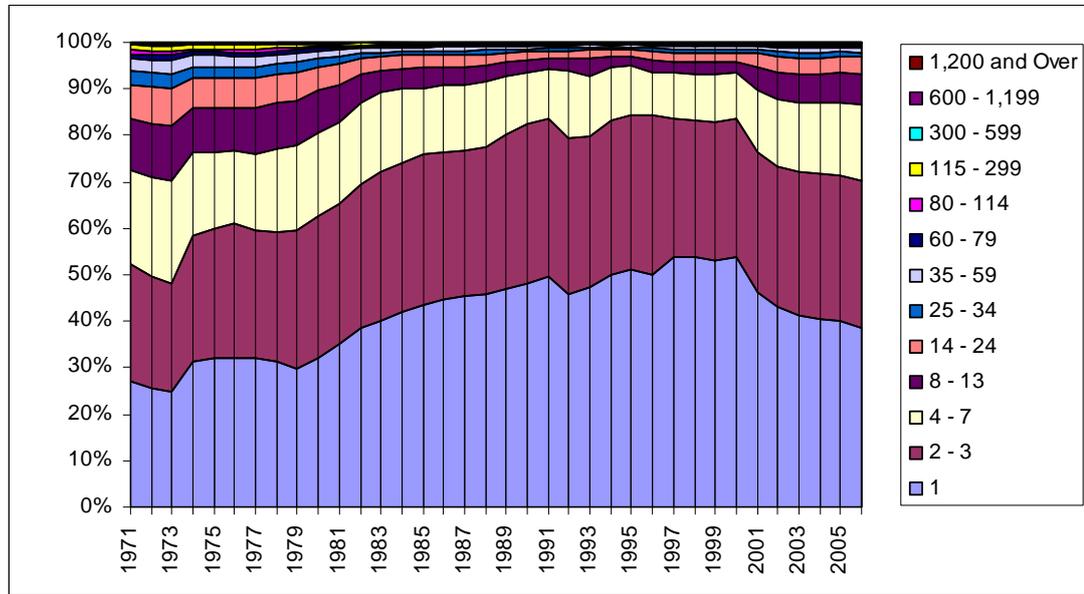


Figure 5.81: Numbers of Construction Firms by Numbers of Employees as Percentages of the Total. Source: Housing and Construction Statistics, and Construction Statistics Annuals

In the discussion below only the overall pattern of main trades employment is discussed due to the lack of continuity of published data, together with those specialist trades where continuity of data can be established. The data is given in Tables 5.A.4 and 5.A.5 in Appendices 5.A.5 and 5.A.6 respectively. Appendices 5.A.5 and 5.A.6 show the growth in the number of specialist trades firms since 1971, and the effects of the cyclical economy in the construction industry. The graphs in these appendices indicate that there must be other driving forces at work as each trade has its own distinctive pattern of change. Comparison of the numbers of specialist trades firms with the numbers employed in those firms reveals an interesting insight into how the structure of the industry is evolving in response to a number of forces, or drivers of change, operating within and upon the industry, including, as shown in Figure 5.82 overleaf:

- Increasing levels of specialisation;
- Increasing amount of legislation;
- Changing social preferences;
- Taxation regimes;
- Technological developments; and
- Economic pressures.

All of these act upon the industry, both independently and conjunctively, and are themselves interdependent within the industry and amongst themselves. Each of these also has concomitant impacts on the education, training and development of the construction industry's managers.

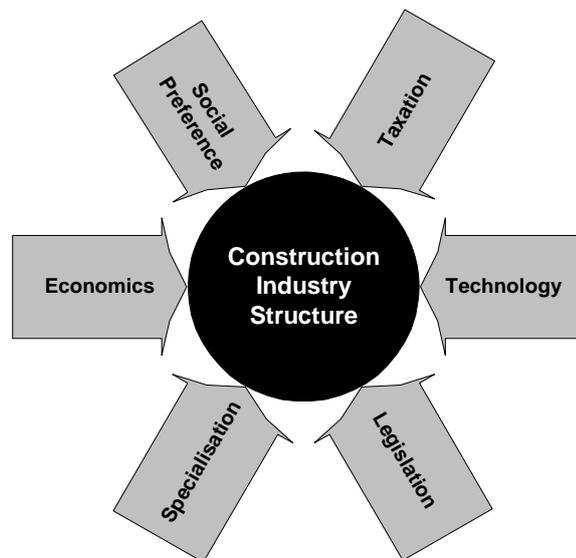


Figure 5.82: Drivers of Change in Construction Industry Structure

In recent decades there has been trend for contractors to make use of specialist trades firms to the extent that now many contractors do not actually carry out any works themselves but are wholly dependent upon employing specialist trades firms to carry out the works (Hillebrandt, 2000). This has become an accepted standard practice within the UK construction industry to the extent that there are now specialist forms of construction procurement contracts, known as 'Management Contracting' and 'Construction Management' in which the main contractor is appointed solely to act as a manager and coordinator of the construction works, and specialist trades or

‘works packages’ contractors are appointed to undertake all the actual construction works. These forms of procurement contracts are normally associated with larger construction projects, rather than smaller ones because of the increased overheads involved.

Research by Harvey (2003: 195-196²) identified three arrangements of subcontracting differentiation in terms of the relationships between the subcontractors in terms of the vertical chain of subcontractors and the horizontal relationships between those subcontractors:

1. A flat hierarchy of subcontracting with short vertical chains, often one tier only. Typically this involved a main contract management firm employing labour through a labour agency. It is effect outsourcing labour, and as such can be seen as the self-employment alternative to direct labour... these can be [characterised as] the “hollowed-out firm”.
2. Extended vertical chains of complementary capabilities at each tier in a vertical chain. This can be seen as “flexibilisation without fragmentation.” The dominant mode of the contract management and subcontracting system of organisation of production are in operation, but with much repeat contracting and stable networks of subcontractors.
3. Extended vertical chains of subcontracting that parcel out contracts even of similar production content (for example, subdividing concrete work or dry-lining or electrical work into smaller packages). This can be characterised as “flexibilisation with fragmentation”. Extensive vertical chains are formed as successive parcels of work are subcontracted out, creating competitive and non-cooperative relations between subcontractors with similar capabilities at each tier of the production chain on a given production site.

Each of Harvey’s subcontracting arrangements described above are depicted in Figures 5.83, 5.84 and 5.85 respectively overleaf.

² Spelling in quotation has been Anglicised.

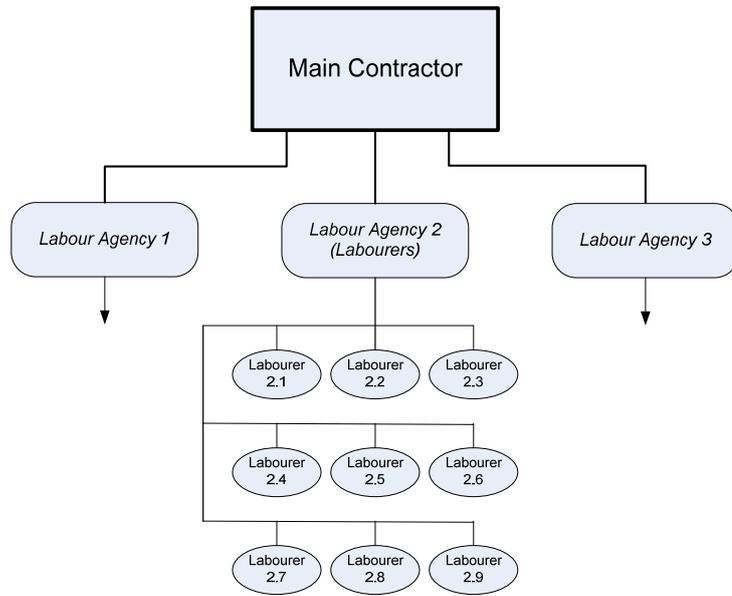


Figure 5.83: Subcontracting arrangement – The “Hollowed-out Firm”.

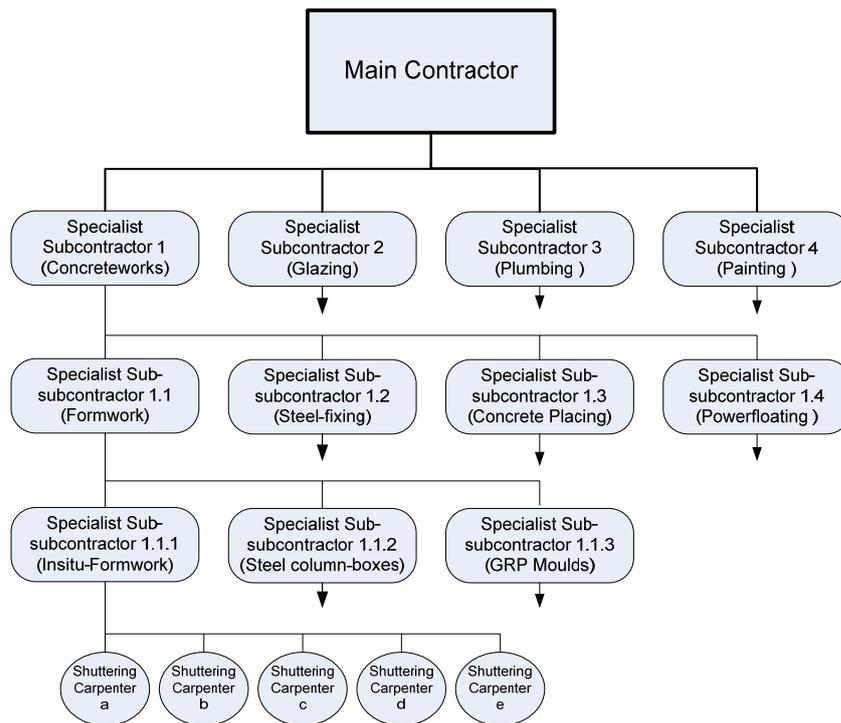


Figure 5.84: Subcontracting arrangement – “Flexibilisation without fragmentation”.

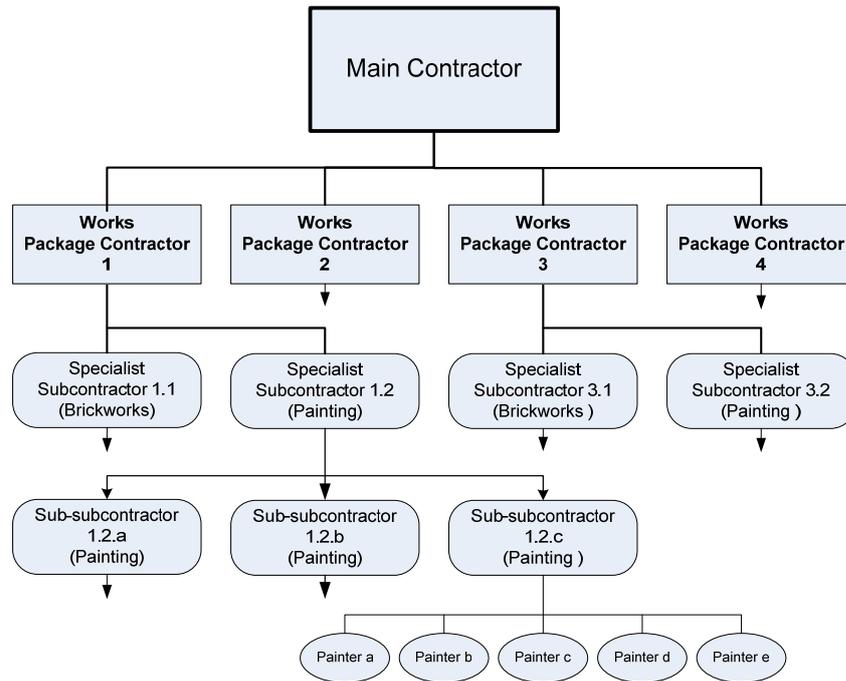


Figure 5.85: Subcontracting arrangement – “Flexibilisation with fragmentation”

Gruneberg and Ive (2000:139) provide an insight into the reasons for the growth in specialist subcontracting:

... for the same capital employed in a business, the more a firm follows a general policy of fully subcontracting the work on its contracts, the greater the value of contracts it can afford to operate... Moreover this larger portfolio may at the same time enable it to reap increased advantages of bargaining power in its dealings with subcontractors on each individual project, giving the firm pecuniary economies of scale.

Much of this change was also an indirect result of government policy from the late 1970s to place as much construction work as possible into the private sector, effectively privatising public works (Harvey, 2003; McCabe, 2007) and the encouragement by government, particularly during the Thatcher era, of self-employment amongst the workforce (Harvey 2001, 2003; Harvey and Behling, 2008).

This specialisation has given the industry economy of scale, not only for the main contractors bargaining position with subcontractors, but also for the specialist subcontractors increased bargaining power with their own subcontractors and

suppliers. In addition subcontracting also provides benefits in dealing with the commercial risk management of construction projects as the hierarchies of subcontractors help the contractors push much of the risk as far down the supply chain as possible (Druker, 2007), particularly chains of legitimate subcontractors. However, with the passing of risk goes the passing of profit. The extent to which subcontracting can take place was highlighted by Interviewee 6 (see Document 3), a package manager with an international contractor on a major redevelopment project, where they had identified instances of up to eight levels of subcontracting from the management contractor downwards. At the highest level was the management contractor, and at the lowest level were individual ‘self-employed’ contractors. This also has connotations for the knowledge and skills sets that construction managers now need and the types of education, training and development needed.

Health and safety legislation may also have contributed to changes in structure and employment patterns. Scaffolding offers one example of this. Tightening of health and safety legislation within the construction industry, and especially those concerning safe working practices, have placed considerable demands upon scaffolders and scaffolding firms. Figure 5.86 below and Figure 5.87 overleaf show the numbers of scaffolding firms and the numbers of scaffolders employed.

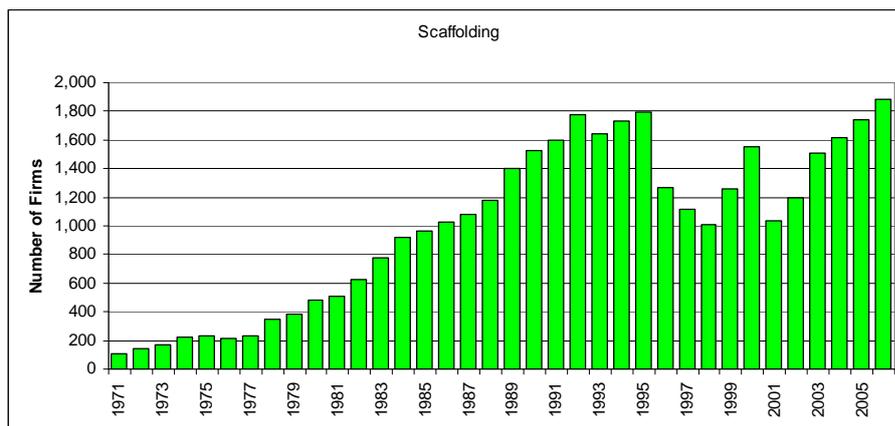


Figure 5.86: Numbers of Scaffolding Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

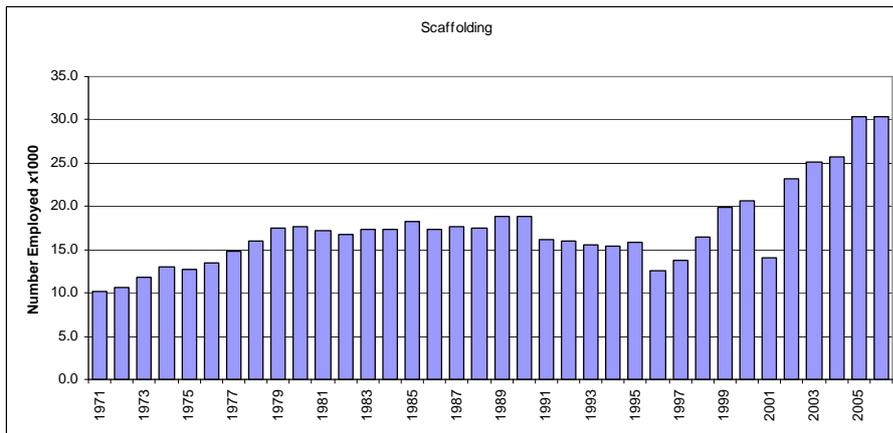


Figure 5.87: Numbers Employed in Scaffolding 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

Traditionally scaffolding, particularly on smaller contracts which make up the bulk of the industry's workload, was at best a semi-skilled trade often carried out by labourers or other tradesmen as a part of their access to work arrangements, not least in the case of bricklayers and blocklayers. Indeed, it was often common practice to pay these trades-people to erect and adapt their own scaffolds, frequently in the misguided belief that those who put up their own working platforms would make sure they are safe. 'Falling from height' even today remains one of the major causes of death and serious injury amongst construction workers, frequently attributed to poorly erected and maintained scaffolding, defective scaffolding, or unauthorised adaptations of scaffolding. All scaffolders are now required by law to be properly trained and certified. It can be seen that the numbers of scaffolders has remained relatively constant (allowing for economic cycles) but the number of firms has dramatically increased from around 100 in 1971 to around a peak of 1800 in 1995, with a current level of around 1500 in 2003. This increase might also be partly attributable to scaffolders setting up their own firms to gain some protection from personal liability through having a limited liability company, and the protection of indemnity insurance, although there is little conclusive evidence to either confirm or deny this.

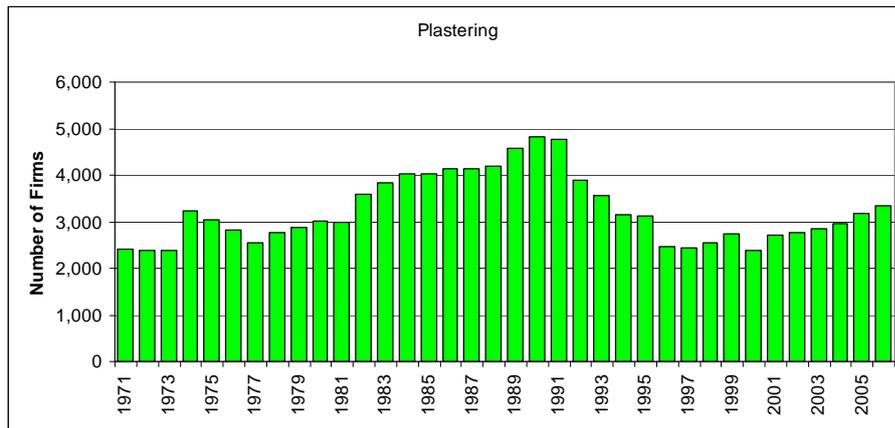


Figure 5.88: Numbers of Plastering Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

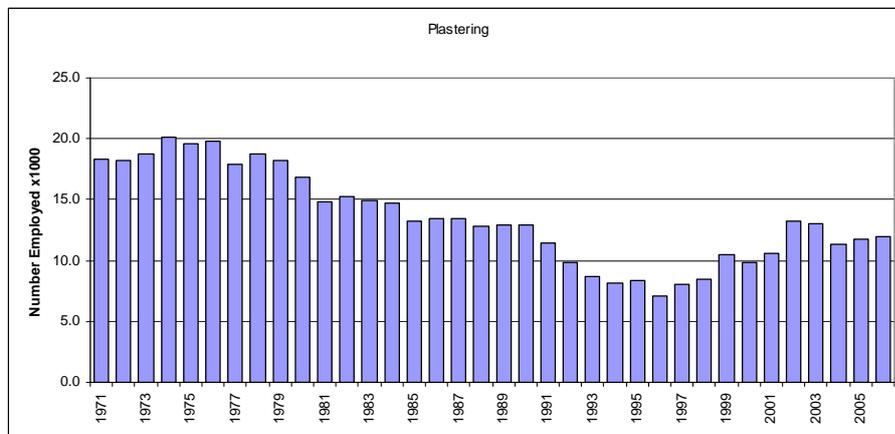


Figure 5.89: Numbers Employed in Plastering 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

Plastering reflects a different kind of change in the industry; see Figure 5.88 and Figure 5.89 above. Here, from the mid 1970s to the 1990s the numbers of firms has shown a steady increase reflecting the change to self-employment whilst the actual numbers employed has steadily declined. Part of this decline can be attributed to the economic drivers of time and cost, and some to the legislative changes of the Building Regulations requiring higher insulation standards in buildings, particularly domestic buildings. Plastering is one of the industry's traditional 'wet-trades', labour intensive in application and time consuming not only in application of plaster but also through its associated drying out time before decorative finishes can be applied. Considerable cost saving can be achieved through the elimination of wet-trades and the drying-out periods. This has resulted in contractors, and in particular housing contractors, switching to dry-lining (plasterboard finished with a plaster skim coat) which is far less labour intensive, and has a potential time saving of two or three

weeks in drying out time. Furthermore dry-lining has a higher insulation value and helps meet the higher insulation requirements of the Building Regulations.

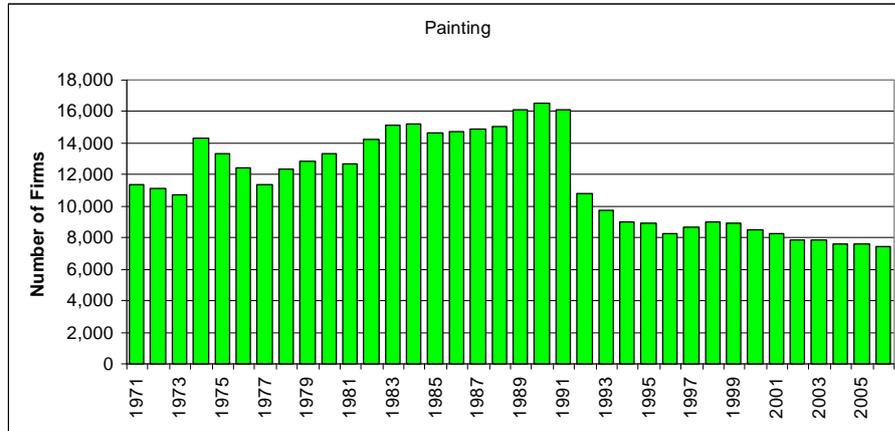


Figure 5.90: Numbers of Painting Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

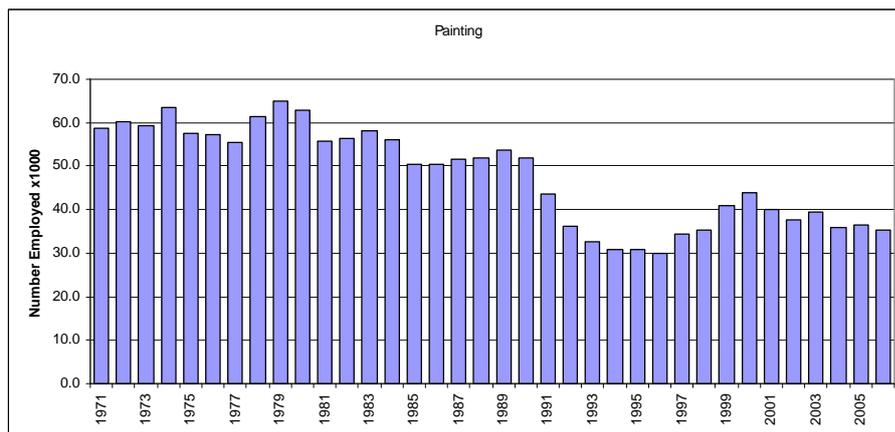


Figure 5.91: Numbers Employed in Painting 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

The painting trades reflect a different set of drivers; see Figure 5.90 and Figure 5.91 above. Here there has not been the same dramatic increase in the numbers of firms as many firms operate in the domestic consumer market. There is a net decline in the numbers of firms operating, and a significant decline in the numbers employed in painting. The increase in the number of firms that might have been expected has been offset by the decline in the numbers of firms trading in the consumer market.

The painting trade has been subject to change as a result of the growth in the consumer DIY market, and home improvements. Consumers who might otherwise

have employed a painting and decorating firm for domestic decoration work are now most likely to carry out the works themselves, although recent anecdotal reports seem to suggest that this trend might be reversing due to the ‘long-hours’ work culture of the UK, leaving people with insufficient leisure time to undertake their own painting and decoration work.

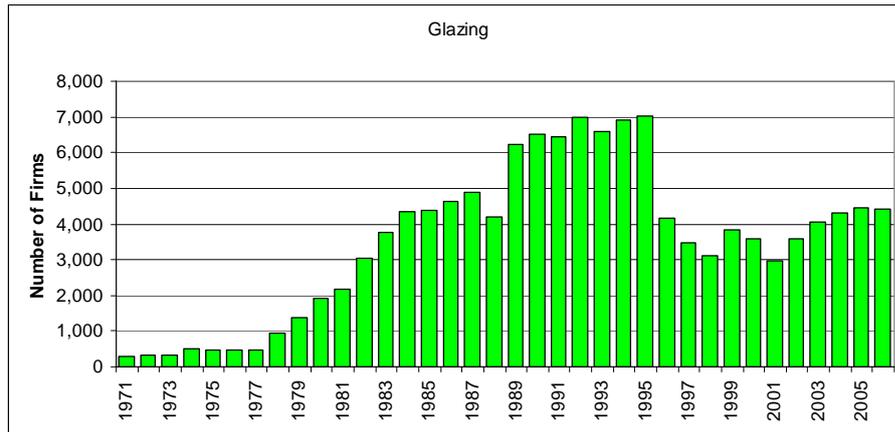


Figure 5.92: Numbers of Glazing Firms 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

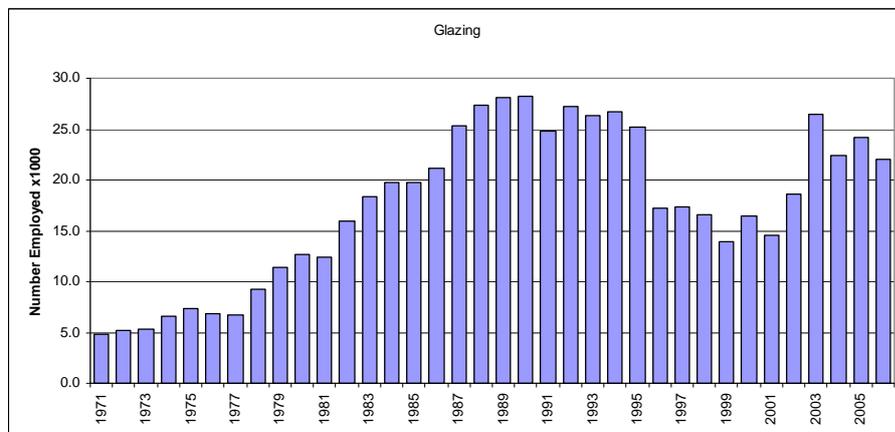


Figure 5.93: Numbers Employed in Glazing 1971~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

Conversely, glazing displays the opposite effect; see Figure 5.92 and Figure 5.93 above. An increase in numbers of both firms operating and those employed reflects the growth in the domestic home improvements market, particularly in replacement glazing (windows and doors).

Most trades have experienced a growth in the numbers of firms operating, but without a corresponding growth in the numbers of persons employed in those trades. This can largely be attributed to changes in employment practice, and in particular the growth in self-employment within the construction industry.

5.5.5.4 Self-Employment and Sub-contracting

As has been seen, one of the most significant changes in the industry in recent decades has been the growth of self-employment and subcontracting. The concept of self-employment amongst traditional manufacturing, including the construction industry, is not new. Barker (2007: 60) notes that such practices were common during the period 1880 until the outbreak of WWI. Even in the 1880s there were concerns over the distinction between employed (employees) and self-employed workers (ibid) with Forde and Mackenzie (2007: 27) drawing attention to the relationship between these practices and the ‘recruitment difficulties, skills shortages and labour reproduction in the construction industry in the UK’ with a Royal Commission for Labour from 1890 to 1894 revealing concerns about labour shortages and skills deficiencies in the industry (ibid).

One of the problems for which the construction industry has been notorious in the past is what was known as ‘lump labour’. The high level of casual employment in the industry, particularly amongst the unskilled and semi-skilled workers, mainly brought about by the way the construction firms themselves obtain work and the nature of the work itself, often mean that construction companies have a variable workload in a variety of locations. Thus much of the workforce has traditionally been employed on a project-by-project basis, often in very poor conditions (Winch, 1994). Furthermore throughout the lifespan of a construction project a variety of trades are required at different times.

This has resulted in the creation of specialist trades contractors who attempt to maintain a stable workload (continuity of work) by working on multiple projects for a number of different contractors at the same time. As the specialist trades contractors only undertake a part of the overall project work under contract to the

main contractor they are invariably referred to as ‘sub-contractors’. These subcontractors, or specialist trades contractors, are firms in their own right, and some of the specialist firms can be significantly bigger than the main contracting firms that employ them.

Both main contractors and specialist trades contractors traditionally made extensive use of casual employment. Many of those employed on a casual basis were paid on a ‘self-employment’ basis, or claimed that they were self-employed, thus being responsible for paying, for example, their own taxes, national insurance contributions and holiday stamps. Within the construction industry these types of workers are invariably referred to as ‘labour-only subcontractors’. This was an attractive option for employers as not only did it mean that they did not have to pay, for example, not only employers’ national insurance contributions, but also pension contributions (although few construction companies actually ran pension schemes for non white-collar workers), redundancy payments, sick pay and holiday pay. This made considerable savings in the cost of employment, and provided a greater degree of flexibility. Harvey (2003, 198-199) comments that the change of status of workers from direct employment to self-employment meant that:

Payments for these workers automatically fell outside the scope of any possible bargaining, as technically they were no longer paid wages.

They lost entitlement, during most of this period [1977 to 1997] to holiday pay, sick pay, employment benefit, and, in most cases, any form of pension arrangements.

Automatically too, they lost any of the normal employment protections for dismissal or discipline that form part of a collective agreement related to direct employment.

However, with this increased flexibility came increased insecurity for the worker with a lack of sick pay, holiday pay, redundancy payments and no guarantees of employment (Nesbit and Thomas, 2000). It also meant that, in many instances, construction companies abdicated any responsibility for education, training and development of these workers beyond statutory requirements.

Flexibility was not the only reason that self-employment has become so wide-spread within the construction industry. Both Clarke (1992) and Harvey (2001, 2002) note that self-employment was originally encouraged within the industry as a way of undermining union organisation and power within the construction industries in the large cities, particularly London, during the late 1960s ultimately resulting in the national building strike of 1972. The Phelps-Brown report of 1968 into the disputes in the construction industry recommended that self-employment within the industry not only be encouraged but also be extended. This was to result in the 1970 Finance Act creating a unique tax scheme for the construction industry establishing two types of self-employment, those who paid tax at source, but were otherwise self-employed (SC60s), and those who paid tax on a quarterly returns basis (714s) (Harvey, 2001, 2002).

Unfortunately the distinction between being an employee and being self-employed is not clear-cut, especially in the case of the construction industry and one with which employment law itself struggles to cope with (Barker, 2007) as the traditional test of ‘contract of service’ (employee) versus ‘contract for service’ (contractor) can be difficult to apply due to the many and varied interpretations of ‘subcontractor’, ‘labour-only subcontractor’, and ‘self-employed’ within the industry (Harvey and Behling, 2003; Gribbling and Clarke, 2006; Barker, 2007; Forde and MacKenzie, 2007; Raidén, Pye and Cullinane, 2007) resulting in many courts struggling to determine the nature of the form of employment, with sometimes seemingly bizarre decisions (Barker, 2007).

The Inland Revenue (HMIR, 2000: 3) notes:

The same rules apply to the construction industry as in any other industry to determine whether or not a worker is an employee or self-employed. However there are special circumstances in the case of the construction industry because labour-only subcontractors are often short-term or casual workers, and there is often confusion about whether holding a subcontractor’s tax certificate or registration card means that a worker is self-employed.

The Inland Revenue offer a considerable degree of guidance to both employers (HMRC 2001) and to employees and self-employed (HMRC 2004) in attempting to

determine whether or not, for tax purposes at least, a worker is an employee or self-employed. It is notable, although not surprising, that education, training and development does not form any part of any assessment, either through its provision or its undertaking, in determining the employment status of a worker. Harvey (2001: 13), in citing Dennis and Morris (1995) and Burchell, Deakin and Honey (2000), considers four legal ‘tests’ that have been successively overlaid on each other to distinguish between employed and self-employed:

- Control;
- Integration;
- Economic reality; and
- Mutuality of obligation.

Harvey’s (2001) consideration of the application of these legal tests highlights the legal problems and difficulties in defining who is ‘employed’ and who is ‘self-employed’. Table 5.24 below shows the combinations of these tests and possible outcomes:

Table 5.24: The possible combined outcomes of the application of four tests.
Source: Harvey (2001: 15; Table 2.2)

| | | | | | | | | | | | |
|------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| Subject to Control | ✓ | ✗ | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ |
| Integration | ✓ | ✗ | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✓ | ✓ |
| Economically dependent | ✓ | ✗ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✓ | ✓ | ✗ |
| Mutuality of obligation | ✓ | ✗ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ | ✗ |
| <i>Multiple test outcome</i> | ✓ | ✗ | ? | ? | ? | ? | ? | ? | ? | ? | ? |
| | ✓ indicates employment ✗ indicates self-employment | | | | | | | | | | |

The combinations of the tests produces only two definitive outcomes out of eleven possible combinations; one for ‘employed’ and one for ‘self-employed’ leaving nine other possible combinations (Harvey, 2001). Barker (2007) reporting on various law reports draws attention to the fact that courts have been unable to reduce the question of employee or self-employed to a ‘checklist approach’, but that a more complex and holistic approach to the nature of the employment must be taken, and each case decided on its own merits.

Many of those employed as self-employed labour-only subcontractors were often casual workers; some might even be itinerants, who moved from job to job, town to town, employer to employer following the available work. Often, on larger projects, these workers might live in temporary accommodation or even live on site in workers' camps, not infrequently working under assumed names that changes as they moved from project to project. The effect of this was that these workers often did not pay any statutory deductions such as tax and national insurance contributions as they could not be traced by the relevant authorities; they were also invariably paid cash-in-hand (Harvey, 2001, 2002; McCabe, 2007).

In an attempt to deal with these problems the Government introduced the Construction Industry Tax scheme in 1970 Finance Act, where all employers and self-employed workers had to register with the Inland Revenue and obtain a certificate of registration known as the '714 certificate'. If any firm or self-employed worker could not produce their 714 certificate then the employer was required to deduct tax at source at the basic rate. Those firms and self-employed workers also had to produce a receipt for payment to the employer. For self-employed workers who did not or could not meet the requirements of this scheme a 'SC60' certificate was available which enabled the employer to deduct tax at source, but allowed the employee to be treated as a self-employed worker in all other respects, particularly in being able to offset many items against tax that ordinary 'on-the-books' employees were denied, such as travelling costs, work clothes, and tools.

Because of the benefits of this type of employment to the employer many often paid their 'self-employed' workers at a higher rate than normal employees, and encouraged their workers, including 'professionals' and white-collar workers to become self-employed because of the nett saving in the costs of employment to the employer (Wilson 1990). Self-employment also became an attractive option to many as it was generally perceived as offering opportunities for higher earnings, scope to exploit the method of payment, and greater independence. (Nesbit and Thomas, 2000: 360). Many workers had also become self-employed in response to having

been made redundant as a ‘best-option’ for obtaining an income in difficult times (Nesbit, 1997). McKeown (2003) classes these drivers for self-employment into push and pull factors together with default (neutral) factors as shown in Figure 5.94 below:

| | Left prior work arrangement to become a contractor | Left prior work arrangement and later became a contractor |
|---------------------------------|---|---|
| Contractor by choice | <p><i>PULL</i></p> <ul style="list-style-type: none"> - Prefer to be own boss - Set up own business - Set up business with others - More money - Always wanted to - Flexible lifestyle | <p><i>DEFAULT 1*</i></p> <ul style="list-style-type: none"> - Best option available - Normal in my profession - Balance work and family - Voluntary redundancy |
| Contractor not by choice | <p><i>DEFAULT 2*</i></p> <ul style="list-style-type: none"> - Best option available - Normal in my profession - Balance work and family - Voluntary redundancy | <p><i>PUSH</i></p> <ul style="list-style-type: none"> - Involuntary redundancy - Employer request - No/few career options |

Figure 5.94: The Push/Pull Matrix

Source: McKeown (2003: 174) Table II

*Note: Defaults 1 and 2 share the same options.

As with any scheme, loopholes were quickly exploited. Counterfeit and stolen certificates became commonplace, or the scheme simply abused. Attempts to tighten up the scheme ensued. The ‘714’ scheme ran from 1970 to 1999 when it was replaced by the Construction Industry Scheme (CIS) in an attempt to address the abuses of the 714 scheme. This together with the stricter requirements of the CIS scheme has produced a drop in the rates of self-employment since 2000 of around 20% in the numbers of self-employed workers in the industry. Under the CIS scheme the Inland Revenue now require that self-employed subcontractors obtain a registration card in accordance with nature of their business (HMIR, 2003). For those who fail to register, or fail to register in accordance with the requirements of the scheme, fines and other punitive measures can be incurred by the self-employed (HMCE, 2001).

Unfortunately the CIS scheme was found not to be sufficiently robust to reduce the level of abuse of the ‘self-employed’ status and plans were announced by the IR to reform the CIS scheme. HMIR published its consultative document in November

2002 (HMIR, 2002). Following a three-month consultative period HMIR published the responses to their consultative document (HMIR, 2003c) and in HMIR's pre-budget report of 10th December 2003 (HMIR, 2003d) it was announced that the CIS scheme was to be reformed to 'tackle non-compliance in the construction industry by contractors routinely ignoring their responsibilities both as contractors and employers, and by subcontractors using artificial schemes'³. However, during this period it has been noted that the level of self-employment has once again started to climb (Raidén, Pye and Cullinane, 2007). Raidén, Pye and Cullinane draw attention to Briscoe, Dainty and Millett's (2000) claim that there is a direct correlation between the nature of the taxation scheme in operation and the level of self employment.

New legislation was drafted and laid before Parliament in July 2005 as 'The Income Tax (Construction Industry Scheme) Regulations 2005' (SI 2005 No.2045) with the intention of them coming into force on 6th April 2006 (SI 2005 No.2045EM). However on 19th October 2005 it was announced that these regulations would not come into effect until 5th April 2007, as more time was needed by both the HMRC and industry to prepare for their introduction (HMRC, 2005).

The new legislation (SI 2005 No.2045) now abolishes the registration cards and replaces them with a verification service, together with a new employment status declaration to highlight to all those that engage others that they must consider the employment status of those they engage. The implementation of the reformed CIS will require contractors engaging subcontractors to verify with the HMRC whether or not payments to the subcontractor can be paid on a gross or nett basis. Fortunately it was recognized that this would not have to apply to every new contract with a subcontractor (IR, 2003c) and that where a contractor had previously employed the subcontractor in the current or previous two years then they need not re-verify the subcontractor's payment status. The HMRC will notify the contractor of any change in the subcontractor's payment status. Furthermore the contractor's monthly

³ The 'artificial schemes' referred to by HMRC are more commonly referred to as 'shell-companies'.

payment submissions to the HMRC must give details of all payments made to subcontractors, including nil returns (SI 2005 No.2045 EM).

One of the concerns raised during the consultative period was that of establishing a subcontractor's identity as documentation is no longer required to be produced by the subcontractor (HMIR, 2003c), thus the possibility of 'identity theft' arises whereby a bogus/unregistered subcontractor adopts the identity of a bone-fide registered subcontractor. This aspect does not seem to have been fully addressed.

In the current economic environment with considerable labour shortages in the industry, anecdotal evidence suggests that many contractors are now reverting to 'on-the-books' employment for employees, with the offer of secure employment, in the attempt to obtain and retain labour, offering all workers substantial 'benefits' packages in preference to subcontracting.

Due to widespread abuse of the CIS scheme identified above in July 2009 HMT and HMRC published a joint consultation document entitled 'False self-employment in construction: taxation of workers' aiming to '...develop the best legislative approach...' to '...ensure that construction workers engaged in an employment relationship are taxed appropriately' (HMT, 2009: Preface). The consultation period takes place from 20th July 2009 until 12th October 2009 and sets out the Government's intentions towards proposed legislation to determine whether or not a person is deemed 'employed' or 'self-employed' with regard to payment of income tax and national insurance contributions.

The Government is proposing the following statutory criteria of which a worker must satisfy at least one of the criteria to be considered self-employed:

1. Provision of plant and equipment – that a person provides the plant and equipment required to do the job that they have been engaged to carry out. This will exclude the tools of the trade which it is normal and traditional in the industry in the industry to provide for themselves to do their job;
2. Provision of all materials – that a person provides all materials required to complete a job; or

3. Provision of other workers – that a person provides other workers to carry out operations under the contract and is responsible for paying them.

(HMT, 2009: 16)

If legislation is introduced along the lines of the proposals then this could have far reaching implications for the structure of the industry and its employment practices as HMT notes that in 2007/2008 there were:

300,000 subcontractors operating within the Construction Industry Scheme (CIS) who did not claim any deductions for the costs of materials, not for plant and equipment ... [and] that a large proportion of these ... will in fact be working under employment terms.

(HMT, 2009: 6)

If legislation is enacted in line with HMT's and HMRC's proposals it have not only a significant impact upon the structure of the construction industry, but also upon the provision of education, training and development of workers (including construction managers) within the industry as employers will no longer be able to pass this responsibility down to workers that are no longer deemed self-employed.

5.5.6 Insolvency and Bankruptcy

An expanding construction market also tends to lead to a higher number of insolvencies in the early stages of the expansionary cycle (see Figure 5.95 overleaf). Contractors take on work on a fixed-price basis, often with little or no profit margin, and frequently with a negative margin (below cost) in order to maintain turn-over, perhaps hoping to break even through claims, and additional works. They then find themselves unable to do so, as with expansion inevitably comes inflation through increased materials costs and labour costs that these contractors are unable to meet. Particularly vulnerable are the medium and larger sized firms with longer-term contracts (twelve months plus) without sufficient financial reserves to cover the losses, not least those who have borrowed heavily to fund expansion.

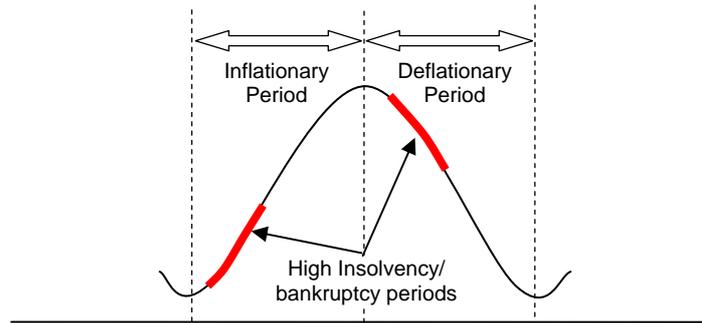


Figure 5.95: Insolvency and Bankruptcy in the Economic Cycle

Inflationary cycles also often lead to increased interest rates and contractors who have borrowed heavily to finance their operations and expansion, or those such as house-builders who have borrowed heavily to buy cheap land in the deflationary period hoping to benefit from increasing land values in the inflationary cycle, find they cannot meet the increased interest payments (Hillebrandt, Cannon and Lansley, 1995).

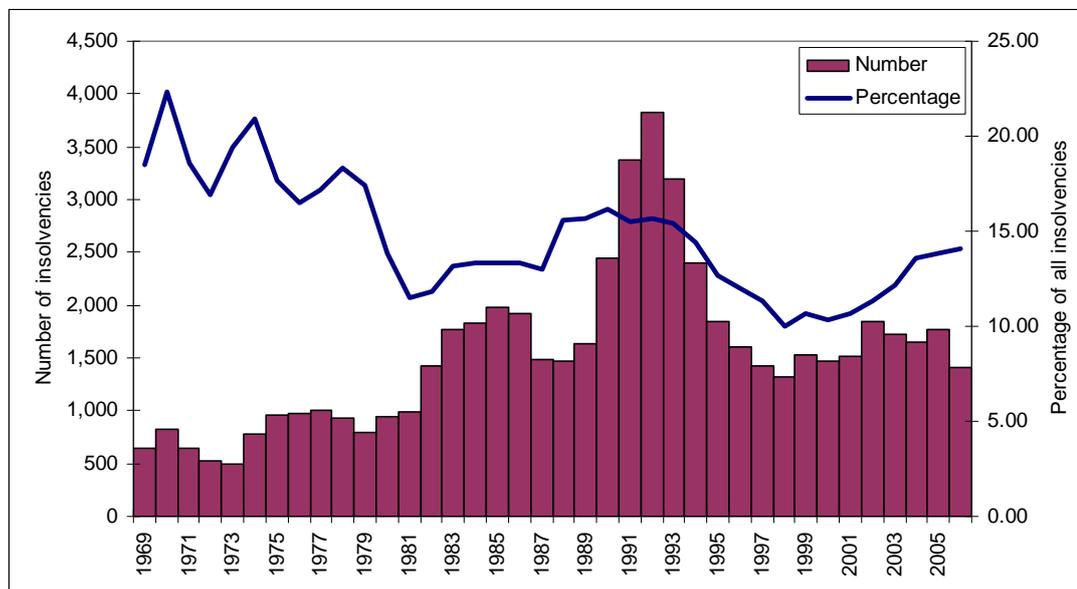


Figure 5.96: Insolvency Levels of Construction Firms v All Firms 1969~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals.

As the numbers of construction firms has increased there has been an increase in the numbers of firms becoming insolvent (see Figure 5.96 above). The insolvency rate is linked to the economic cycles and performance of the industry. In terms of national

insolvency levels the construction industry accounts for around 1 in 7 of all business insolvencies.

Within the industry itself the insolvency rate averages around 1% of the number of construction firms annually, but does vary between 0.7% and 1.9% depending upon the state of the economic cycle in the industry as shown in Figure 5.97 below. It should be noted that these figures are based on all firms including those employing just one person. In times of recession the insolvency rate amongst construction companies more than doubles that found in non-recessionary periods.

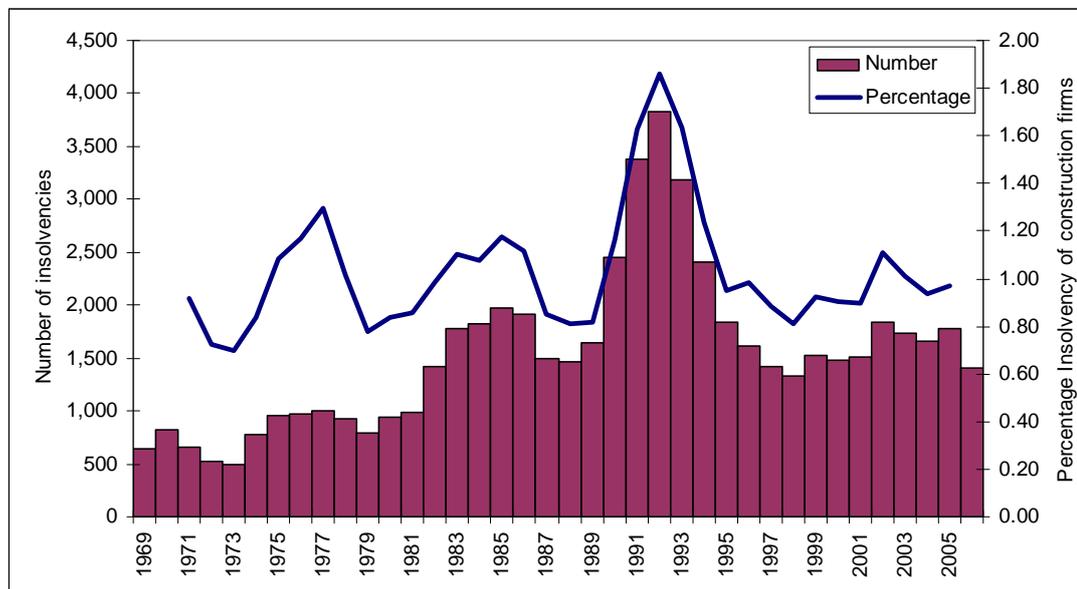


Figure 5.97: Insolvency Levels of Construction Firms 1969~2006

Source: Housing and Construction Statistics, and Construction Statistics Annuals

In terms of self-employed workers, bankruptcy levels remain high with around 1,700 self-employed workers being declared bankrupt annually, almost double early 1990s pre-recession level. The vulnerability of self-employed workers is evident in the bankruptcy rate quadrupling during the recessionary period as many workers made redundant in the recession tried, and failed, to continue in the industry on a self-employed basis together with those who were already employed who found themselves without work as peripheral workers were shed to preserve the core. See Figure 5.98 overleaf.

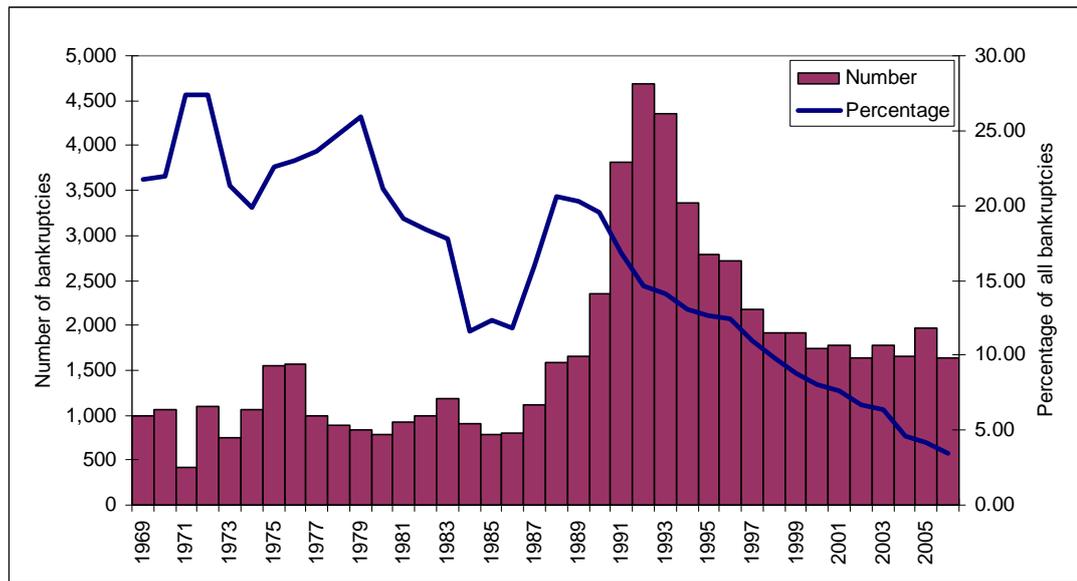


Figure 5.98: Bankruptcy Levels of Self-employed 1969~2006
 Source: Housing and Construction Statistics, and Construction Statistics Annuals.

The apparent significant drop in the overall percentage of bankrupt self-employed construction workers is not due to fewer workers becoming bankrupt, but to the practice of self-employment being adopted by other industries, notably agriculture and more recently hospitality, and perhaps a more recent increasing trend for personal voluntary bankruptcies amongst individuals (generally employees) due to high levels of personal debt (Watts and Hall, 2005; Thelwell, 2007) and the loss of stigma being attached to bankruptcy (Gribben, 2006) along with the easing of the bankruptcy laws. (Meyer, 2004; Thompson, 2004; and Farrow, 2006).

5.5.7 The Construction Skills Certification Scheme (CSCS)

It was mentioned earlier in this chapter that many employers, particularly in the case of self-employed and agency workers, provided no more education, development and training of their workforces than the statutory minimum requirement, primarily that required by the Health and Safety at Work etc Act 1974 (SI 1974 No.37) and more recently, The Management of Health and Safety at Work Regulations 1999 (SI 1999 No.3242). Despite this statutory requirement the nature and standard of education and training, where provided, was found to be inconsistent in extent and quality.

In 1995 the Construction Skills Certification Scheme (CSCS) was introduced to try and improve the standards and qualifications of the workforce and this included a mandatory health and safety test for all workers (Construction Skills, 2007a) that had to be passed to be able to apply for a CSCS card to show the worker was competent to work on a construction site (Aldis, 2001). In recognition of the fragmentation of the industry and the specialisation existing within it, the CSCS provides a number of different qualification arrangements, each of which has its own distinctive card (see Appendix 5.A.8.2).

The original CSCS was aimed at the trades/crafts workers employed on construction sites, and in 2001 the scheme was extended to include technical, supervisory and managerial workers. The scheme was extended again in November 2006 to include consultants, clients and other construction professionals who might or might not be based full-time on site as well those whose work might require them to visit a construction site from time-to-time, but would not normally be considered as construction workers or professionals (Richardson, 2006c), such as technical or sales representatives. Under the CSCS a person is deemed to be based 'full-time' on site if they spend more than thirty days on site in any six-month period.

The Technical Supervisor Manager routes to gaining a CSCS card (shown in Figure 5.99 overleaf) recognises the various routes into supervisory and management roles, including the recognition of the roles of the professional institutions, but those who require a PQP (Professionally Qualified Person) Yellow Card are required to take the CSCS Higher Managerial Health and Safety Test (Construction Skills, 2007b), and submit the CPD records for the two years prior to application. Additionally the PQP Yellow Card is only valid for five years and can only be renewed by verification of the PQP criteria, i.e. the continued membership of an approved professional institution and the maintenance of CPD activities records.

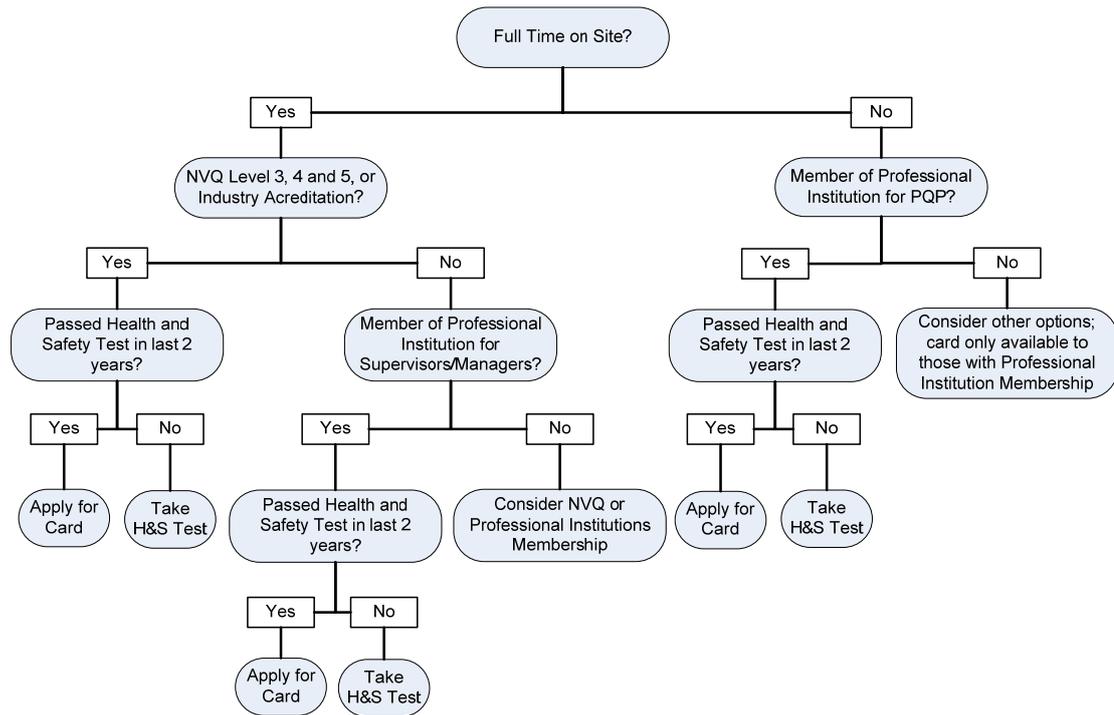


Figure 5.99: Technical, Supervisor, Manager Routes to Gain CSCS Card.

Source: Adapted from: CSCS (2007) Technical, Supervisor, Manager Routes

The CSCS is backed by the Government, the HSE, Main Contractors Group and professional institutions and is now widely recognised within the industry as the basic qualification to work on a construction site. The CSCS now has more than 1.15 million registered workers and professionals. However the widespread acceptance of the scheme has also brought its own problems as it too, like the subcontractors tax scheme, has become the target of organised crime producing counterfeit CSCS cards (Broughton 2005, Richardson 2006a).

The aim, never-the-less, remains to have a 100% CSCS workforce qualified to at least NVQ Level 2, with many leading industry clients now specifying that the workforce employed on their projects is fully qualified to this level. At present it is estimated that only 45% of the construction workforce is qualified to NVQ Level 2 or above, including many industry managers, particularly in the house-building sector where there is a drive to train managers to at least NVQ level 4 (CITB, 2004).

5.5.8 Implications for Education, Training and Development

Having examined the evolving structure of the construction industry and observed the considerable growth in self-employment in recent decades, not only amongst the trades/crafts elements but also amongst the professional elements, the impact these changes have had must now be considered with respect to management education, training and development.

Latham (1994: 9, para. 2.7) commented that:

The industry has complained for many years that it should not be used as an economic regulator. It has almost ceased to believe that Government can, or ever will, resist the temptation to affect its livelihood through public expenditure restrictions or fiscal/monetary policies.

He further stated (1994: 8, para. 2.5.1) that:

If the flow of work to the industry is less than the capacity available, a number of consequences follow:

- a) the firm will reduce their staff or may close altogether; ...
- d) training and education will suffer; ...

Thus the cyclical nature of the construction industry and interventionist Government expenditure policies make long term strategic planning in the industry difficult as firms expand and contract or cease to exist in response to the variable workload available. This makes any form of long-term education, training and development policies for the workforce, especially managers, vulnerable as such policies invariably require long periods of stability to be fully effective (Druker and White, 1996).

Latham (1994: 68, para. 7.12) also identified the detrimental effect that self-employment has on training and development in the industry. Whilst, perhaps reluctantly, not recommending a return to compulsory employment as self-employment is a preferred option of working for many people, Latham recognises the damage that false self-employment does to the industry and notes, optimistically, that new tax regimes will bring a halt to false self-employment and improve arrangements for training. Whilst the perceived benefits of self-employment were those of higher earnings, better job satisfaction and greater flexibility, the perceived

drawbacks were lack of job security, benefits and training opportunities (Nisbet, 1997).

Nisbet and Thomas (2000: 355) note that there are two distinct groups and approaches to education, training and development:

- Those who are ‘unqualified’ and undergoing training, sponsored by their employer, to become ‘qualified’, and
- Those who are already qualified.

The former group, more likely to be employees than self-employed, will be looking to obtain the qualifications necessary for them to be able to develop their careers, whilst the latter group will have established careers and therefore may be more concerned about obtaining high incomes and job satisfaction.

For management and other construction professionals many construction firms still provide little or no training and development (Cooper, 2004) and rely on education having been completed prior to the worker joining the firm. With the various demands for the industry to have an ‘all-qualified’ workforce the CSCS has taken the first steps in recognising the various managerial and professional roles in the industry and has produced a range of cards to match. The requirement to have an appropriate NVQ or approved professional institution membership may well act as a major driver to improve education, training and development in the industry.

5.5.9 Conclusions

This thread of research has sought to answer the first research sub-question ‘How does the structure of the construction industry affect continuing education training and development of construction management?’ by using the first element of the critical research model ‘structure’ to examine the structure of the construction industry through its constituent strata and how that structure is evolving through a desk-top study of the numbers of firms, and the numbers of workers employed within the industry and within the constituent companies. This study has also identified the principle drivers for the agential properties that act as structural changes that are occurring.

It has been shown that due to the importance of the construction industry to the UK economy, the construction industry is often used by Government as an economic regulator. This in turn has, from time-to-time, impacted greatly upon employment levels within the industry through cycles of 'boom and bust'. It has been found that, in order to accommodate these macro-economic variations in the economy and the micro-economic variations in construction company workloads due to the competitive nature in the way work is generally obtained, construction companies have been forced to become as flexible as possible. This has been achieved through having a permanent core workforce and a peripheral workforce of subcontract and agency staff to accommodate the variable workload.

Traditionally construction companies included within their core workforce not only their management and supporting functions but a large proportion of their trades/crafts workforce. The peripheral workforce often consisted of a large contingent of itinerant workers who were frequently paid cash-in-hand on the basis of being self-employed, thus responsible for paying their own taxes, national insurance and holiday pay contributions, which frequently they did not do. Employers too also avoided liability for items such as national insurance, holiday pay, sick pay and redundancy payments.

In an attempt to stop these practices successive governments introduced various tax schemes for the construction industry for the registration of self-employed workers that would enable the necessary flexibility in employment for both employer and self-employed worker alike. The introduction of the tax registration schemes, far from regulating the itinerant 'self-employed' workers, gave a new legitimacy to self-employment that was quickly exploited by both employers and workers alike, leading to a rapid and substantial increase in self-employment as many employers moved much of their trades/crafts workforce, and in many instances supervisory and managerial workers as well, to self-employed status to reduce their employment contract obligations (i.e. sick pay, holiday pay and redundancy pay) for directly employed workers. In so-doing this also removed obligations for education, training

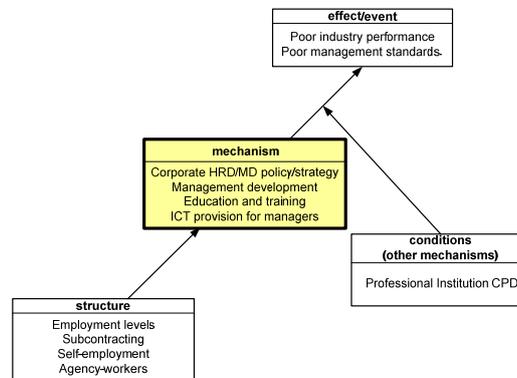
and development of the workforce (other than for a very limited statutory obligation under the Health and Safety at Work etc Act of 1974) as this now became the self-employed persons own responsibility. This ultimately led to the introduction of The Management of Health and Safety at Work Regulations of 1999 which introduced new regulations placing a statutory duty on employers for self-employed, agency workers and sub-contractors in their employ for health and safety training.

Consequently this generally resulted in no education, training or development of the peripheral workforce taking place as the short term focus of the construction industry was, and often still is, reducing costs to remain competitive to secure sufficient work to stay in business. This has indirectly resulted in the UK having one of the poorest qualified workforces in Europe.

These initiatives have resulted in the construction industry becoming more fragmented with a growth in the number of companies employing less than eight persons, rising to over 90% of the number of companies in the late 1990s.

Attempts to redress some of these problems have started with the introduction of the CSCS cards, firstly for trades/crafts workers, and more recently for construction managers, construction professionals and other construction-related occupations. In the case of construction professionals it has already been noted that in order to retain a CSCS PQP card evidence of CPD is required. Consequently, the next chapter will review the CPD requirements of the professional institutions and how these are structured.

5.6 Mechanism: Education, Training and Development of Construction Managers



5.6.1 Introduction

This chapter comprises the findings of the second element, ‘mechanisms’, of the critical realist research model, and seeks to address the second research sub-question of ‘What continuing education, training and development of construction managers is currently undertaken by construction companies?’. It therefore presents the findings from the questionnaire survey of the current state of management education, training and development of construction managers in some of the UK’s top construction companies.

Many of the questions form part of linked or grouped sets of questions. These are considered together in their sets or groups, as it is the interrelationship of the responses that is important, rather than the responses to the individual questions. Where there are ‘stand alone’ questions these will be considered on an individual basis. The abstraction of the responses to each question in the survey, cross-tabulations of groups or sets of questions and statistical analysis is shown in detail in Appendix 5.10.

5.6.2 Questionnaire Survey Response Rate

As stated in Chapter 5.4 the response rate for the questionnaire was not expected to be high, and that more than one round of issuing of the questionnaire might be required. Inevitably the number of rounds of issuing the questionnaire would be determined by the response rate.

The first round of questionnaires was despatched in early July 2006 to the 149 selected companies. No 'return by' date was specified in order to give respondents the opportunity to complete the survey questionnaire form at their own convenience and within a timeframe of their own choosing. A limited time-frame response period might have resulted in questionnaires not being completed as the respondent might not have had time available within an allotted timeframe, or would be put off from doing so if the time-frame had expired, particularly as the issue date was close to the summer holiday period and a lower than normal response rate might be expected due to the possibility of respondents being away on holiday.

By mid-August 2006 eighteen (12.41%) positive responses and four (2.76%) negative responses (declined to complete the questionnaire survey) were received. Four (2.76%) were returned by the Post Office as the addressee had 'gone away'. 'Gone away' returns were subsequently found to be companies that had ceased trading, merged with another company, or been taken over by another company and were no longer trading in their own right and with no forwarding address. As the contact details for these companies had been obtained from their web-sites it was assumed that these websites were hosted by third-party providers and therefore the websites were still active until such time as they were removed by the providers.

The first round was disappointing with only eighteen positive responses (12.41%) being received out a possible 145 respondents, thus by discounting the negative responses a nett response rate of 14.67% was achieved and very much lower than anticipated. Accordingly, it was decided in August 2006 to issue a second round of questionnaires to the 123 companies that had not responded in any way. This was done in October 2006, after the summer holiday period was over.

This second issue of questionnaires produced a further fifteen positive responses, two negative responses and three ‘gone away’ returns. The positive response rate being 12.50% of the possible respondents, resulting in a combined total of thirty-three positive responses by mid-December 2006 from a possible 142 companies, i.e. an aggregate positive response rate of 23.24%, or nett response rate of 24.25%. This was still marginally below the bottom of the expected positive response range suggested by Easterby-Smith, Thorpe and Lowe (1991) as 25% - 30%, and Fellows and Lui (1997) as 25% - 35% for postal questionnaires.

Following processing of the questionnaires during January and February 2007 that failed to yield statistically valid data it was decided that a third and final issue of questionnaires would be sent out as the current response rate was deemed inadequate. This was done in early March 2007 with a further 103 questionnaires being dispatched to those who had still not responded in any way. This yielded a further twelve positive responses (11.65%), and no negative responses or ‘gone away’ returns. This resulted in a final total of forty-five positive responses out a possible 142 respondents, giving an overall positive response rate of 31.69%, marginally above that of Easterby-Smith, Thorpe and Lowe (1991), and within the expected response range suggested by Fellows and Lui (1997). The final response rates are summarised in Table 5.25 below.

Table 5.25: Summary of Survey Questionnaire Returns

| Issue | Date | Questionnaires Issued/Reissued | Possible Respondents | Positive Responses | Negative Responses | ‘Gone Away’ |
|-------|--------------|--------------------------------|----------------------|--------------------|--------------------|--------------|
| 1 | July 2006 | 149 | 145 (97.32%) | 18 (12.41%) | 4 (2.76%) | 4 (2.68%) |
| 2 | October 2006 | 123 | 120 (97.56%) | 15 (12.50%) | 2 (1.67%) | 3 (2.44%) |
| 3 | March 2007 | 103 | 103 (100.00) | 12 (11.65%) | 0 (0.00%) | 0 (0.00%) |
| Total | | 149 | 142 (95.30%) | 45 (31.69%) | 6 (4.22%) | 7 (4.70%) |

Thus with a response rate of 45, being below the recommended minimum requirement of 47 responses for 90% confidence limit with a 10% margin of error it is necessary to determine the actual confidence limit for 45 responses. This was

found to 89% and thus acceptable and the results can be considered representative of the population of the top 150 construction companies, but clearly not of the industry as a whole.

As respondents had the option to remain anonymous thirteen of the forty-five respondents (28.89%) had chosen to do so. Although each questionnaire had been encoded to identify the firm responding, it was noted that in the majority of cases that the 'Freepost' replied paid envelope provide for the return of the questionnaire had been put through the company's post franking machine. This not only incurred unnecessary postage costs by the company, but invariably embossed the envelope with the company's name and logo as a part of the franking process, making the identification of the respondent company an easy task. Never-the-less the returned encoded questionnaires and embossed envelopes were still checked against the database for authenticity. In only one instance did the name of the respondent company not match the name in the database to whom the questionnaire had been sent. Here it subsequently transpired that this company consisted of a conglomerate of regional companies; the questionnaire was forwarded to the group's HR director based in one of the composite companies not individually identified in the database. The last completed questionnaire returned was received in late May 2007.

The results of the questionnaire are now discussed below. The results and analysis are presented in the following sections.

5.6.3 Staff Development Policy

Question 1: To what extent does your organisation have a formal staff development policy?

Question 2: Does the policy formally require staff to undertake development activities?

Question 3: To what extent is the staff development policy implemented?

Questions 1, 2 and 3 above consider staff development policies in construction companies. The three questions provide a three-dimensional interpretation of the extent to which staff development is currently embedded within construction companies.

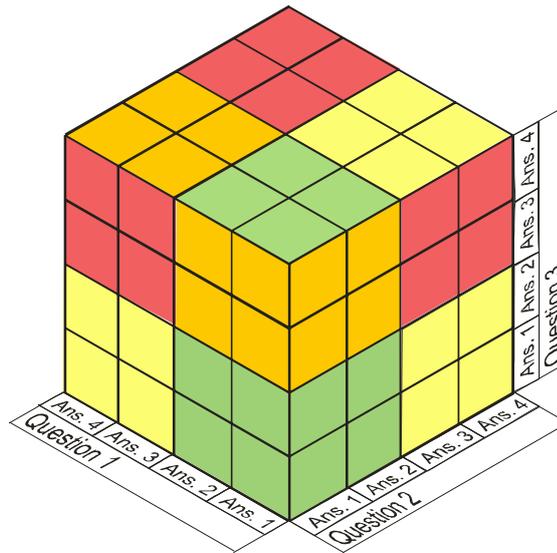


Figure 5.100: Three-dimensional response matrix

Whilst the results can be interpreted as a three-dimensional matrix as shown in Figure 5.100 above, this cannot be easily reproduced in two-dimensional media therefore the three bubble diagrams given in each set of cross-tabulations in the following sections of this chapter show the sum of the responses (i.e. at the face) of each combination of questions.

5.6.3.1 Responses to Question 1

Question 1: To what extent does your organisation have a formal staff development policy?

From the responses to Question 1 (see Table 5A.16 in Appendix 5A.10.1) it was found that twenty-five companies (55.56%) claim to have a staff development policy for all staff and ten companies (22.22%) claim to have a staff development policy for most staff (Mean R = 3.24), thus thirty-five companies (77.78%) have a staff development policy for the majority of staff. This leaves ten companies (22.22%) with staff development for a minority of staff, including four companies (8.96%) that do not have any staff development policies for their staff as shown in Figure 5.101 overleaf. This can be aligned with a company's concern for learning (Mumford and Gold, 2004).

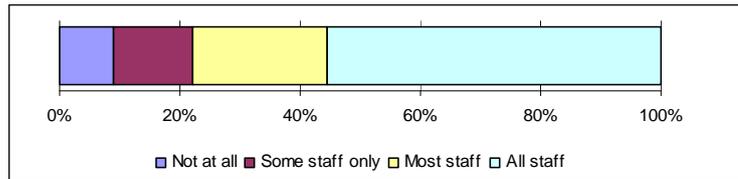


Figure 5.101: Responses to Question 1.
For data see Table 5A.16, Appendix 5A.10.1.

Here staff development policies do not yet appear to be fully embraced by large construction companies. Thus it would appear that a significant number of companies (55.56%) claim to have or be at Stage 4 ‘planned strategic management’ development level (Mumford and Gold, 2004) having Type 3 ‘formal management development’ (Mumford, 1994). However, a significant number of companies (44.44%) lie in the intermediate Stage 3 ‘planned management development’ and Stage 2 ‘unplanned reactive management development’ with Types 2 and 1 management development. It is perhaps of a matter of concern that some 8.96% of companies have not progressed beyond Stage 1 ‘unplanned management development’ and Type 1 ‘informal management development’. The lack of a management development policy does not indicate Type X ‘incidental management development’ management development as these companies maintain a high concern for task.

5.6.3.2 Responses to Question 2

Question 2: Does the policy formally require staff to undertake development activities?

The second aspect (Question 2) of staff development policy considers whether the policy formally requires staff to undertake development activities. This can be aligned with a company’s concern for task (Mumford and Gold, 2004). The responses to Question 2 are given in Table 5A.17, Appendix 5A.10.2. Here it can be observed that there is a substantial drop in requirement with only nine companies (20.00%) having any requirement for their all their staff to undertake development activities, whilst fifteen companies (33.33%) require most staff to undertake development activities (Mean R = 2.51) as shown in Figure 5.102 overleaf.

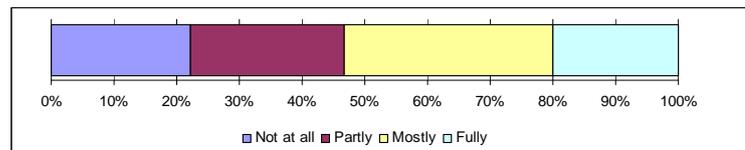


Figure 5.102: Responses to Question 2

For data see Table 5A.17 Appendix 5A.10.2.

It can be seen that far fewer firms have a requirement for their staff to undertake development activities. The cross-tabulation with Question 1 below will reveal the extent of companies with staff development and those that actually require staff development. Here a more realistic position appears with companies with regard to the implementation of their policies as their management development is less well established. There is a significant decrease in the number of companies at Stage 4 'strategic management development' with Type 3 'formal management development', with a corresponding increase in the lower Stages 1 to 3 and Types 1 and 2. This would again suggest that construction companies are highly focussed on the task of construction.

5.6.3.3 Cross-tabulation of Question 1 and Question 2

Question 1: To what extent does your organisation have a formal staff development policy?

Question 2: Does the policy formally require staff to undertake development activities?

This cross-tabulation will test the null-hypothesis H_0 that there is no association between a company having a formal staff development policy and the requirement to undertake staff development activities. The data analysis for this cross-tabulation is given in Appendix 5A.10.4. The distribution of responses (see Table 5A.19) is shown in Figure 5.103 overleaf.

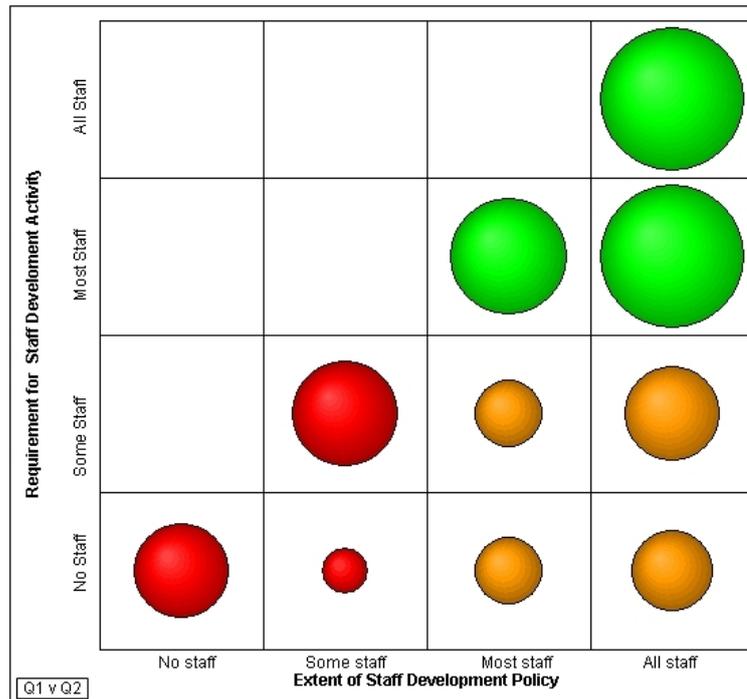


Figure 5.103: The extent v. the requirement of staff development policies (Q1 v. Q2).
For data see Table 5A.19, Appendix 5A.10.4.

The cross-tabulation tests run on SPSS using the four-by-four contingency table produced, as predicted, no reliable results for the Chi-square Tests (see Table 5A.20) as the data failed to meet the criteria required for reliable results. Consolidating the results (see Table 5A.21) reveals that only twenty-four companies (53.33%) have any significant formal requirement for staff to undertake development activities with ten companies (22.22%) having little or no formal requirement for staff development activity. A further eleven companies (24.44%), whilst claiming to have a staff development policy for the majority of staff, have little or no formal requirement for staff to undertake development activities, as shown in Figure 5.104 overleaf.

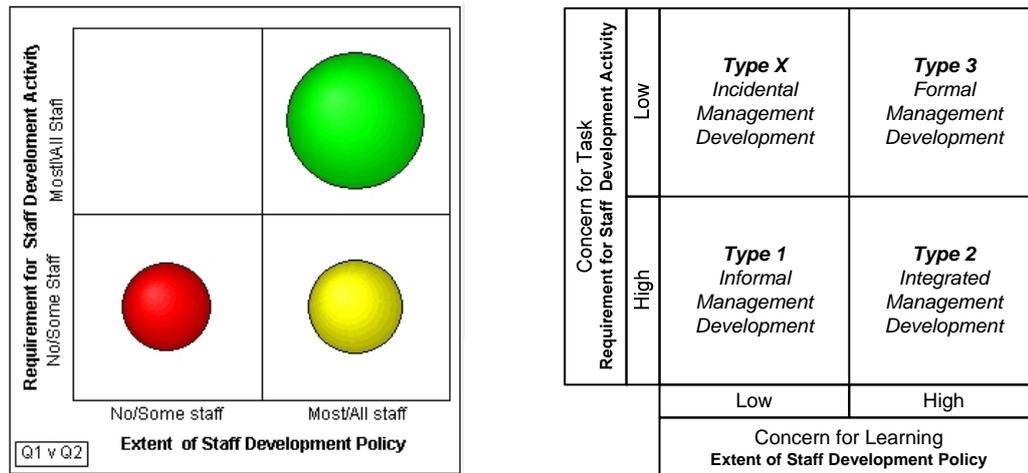


Figure 5.104: Consolidated: The extent v. the requirement of staff development policies (Q1 v. Q2). For data see Table 5A.21, Appendix 5A.10.4.

Consolidating the contingency into two-by-two cells also failed to meet the criteria with one cell contained a zero value against an expected minimum value of 4.67, thus the results must be treated with extreme caution (see Table 5A.22). The Chi-square Tests results [$\chi^2 = 14.694$; $\rho = 0.000$] and [$\Lambda = 18.609$; $\rho = 0.000$] indicate that there is a moderately high degree of certainty that there is an association between the two variables. The alternative Symmetrical Measures results (see Table 5A.23) for the Phi Coefficient and Cramer's V [ϕ & $V = 0.571$; $\rho = 0.000$] and the Contingency Coefficient [$C_c = 0.496$, $\rho = 0.000$] both indicate with a high degree of certainty that there is a moderate level of association between the two variables. It can therefore be concluded that there is a moderate level of association between the responses to Question 1 and the responses to Question 2 and that the null-hypothesis H_0 can be rejected with a high degree of certainty and little risk of a Type I error occurring.

As the null-hypothesis indicates with a high degree of certainty, there is a moderate level of association between the two variables. Using the consolidated two-by-two matrix enables a direct comparison with Mumford and Gold's (2004) 'types of management development' (see Figure 5.103 above) with a high degree of confidence. Thus it can be seen that Type 3 'formal management development' is present in 53.33% of companies in terms of their staff development policies and staff development activities; and 22.22% of companies have reached Type 2 'integrated

management development’, 22.44% Type 1 ‘informal management development’. As expected, no firms are found with Type X ‘incidental management development’.

5.6.3.4 Responses to Question 3

Question 3: To what extent is the staff development policy implemented?

An important aspect of any policy is whether or not that policy is implemented. Responses to Question 3 (see Table 5A.18, Appendix 5A.10.2) reveal that only sixteen companies (33.56%) have actually implemented their staff development policies in full, whilst nineteen companies (44.22%) have implemented their policies for most staff (Mean R = 3.04). This is illustrated in Figure 5.105 below. Again, this can be aligned with a company’s ‘concern for task’ (Mumford and Gold, 2004).

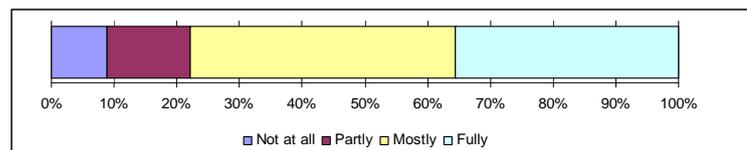


Figure 5.105: Responses to Question 3
For data see Table 5A.18, Appendix 5A.10.3.

Thus, it can be seen that many large construction companies that have staff development policies have yet to implement them fully. This would suggest that these companies are less advanced in the implementation, thus they are at a lower level of development, as the concern for task still dominates these companies, It would appear that the greatest level on implementation is at Stage 3 ‘planned management development’, and at Type 2 ‘integrated management development’. The cross-tabulation of the extent to which companies have staff development policies and the extent to which they are implemented is discussed below.

5.6.3.5 Cross-tabulation of Question 1 and Question 3

Question 1: To what extent does your organisation have a formal staff development policy?

Question 3: To what extent is the staff development policy implemented?

Comparing the two sets of responses reveals the extent to which those companies that have policies have implemented them as shown in Figure 5.106 overleaf. The null-hypothesis H_0 for the cross-tabulation here is that there is no association between the extent of organisational staff development policies and the extent to which those policies are implemented. The analysis of this data is given in Appendix 5A.10.5.

Here it can be seen that only fourteen companies (31.1%) claim to have implemented their staff development policy in full, with another nineteen companies (42.22%) claiming to have mostly implemented their policies. Consolidating the data into a two-by-two matrix (see Figure 5.106 overleaf) reveals that some eight companies (17.78%) have made little or no progress with staff development policies, with the remaining four companies (8.88%) having made some progress (see Table 5A.26).

The cross-tabulation tests run on SPSS using the four-by-four contingency table produced, as predicted, no reliable results for the Chi-square Tests (see Table 5A.25,) as the data failed to meet the criteria required for reliable results. Consolidating the contingency table to two-by-two cells does not produce a reliable set of Chi-square test results as the data just fails to meet the criteria with two cells having values of 2 when an expected minimum value of 2.22 is required, thus the results must be treated with caution. Never-the-less, a useful comparison can still be made with Mumford and Gold's (2004) 'types of management development'.

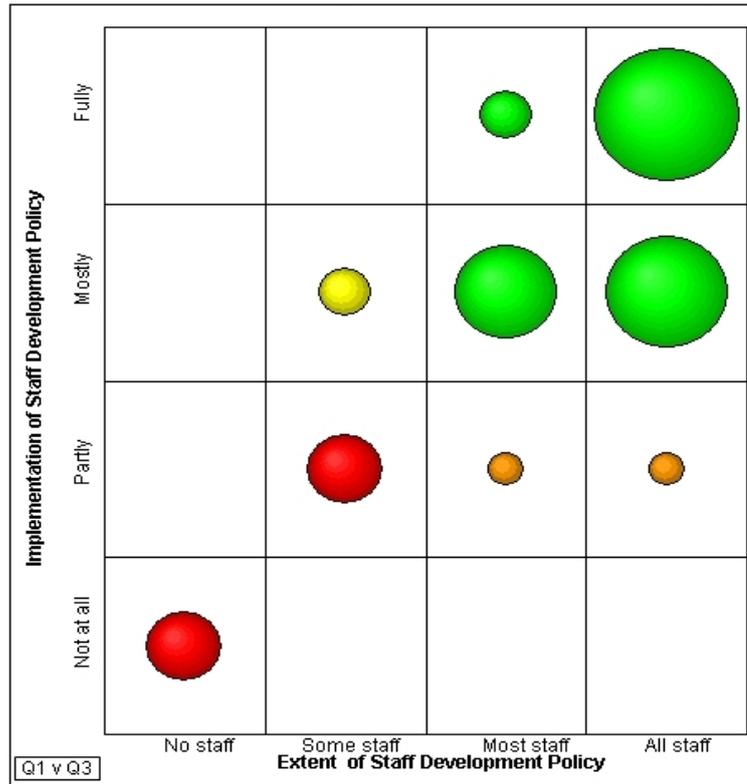


Figure 5.106: The extent v. the implementation of staff development policies (Q1 v. Q3). For data see Table 5A.24, Appendix 5A.10.5.

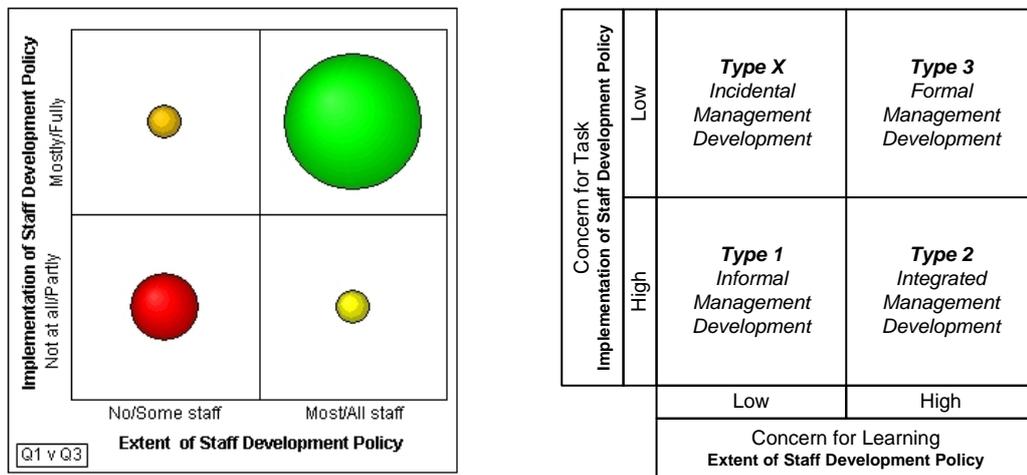


Figure 5.107: Consolidated: The extent v. the implementation of staff development policies (Q1 v. Q3). For data see Table 5A.26, Appendix 5A.10.5.

The results for the Chi-square tests [$\chi^2 = 24.833$; $\rho = 0.000$] and the Likelihood ratio [$\Lambda = 22.333$; $\rho = 0.000$] (see Table 5A.27) indicate that there is a high degree of certainty that there is an association between the two variables. The alternative

Symmetrical Measures results (see Table 5A.28) for the Phi Coefficient and Cramer's V [ϕ & V = 0.743; ρ = 0.000] and the Contingency Coefficient [Cc = 0.596, ρ = 0.000] both indicate with a high degree of certainty that there is a strong level of association between the two variables. It can therefore be concluded that there is a strong level of association between the responses to Question 1 and the responses to Question 3 and that the null-hypothesis H_0 can be rejected with a high degree of certainty, and little risk of a Type I error occurring.

As the null-hypothesis indicates with a high degree of certainty that there is a strong level of association between the two variables using the consolidated two-by-two matrix again enables a direct comparison to be made with 'Mumford and Gold's (2004) 'types of management development' with a high degree of certainty(see Figure 5.107 above). It can be seen that Type 3 'formal management development' is dominant, consistent with the results found in the cross-tabulation of Question 1 and Question 2. However, it can also be seen that a small number of companies appear to have Type X 'incidental management development' as they have neither policy nor implementation of staff development. The result here is slightly more polarised indicating a more distinctive split between those that have implemented staff development policies and those that have not. Thus, the Type 1 'unplanned management development' is more evident than Type 2 'integrated management development'.

5.6.3.6 Cross-tabulation of Question 2 and Question 3

Question 2: Does the policy formally require staff to undertake development activities?

Question 3: To what extent is the staff development policy implemented?

The cross-tabulation here is to test the null-hypothesis that there is no association between the staff development policy formally requiring staff development to be undertaken and the implementation of that policy. The data analysis for this cross-tabulation is given in Appendix 5A.10.6. In the final cross-tabulation in this section (shown in Figure 5.108 overleaf) between the implementation and the requirement for staff development (see Table 5A.29), it was found that seven companies (15.56%) with a fully implemented staff development policy had a formal

requirement for staff development activity. As with the previous two comparisons of staff development policy responses no reliable results were obtained using the four-by-four cell contingency table as the data failed to meet the criteria for reliable output for Chi-square Tests (see Table 5A.30).

Consolidating the results to a two-by-two cell matrix (see Table 5A.31) reveals twenty-three companies (51.11%) had a substantial implementation and development activity requirement. However, nine firms (20.00%) had little or no implementation of policy or formal requirement for staff development activity.

In this cross-tabulation no meaningful comparison can be made with Mumford’s (1994) ‘Stages of Management Development’ and Mumford and Gold’s (2004) ‘Types of Management Development’ as both the criteria used have been classified as ‘concern for task’, thus comparing two like criteria shows only the degree of consistency between the two sets of answers for Questions 2 and 3.

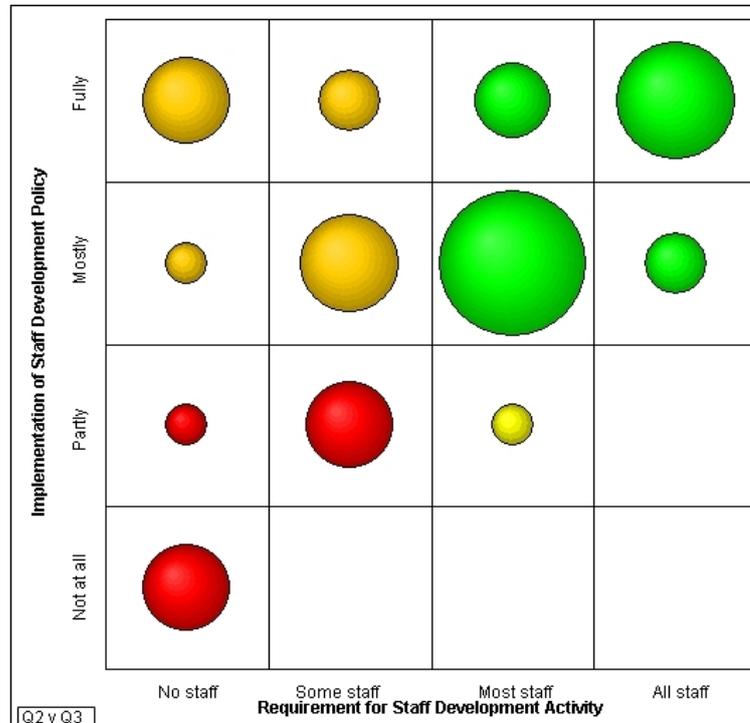


Figure 5.108: The implementation v. the requirement of staff development policies (Q2 v. Q3). For data see Table 5A.29, Appendix 5A.10.6.

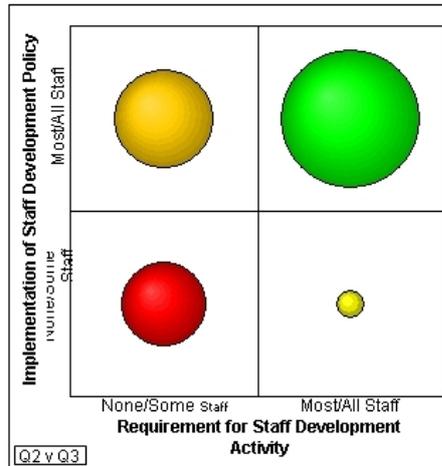


Figure 5.109: The implementation v. the requirement of staff development policies (Q2 v. Q3).
For data see Table 5.31, Appendix 5A.10.6.

Once again consolidating the data to a two-by-two cell contingency table as shown in Figure 5.109 above also failed to meet the criteria for the Chi-square tests as one cell contained a value of 1 against an expected minimum of 4.67. The Chi-square Tests results [$\chi^2 = 9.700$; $\rho = 0.002$] and [$\Lambda = 10.678$; $\rho = 0.001$] (see Table 5A.32) show that there is a moderately high degree of certainty that there is an association between the two variables. The alternative Symmetrical Measures results [ϕ & $V = 0.571$; $\rho = 0.000$] and [$Cc = 0.496$, $\rho = 0.000$] (see Table 5A.33) again indicate that there is only a moderate level of association between the variables but with a high degree of certainty that the results did not occur by chance. In this instance if the null-hypothesis H_0 is rejected there is a low risk of making a Type I error, but if it is accepted there is a high risk of making a Type II error.

5.6.3.7 Implications of Staff Development Policy Findings

The responses to the three questions concerning staff development policies and their respective cross-tabulations reveal that staff development policies are not fully embraced or embodied within the top construction companies in the UK, with some not even having staff development policies, or policies that are implemented. This is reinforced by the findings that many companies' staff development policies, irrespective of whether or not they are implemented have little or no requirement for staff development by their employees.

The suggestion here is that if a large proportion of the top firms do not yet have staff development policies, implemented policies or requirement for staff development, then smaller firms are even less likely to do so. Furthermore, this is not likely to lead, within the industry as a whole, to any systematic attempt to raise the standards of education, training and development within these companies, and the industry at large, which is identified in many reports as a key component to raising productivity in the industry.

In terms of Mumford and Gold's (2004) 'stages of management development' it would appear that the majority of companies have reached or are at Stage 4 'planned strategic management development' and have developed and implemented management development policies as part of their business plans to meet their companies' longer term business needs. Never-the-less, a significant number, whilst having developed management development policies, have yet to fully implement them, suggesting that they have reached Stage 3 'planned management development' or are through on-going implementation progressing towards Stage 4 'planned strategic management development' (Mumford and Gold, 2004). In terms of Mumford's (1994) 'types of management development' these companies correspondingly achieved Type 3 'formal management development' and Type 2 'integrated management development'. It is perhaps a matter of concern that amongst the UK's largest construction companies a few have yet to progress beyond the lowest levels in the 'stages of management development'. Investigation of the survey returns reveals that these construction companies operate either entirely or predominately within the house-building sector where the lowest levels of management standards/qualifications are to be found.

The next section of questionnaire analysis considers staff appraisal policies and their implementation in terms of management development.

5.6.4 Staff Appraisal Policy

Question 4: To what extent does your organisation have a staff appraisal policy?

Question 5: To what extent is the staff appraisal policy implemented?

Question 6: Does the appraisal policy include staff development opportunities?

A key component of any staff development policy is that of staff appraisal as a means of benchmarking performance, for example by setting targets and objectives, although it is possible to have a staff appraisal policy within an over-arching staff development policy. The three questions in this section echo those of the staff development policy questions in the previous section and are considered in a similar way, together with cross-question response comparisons.

5.6.4.1 Responses to Question 4

Question 4: To what extent does your organisation have a staff appraisal policy?

The responses to Question 4 (see Table 5A.34, Appendix 5A.10.7) reveal that twenty-nine companies (64.44%) claim to have a staff appraisal policy for all staff with a further eleven companies (24.44%) having an appraisal policy for most staff. Thus forty companies (88.88%) claim to have policies for all or most of their staff (Mean R = 3.53), with only five companies (11.11%) having little or no appraisal policies in place, as shown in Figure 5.110 below.

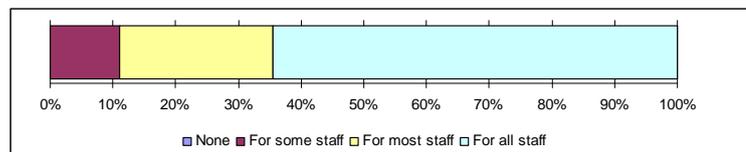


Figure 5.110: Responses to Question 4
For data see Table 5A.34 Appendix 5A.10.7.

As with the staff development policy, it is important to establish whether or not those companies claiming to have staff appraisal policies have implemented them with their staff. Thus, this question can be aligned with Mumford and Gold's (2004) company's 'concern for learning'.

It would appear that staff appraisal policies have yet to be fully embraced by large construction companies. Never-the-less, a significant number of companies, twenty-nine (64.44%), claim to have or be at Stage 4 'planned strategic development'

(Mumford and Gold, 2004) having Type 3 ‘formal management development’ (Mumford, 1994) by way of equating staff development with staff development in this instance. A further sixteen (35.55%) of companies can be considered to have reached the intermediate stages of Stage 3 ‘planned management development’ and Stage 2 ‘unplanned reactive management development’ with Type 2 ‘integrated management development’ and Type 1 ‘informal management development’. No company was found to be at the lowest level of Stage 1 ‘unplanned management development’ and Type 1 ‘informal management development’ due to the high concern for task in construction companies.

5.6.4.2 Responses to Question 5

Question 5: To what extent is the staff appraisal policy implemented?

The responses to Question 5 (see Table 5A.35, Appendix 5A.10.8) reveals that fourteen of the companies (31.11%) claiming to have staff appraisal policies have fully implemented them, whilst twenty companies (44.44%) claim to have implemented their appraisal policy for most staff. This leaves eleven companies (24.44%) with little or nothing by way of appraisal policies for their staff as shown in Figure 5.111 below.

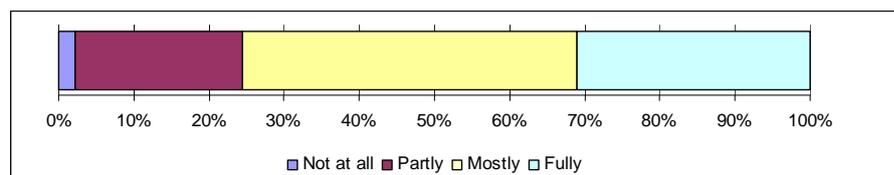


Figure 5.111: Responses to Question 5
For data see Table 5A.35, Appendix 5A.10.8.

Here the implementation of staff appraisal policies can be aligned with the ‘concern for task’ (Mumford and Gold, 2004). It can be seen that fewer companies have fully implemented their appraisal policies, thus fewer companies appear to be at Stage 4 ‘strategic management development’ (Mumford and Gold, 2004) with Type 3 ‘formal management development’ with corresponding increases in the earlier Stages 1 to 3 and Type 1 ‘informal management development’ and Type 2 ‘integrated management development’ (Mumford, 1994). Again, this would appear to confirm that construction companies are highly focussed on the task of construction. The

higher level of implementation of staff appraisal policies compared to the implementation of staff development policies is consistent with that of companies with a strong focus on the task as appraisal is often linked to production outcomes as a basis for determining performance-based rewards for construction managers.

5.6.4.3 Cross-tabulation of Question 4 and Question 5

Question 4: To what extent does your organisation have a staff appraisal policy?

Question 5: To what extent is the staff appraisal policy implemented?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between the extent that companies have staff appraisal policies and the extent to which those policies are implemented. The data analysis for this cross-tabulation is given in Appendix 5A.10.10. Comparing responses (see Table 5A.37) to the above reveals the relationship between the existence of staff appraisal policies and the level of implementation of staff appraisal policies. Here it was found that only twelve companies (26.67%) have fully implemented appraisal policies for all of their staff as shown in Figure 5.112 below.

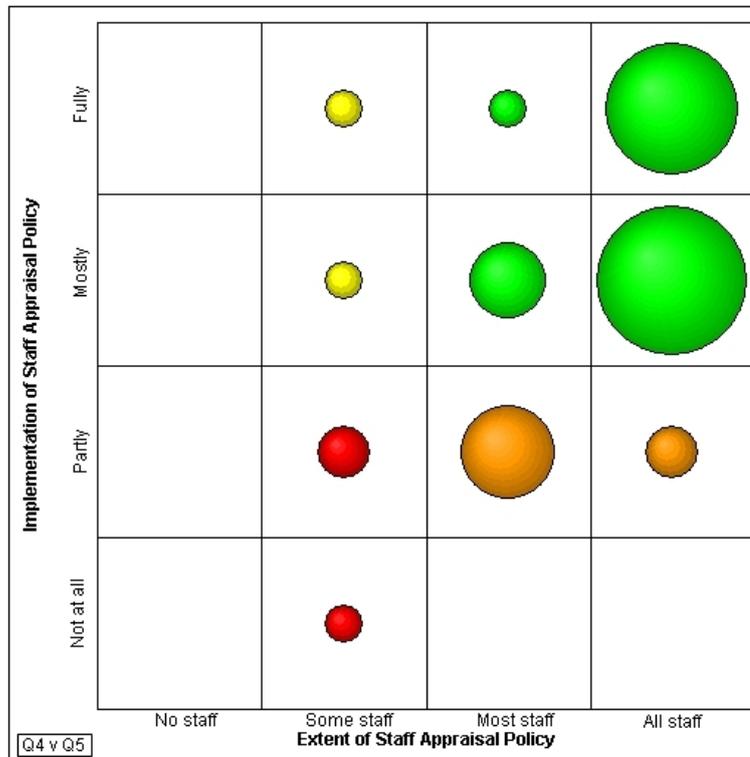


Figure 5.112: The extent v. implementation of staff appraisal policies (Q4 v. Q5). For data see Table 5A.37, Appendix 5A.10.10.

Using the four-by-four cell contingency table data failed to meet the criteria for the Chi-square tests (see Table 5A.38) with no reliable results being obtained. The contingency table was consolidated to two-by-two cells as shown in Figure 5.113 below and Table 5A.39. Here, thirty-two companies (71.11%) having appraisal policies for the majority of staff were also found to have them fully or mostly implemented. Only three companies (6.67%) claiming to have an appraisal policy that covers few staff also did not have any degree of implementation.

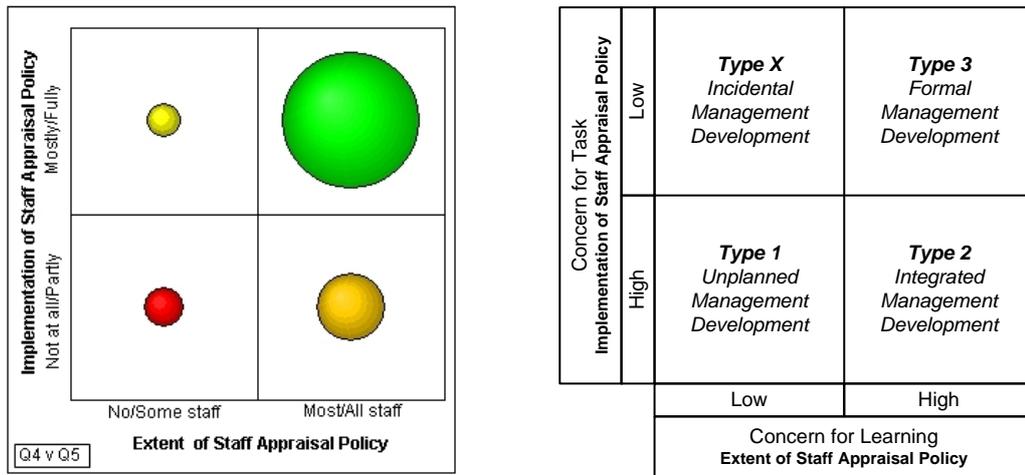


Figure 5.113: Consolidated: The extent v. implementation of staff appraisal policies (Q4 v. Q5). For data see Table 5A.39, Appendix 5A.10.10.

It was found that although two of the cells contained values of less than expected 5, both were above the expected minimum value of 1.22 and therefore the Chi-square Tests results can be considered reliable (see Table 5A.40). The results obtained [$\chi^2 = 3.850$; $\rho = 0.050$] and [$\Lambda = 3.291$; $\rho = 0.070$] indicate that there is a lack of statistical significance, and only a low level of association. However the Symmetrical Measures results [$\phi \ \& \ V = 0.293$; $\rho = 0.050$] and [$Cc = 0.281$, $\rho = 0.050$] reflect the Chi-square results in the low level of association indicating that the result is statistically significant. Here the null-hypothesis H_0 can be accepted with only a low risk of making a Type II error.

The consolidated two-by-two matrix again should enable a direct comparison with Mumford and Gold’s (2004) types of management development (see Figure 113 above). However, the null-hypothesis indicates only a low, but statistically significant, level of association between the two variables with a low risk of a Type

If error occurring therefore a direct comparison with Mumford and Gold's (2004) 'types of management development' can still be made but must be treated with considerable caution. It can be seen that Type 3 'formal management development' appears to be present in thirty-two companies (71.11%) in terms of their staff appraisal policies and their implementation. Type 2 'integrated management development' is found in eight (17.78%) companies and Type 1 'unplanned management development' in just three (6.67%). Type X 'incidental management development' is to be found in just two (4.44%) of companies due to the absence of a staff appraisal policy.

5.6.4.4 Responses to Question 6

Question 6: Does the appraisal policy include staff development opportunities?

The third question, Question 6, in this series relating to staff appraisal sought to establish whether the appraisal policy included any staff-development opportunity incidental to the existence of any staff development policy. Thirty-two companies (71.11%) responded that their appraisal policy did provide for staff development opportunity, with a further nine (20.00%) providing it for most staff (see Table 5A.36, Appendix 5A.10.9). Only four companies (8.88%) claimed they provided little or no opportunity for staff development in their appraisal policies as shown in Figure 5.114 below.

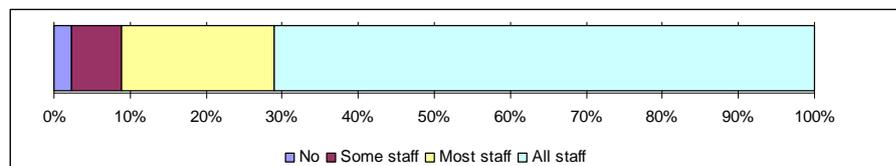


Figure 5.114: Responses to Question 6
For data see Table 5A.36, Appendix 5A.10.9.

Here it can be seen that the majority of companies having a staff appraisal policy also provide staff development opportunities. The inclusion of staff development opportunities with appraisal policies can be aligned with the 'concern for task' rather than 'concern for learning' Mumford (1994) due to the presenteeism culture requiring a high commitment to the construction project expected of construction managers.

5.6.4.5 Cross-tabulation of Question 4 and Question 6

Question 4: To what extent does your organisation have a staff appraisal policy?

Question 6: Does the appraisal policy include staff development opportunities?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between the extent companies having staff appraisal policies and having staff development opportunities within that policy. To provide a clearer understanding of the above, the responses given for Question 6 have been compared to the responses given in Question 4 as shown in Figure 5.115 overleaf. The analysis for this cross-tabulation is given in Appendix 5A.10.11.

Here it was found (see Table 5A.42) that twenty-six companies (57.78%) have both staff appraisal policies for all staff that include the opportunity for staff development. Once again, it was found that the four-by-four cell contingency-table data significantly failed to meet the criteria for a successful Chi-square analysis (see Table 5A.43).

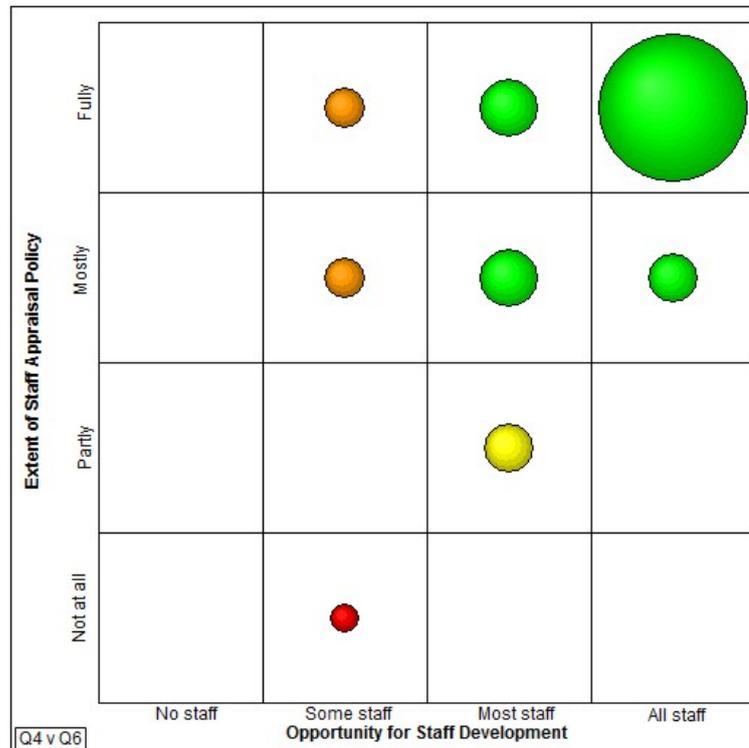


Figure 5.115: The extent of staff appraisal policies v the opportunities for staff development (Q4 v. Q6).

For data see Table 5A.42, Appendix 5A.10.11.

Consolidating the data to a two-by-two matrix (see Table 5A.44) reveals thirty-seven (82.23%) companies as having appraisal policies for most and all staff provided development opportunities for most or all staff. Just one company (2.22%) not having appraisal policies for all or most staff did not provide development opportunities for some staff. See Figure 5.116 below.

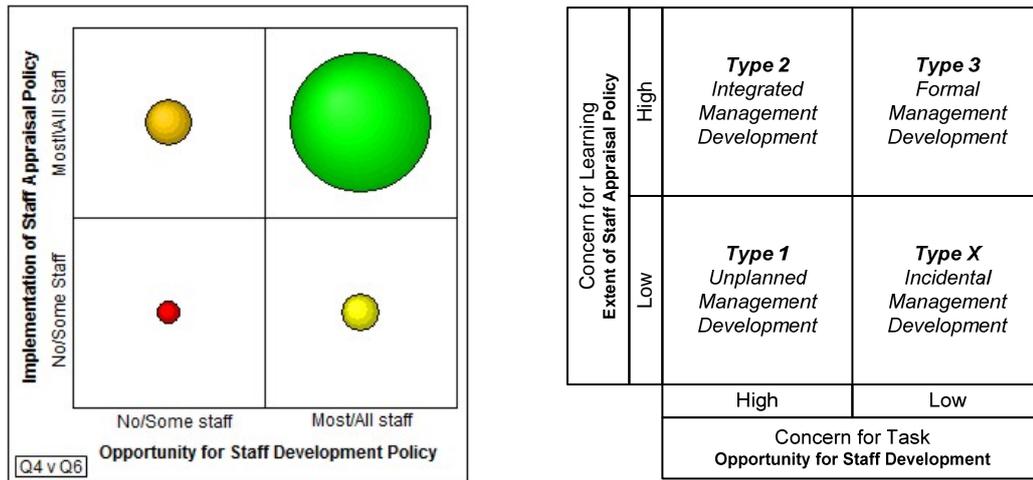


Figure 5.116: Consolidated: The extent of staff appraisal policies v the opportunities for staff development (Q4 v. Q6).
For data see Table 5A.44, Appendix 5A.10.11.

Using the consolidated two-by-two contingency table provided a more reliable set of data, although it was noted that three cells have values of less than 5, although all three exceed the minimum expected value of 0.44, but the results must still be treated with caution (see Table 5A.45). The Chi-square Tests results obtained [$\chi^2 = 0.857$; $\rho = 0.354$] and [$\Lambda = 0.682$; $\rho = 0.409$] show a very low degree of statistical significance. However, the Symmetrical Measures results [ϕ & $V = 0.138$; $\rho = 0.354$] and [$Cc = 0.137$, $\rho = 0.354$] (see Table 5A.46) indicate a weak level of association, but one that is again statistically insignificant. Here the null-hypothesis H_0 can be accepted, but with a very high risk of making a Type II error as there is only a 64.6% probability of the results not occurring by chance.

Here the null-hypothesis indicates a weak but statistically insignificant level of association between the two variables. Using the consolidated two-by-two matrix (see Figure 5.116 above) to make a direct comparison with Mumford and Gold's

(2004) types of management development must be treated with some caution, however, due to the statistical insignificance of the cross-tabulation and the high risk of a Type II error occurring then a comparison with Mumford and Gold's (2004) 'types of management development' can be made with a higher level of confidence than the previous cross-tabulation (Q4 v. Q3). Here it can be assumed that a Type 3 'formal management development' is present in thirty-seven (82.23%) of companies in terms of their staff appraisal policies and opportunities for staff development and Type 2 'integrated management development' can be found in four companies (8.89%). Type 1 'unplanned management development' in three companies (6.67%) and Type X 'incidental management development' in just one company (2.22%), again reflecting the high level of focus on construction projects.

5.6.4.6 Cross-tabulation of Question 5 and Question 6

Question 5: To what extent is the staff appraisal policy implemented?

Question 6: Does the appraisal policy include staff development opportunities?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between the extent companies have implemented staff appraisal policies and the inclusion of staff development within those policies. The analysis for this cross-tabulation is given in Appendix 5A.10.12. In the final comparison of responses to the staff appraisal questions the implementation of staff appraisal policies is compared to the provision of staff development opportunity (see Table 5A.47) as shown in Figure 5.117 below.

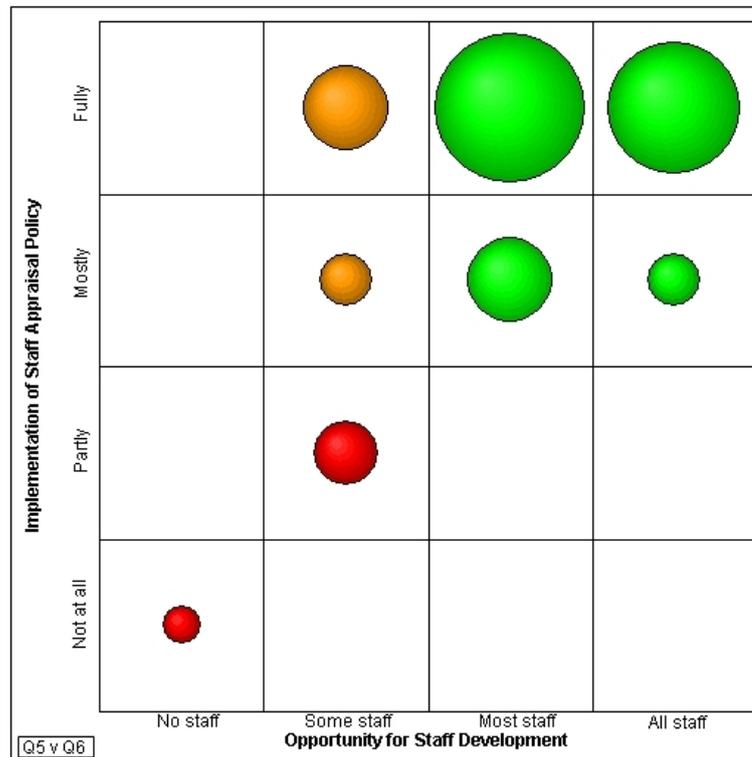


Figure 5.117: The implementation of staff appraisal policies v the opportunities for staff development (Q5 v. Q6).

For data see Table 5A.47, Appendix 5A.10.12.

Twelve companies (26.27%) claiming to have an implemented appraisal policy for all staff include staff development opportunity within the appraisal. In the final cross-tabulation tests of staff-appraisal question responses the data for the four-by-four cell contingency table was, as expected, confirmed as failing to meet the criteria for Chi-square Tests (see Table 5A.48).

Again, consolidating the data to a two-by-two matrix (see Table 5A.49) reveals that thirty-four companies (75.56%) with appraisal policies implemented for all or most staff included development opportunities for all or most staff within their appraisal policies. Seven companies (15.56%) also claim that their staff appraisal policy included staff development opportunity even though the policy has little or no implementation. Only four companies (8.89%) with little or no implementation of their appraisal policies do not include staff development opportunities. See Figure 5.118 below.

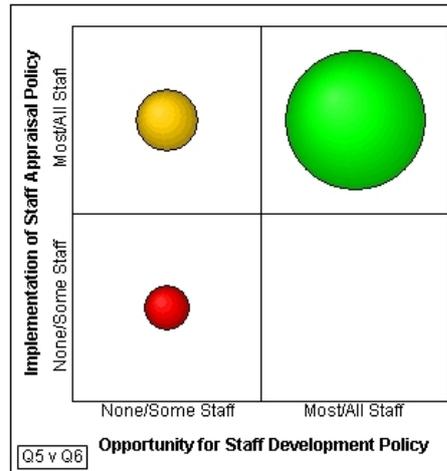


Figure 5.118: Consolidated: The implementation of staff appraisal policies v the opportunities for staff development (Q5 v. Q6).

For data see Table 5A.49, Appendix 5A.10.12.

The consolidated contingency table provided highly unreliable output as one cell contained a value of zero and therefore the results must be treated with extreme caution. The Chi-square Tests results [$\chi^2 = 13.570$; $\rho = 0.000$] and [$\Lambda = 12.576$; $\rho = 0.000$] tend to indicate a strong association between the variables (see Table 5A.50). The Symmetrical Measures results [$\phi \ \& \ V = 0.549$; $\rho = 0.000$] and [$Cc = 0.481$, $\rho = 0.000$] (see Table 5A.51) tend to indicate that there is only a moderate degree of association between the two variables, but with a high degree of significance. In this instance if the null-hypothesis H_0 is rejected there is a low risk of making a Type I error, but if it is accepted, there is a high risk of making a Type II error.

No meaningful comparison can be made with Mumford's 'stages of management development' (1994) and Mumford and Gold's 'types of management development' (2004) as both criteria used have been classified as 'concern for task', thus comparing two like criteria indicated only the degree of consistency between the two sets of responses for Questions 5 and 6.

5.6.4.7 Implications of Staff Appraisal Policy Findings

An important part of any staff development policy is the inclusion of staff appraisal either within the staff development policy or as a separate policy. Here it has been found that around two-thirds of companies had a staff appraisal policy covering all staff, but only around half of these companies had fully implemented those policies.

Whilst all companies have staff appraisal policies for many levels of staff, implementation was found to be variable, which would tend to suggest that staff appraisal is still an emergent concept amongst the top construction companies.

The findings also tend to suggest that the opportunities for staff development are more comprehensively embedded in staff appraisal policies. When coupled with the actual implementation of policies a less well-developed scenario emerges with the lack of policy implementation reducing the likely availability of development opportunities for staff. Here it would appear that a greater number of companies have reached or are at Stage 4 ‘planned strategic management development’ (Mumford and Gold, 2004) and have developed and implemented staff appraisal policies as part of their business plans to meet their future longer term business needs. Again, a significant number of companies, whilst having developed staff appraisal policies, have yet to implement those policies suggesting that they have reached Stage 3 ‘planned management development’ or are engaged in an on-going implementation, progressing towards Stage 4 (Mumford and Gold, 2004). In terms of the Types of management development these companies have correspondingly achieved Type 3 ‘formal management development’ and Type 2 ‘integrated management development’ (Mumford, 1994). Again, it is a matter of concern that some of the UK’s largest construction companies have yet to progress beyond the lowest levels in the stages and types of management development with regard to staff appraisal policies, and, as with management development, these were found to be engaged either wholly or predominantly in house building.

The interrelationship between staff development policies and staff appraisal policies is considered in the next section.

5.6.5 Staff Development Policy compared to Staff Appraisal Policy

The previous two sections considered aspects of staff development policy and staff appraisal policy separately. This section considers the combined status of staff

development and staff appraisal policies in construction companies. The responses to corresponding questions in each section are compared.

5.6.5.1 Cross-tabulation of Question 1 and Question 4

Question 1: To what extent does your organisation have a formal staff development policy?

Question 4: To what extent does your organisation have a staff appraisal policy?

Here the cross-tabulation is to test the null-hypothesis H_0 that there is no association between companies having a staff development policy and a staff appraisal policy. Comparison of the responses, as shown in Figure 5.119 below, for the extent of staff development policies and staff appraisal policies will reveal the co-existence of these policies within construction companies. The analysis of data for this cross-tabulation is given in Appendix 5A.10.13.

Twenty-three companies (51.11%) claim to have both fully implemented staff development policies and staff appraisal policies, see Table 5A.52. As all the previous Chi-square tests using the four-by-four cell contingency table failed to produce reliable results due to the cell data failing to meet the criteria (five cells having a zero entry) it was to be expected that this comparison would also fail, see Table 5A.53.

Consolidating the data into a two-by-two matrix, see Table 5A.54, revealed a total of thirty-three companies (73.33%) having staff development policies for all or most staff and staff appraisal policies for all or most staff. Just three companies (6.67%) have little or nothing of either policy in place. The remaining nine companies (20.00%) were found to have varying degrees of policies in place, as shown in Figure 5.120 overleaf.

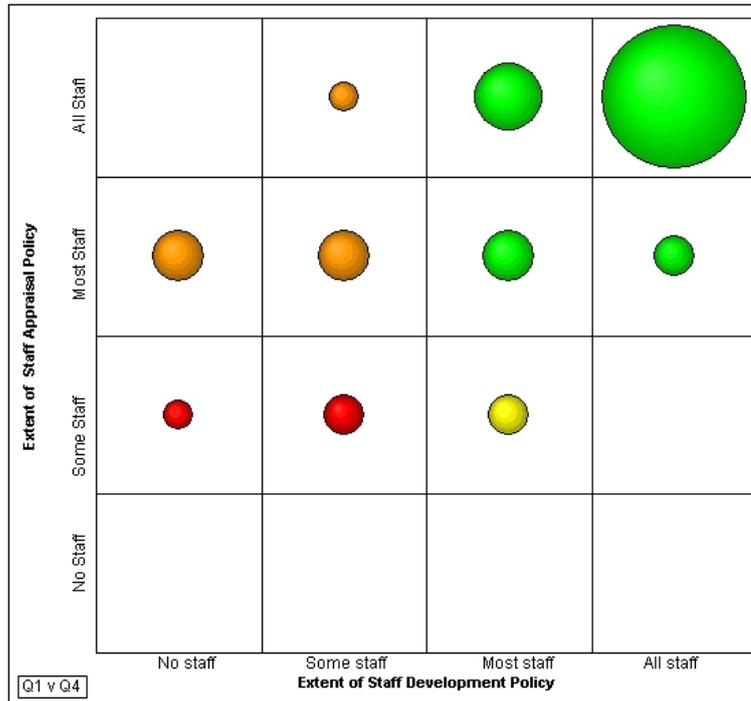


Figure 5.119: The extent of staff development policies v the extent for staff appraisal policies (Q1 v. Q4).
 For data see Table 5A.52, Appendix 5A.10.13.

Using the consolidated two-by-two cell contingency table was more successful. Although SPSS warned that two cells failed to meet the criteria of expected values greater than or equal to 5, their values exceed the minimum expected value of 1.11, indicating a degree of validity in the output; however, that it must be treated with caution.

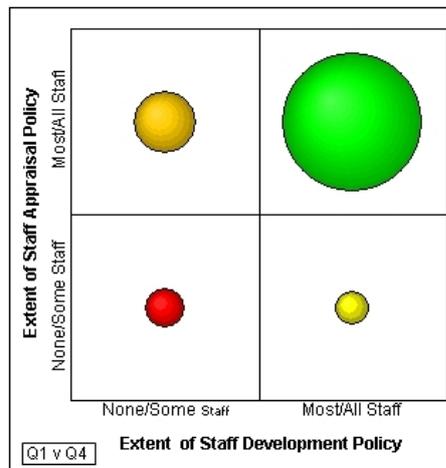


Figure 5.120: Consolidated: The extent of staff development policies v the opportunities for staff appraisal policies (Q1 v. Q4).
 For data see Table 5A.54, Appendix 5A.10.13.

The Chi-square Tests (see Table 5A.55) produced positive results of [$\chi^2 = 3.845$; $\rho = 0.031$] and [$\Lambda = 3.845$; $\rho = 0.050$] that are just statistically significant indicating that there is a moderate level of association between the variables. However [$\rho_F = 0.065$] for Fisher's Exact test confirms that the association cannot be considered statistically significant. The Symmetrical Measures results of [ϕ and $V = 0.321$; $\rho = 0.031$] and [$C_c = 0.306$; $\rho = 0.031$] both indicate that there is a strong probability of only a moderate association between the variables. Thus if the null-hypothesis H_0 is accepted there is low risk of making a Type II error.

No meaningful comparison can be made with Mumford's (1994) Stages of Management Development and Mumford and Gold's (2004) Types of Management Development as both criteria used have been aligned with 'concern for learning', thus a comparison would comprise two like criteria. It does however serve to indicate the degree of consistency between the two sets of responses, and supports the earlier findings that a significant number of firms appear to be operating at the higher levels of management development of Stage 3 'planned management development' and Stage 4 'strategic management development' in claiming to have both staff development policies and staff appraisal policies.

5.6.5.2 Cross-tabulation of Question 2 and Question 6

Question 2: Does the policy formally require staff to undertake development activities?

Question 6: Does the appraisal policy include staff development opportunities?

In the second comparison in this section, the staff development policy requirement for staff to undertake staff development is compared to the level of staff appraisal policy inclusion of staff development activities. The cross-tabulation is to test the null-hypothesis H_0 that there is no association between these two variables. The analysis of data for this cross-tabulation is given in Appendix 5A.10.14. Here it was found that eight companies (17.78%) that have fully implemented staff development policies had appraisal policies that included staff development activities for all staff as shown in Figure 5.121 overleaf. Only one company (2.22%) claimed neither to have a staff development policy nor to have a staff appraisal policy that included staff development opportunity. Three companies (6.67%) had little or no

requirement in their staff development policies for staff to undertake development, and little or no inclusion in their staff appraisal policies for staff development activities (see Table 5A.57). Here again the cross-tabulation using the four-by-four cell contingency table failed to meet the criteria for a successful Chi-square Test (see Table 5A.58).

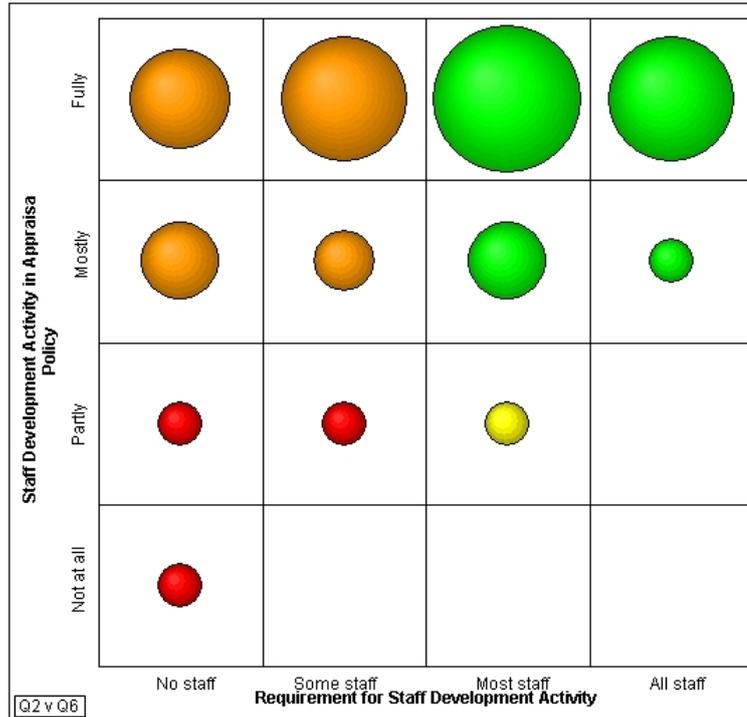


Figure 5.121: The extent of staff development in appraisal policies v the requirement for staff development (Q2 v. Q6).
 For data see Table 5A.57, Appendix 5A.10.14.

Consolidating the data into a two-by-two cell contingency table (see Table 5A.59) reveals that twenty-three companies (51.11%) that have either a mostly or a fully implemented staff development policy had appraisal policies that included staff development for most or all staff (see Figure 5.122 overleaf). It was also revealed that eighteen companies (40.00%) that claim to have little or no requirement in their staff development policies for staff to undertake development, do however have an inclusion in their staff appraisal policies for staff development activities for most or all staff.

The consolidated data in the two-by-two cell contingency table also fails to meet the criteria as two cells have values of less than 5, one cell having a value of 1, below the minimum expected value of 1.87, thus the results must be treated with great caution (see Table 5A.59).

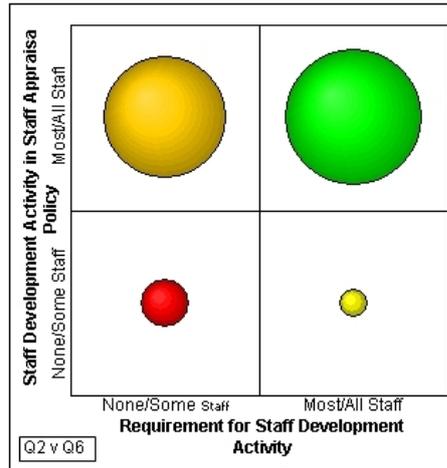


Figure 5.122: Consolidated: The extent of staff development in appraisal policies v the requirement for staff development (Q2 v. Q6).
For data see Table 5A.59, Appendix 5A.10.14.

The Chi-square Tests (see 5A.60) produce results of [$\chi^2 = 1.416$; $\rho = 0.234$] and [$\Lambda = 1.458$; $\rho = 0.227$]. This association is very weak and as $\rho > 0.05$ the result is not statistically significant, therefore this suggests that the association between the variables could have occurred by chance. This is confirmed by [$\rho_F = 0.326$] therefore the null-hypothesis H_0 can probably be accepted. The Symmetrical Measures show similar results [ϕ and $V = 0.177$; $\rho = 0.234$] and [$C_c = 0.175$; $\rho = 0.034$]. The association is shown to be weak, and not statistically significant, thus the null-hypothesis H_0 can be accepted, but with a high risk of a Type II error occurring, i.e. accepting H_0 when it should have been rejected.

Again, as both criteria used have been aligned with ‘concern for task’ a comparison would comprise two like criteria thus no direct comparison can be made with and Mumford and Gold’s (2004) ‘Types of Management Development’. However, it does serve to indicate the degree of consistency between the two sets of responses and the comparison can be aligned with Mumford’s (1994) ‘Stages of Management

Development'. A lower level of development is apparent in a significant number of companies, even though they have requirements for staff development in their appraisal policies do not seem to have any specific requirements for their managers to undertake this aspect of their policies. This suggests that they might be operating at lower levels of management development, typically Stage 2 'unplanned reactive management development' and Stage 3 'planned management development'.

5.6.5.3 Cross-tabulation of Question 3 and Question 5

Question 3: To what extent is the staff development policy implemented?

Question 5: To what extent is the staff appraisal policy implemented?

The final comparison of this section compares the extent of the implementation of the staff development policy with that of the staff appraisal policy, where a greater degree of cross-tabulation might be expected. Here the cross-tabulation is to test the null-hypothesis H_0 that there is no association between the extent to which companies have staff development policies implemented and the extent to which the staff appraisal policies are implemented. The statistical analysis is given in Appendix 5A.10.15.

Eight companies (17.78%) that claimed to have a fully implemented staff development policy also claimed to have a fully implemented staff appraisal policy (see Table 5A.62). Thirty-one companies (68.89%) who claimed to have a staff development policy mostly or fully implemented also claimed to have their staff appraisal policy fully implemented (see Table 5A.64). Just one company (2.22%) claimed neither to have a staff development policy nor a staff appraisal policy implemented; seven companies (15.56%) claimed no or partial implementation of both policies. These seven companies were in varying states of implementation for most or all of their staff (see Figure 5.123 overleaf).

In the previous cross-tabulations of this series the Chi-square Test using the four-by-four cell contingency could not produce reliable results as the data failed to meet the test criteria, consistent with all of the previous tests, and as expected (see Table 5A.63).

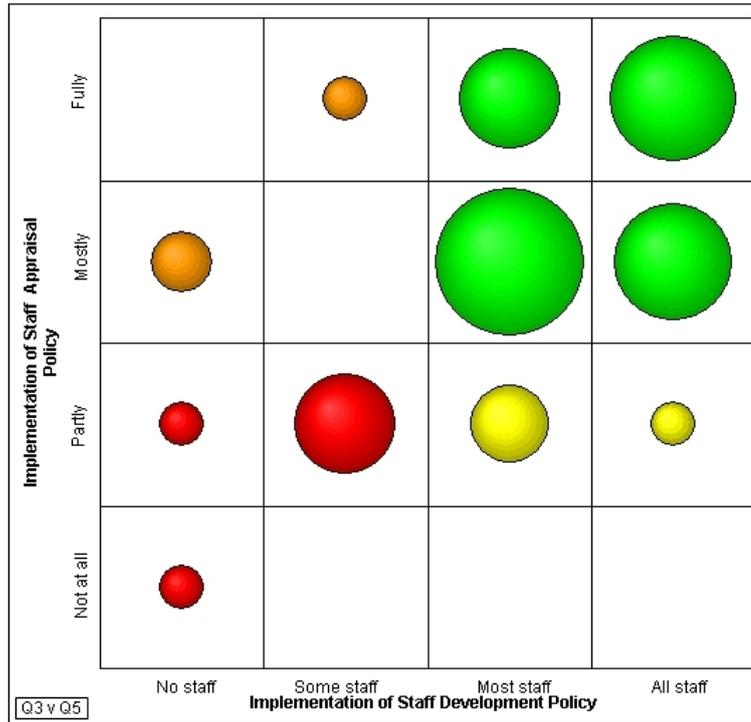


Figure 5.123: The implementation of staff development in appraisal policies v the implementation of staff development policy (Q3 v. Q5).
 For data see Table 5A.62, Appendix 5A.10.15.

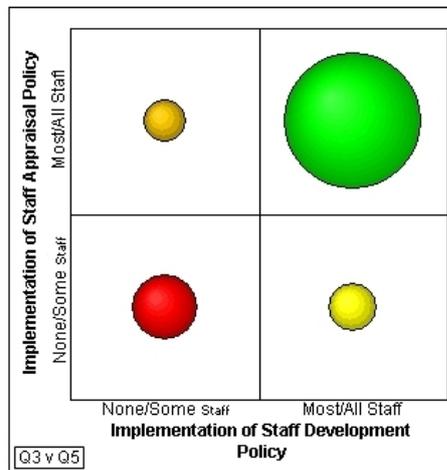


Figure 5.124: Consolidated: The implementation of staff development in appraisal policies v the implementation of staff development policy (Q3 v. Q5).
 For data see Table 5A.64, Appendix 5A.10.15.

Using the consolidated two-by-two cell contingency table the data almost meets the criteria for a reliable Chi-square Test (see Figure 5.124 above). Only one of the cell values falls below the expected value of 5, but it exceeds the minimum expected value of 2.44, so again the output results must be treated with caution (see Table

5A.65). The Chi-square Test results [$\chi^2 = 14.447$; $\rho = 0.003$] and [$\Lambda = 12.959$; $\rho = 0.000$] both indicate a strong association with a high degree of statistical significance which is confirmed by [$\rho_F = 0.001$]. The Symmetrical Measures [ϕ and $V = 0.567$; $\rho = 0.000$] and [$C_c = 0.493$; $\rho = 0.000$] show a moderate association that is statistically significant (see Table 5A.66), thus the null-hypothesis H_0 can be rejected with little risk of a Type I error occurring, but if it is accepted there is a high risk of a Type II error occurring.

As with the previous comparison both criteria used have been aligned with ‘concern for task’ a comparison would comprise two like criteria thus no direct comparison can be made with and Mumford and Gold’s (2004) ‘Types of Management Development’. However, it does serve to indicate the degree of consistency between the two sets of responses and the comparison can be aligned with Mumford’s (1994) ‘Stages of Management Development’. A lower level of implementation of policies is apparent in a significant number of companies. Again, this suggests that they might be operating at lower levels of management development, typically Stage 2 ‘unplanned reactive management development’ and Stage 3 ‘planned management development’, with a few companies operating at the higher Stage 4 ‘planned strategic management development with both staff development and staff appraisal policies implemented.

5.6.5.4 Implications of the Staff Development and Appraisal Policies Comparison

An important part of any staff development policy is the inclusion of staff appraisal, either within the policy or as a separate policy. Here it is found that more companies have staff appraisal policies covering more staff than they do staff development policies. However, the appraisal policies are not as widely implemented as staff development policies even though the majority of staff appraisal policies include opportunities for staff development.

This would suggest that staff appraisal in construction companies is more focussed on short-term performance of staff rather than long-term performance and

development, i.e. meeting the companies' short-term operational needs rather than longer term strategic needs. Indeed, there is much anecdotal evidence to suggest that, in the case of construction managers, appraisal is invariably focussed on meeting production and financial targets and little else.

In terms of management development this would suggest that most construction companies are not as advanced in their management development as they would have themselves and others believe. This supports earlier comparison findings made and again suggests that many of the UK's top construction companies are, in terms of their management development, operating at the interface of Stage 3 'planned management development' and Stage 4 'strategic management development' (Mumford and Gold, 2004). This is supported by Type 2 'integrated management development' (Mumford, 1994) with a clear focus on short/medium term goals (production targets) rather than Type 3 'formal management development' with long term strategic goals.

5.6.6 Encouragement of Staff Development

Question 7: To what extent does your organisation encourage staff development activities?

Question 7 seeks to establish the level of encouragement given to staff wanting to undertake activities, irrespective of the staff development, Mean R = 3.53. Here it has been found that twenty-eight companies (62.22%) claimed that they encouraged staff development activities amongst all staff, whilst another thirteen companies (28.89%) claimed to encourage staff development activities amongst most staff, thus forty-one companies (91.11%) claimed to encourage most or all of their staff to undertake staff development activities (see Figure 5.124 below). Only four companies (8.89%) claimed that they only encouraged a few staff, and no company claimed not to encourage staff at all.

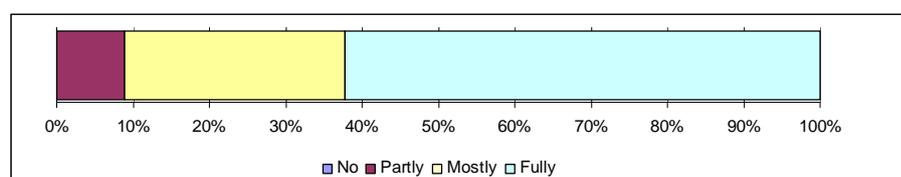


Figure 5.125: Responses to Question 7
For data see Table 5A.67, Appendix 5A.10.16.

Here the management development alignment is with Mumford and Gold's (2004) 'concern for learning', with twenty-eight companies (82.82%) of companies claiming to have a high concern for learning through their encouragement of staff development activities amongst their construction managers. However, a significant number, thirteen (28.89%), indicated they are not fully committed to staff development activity, suggesting a lesser concern for learning, with four (8.89%) suggesting a low concern for learning.

How do the claims for encouraging staff to undertake development activities compare to the state of staff development policies and staff appraisal policies? In the following comparisons cross-tabulations are made with the responses to previous questions.

5.6.6.1 Cross-tabulation of Question 7 and Question 2

Question 7: To what extent does your organisation encourage staff development activities?
Question 2: Does the policy formally require staff to undertake development activities?

The cross-tabulation here is to test the null-hypothesis, H_0 , that there is no association between the extent companies encourage staff development and the formal requirement to undertake staff development. The statistical analysis for the analysis of this cross-tabulation is given in Appendix 5A.10.15. This test of association reveals that only seven companies (15.56%) had both a staff development policy that required all staff to undertake staff development activities and claimed to give encouragement to all staff to undertake development activities, as shown in Figure 5.126 overleaf.

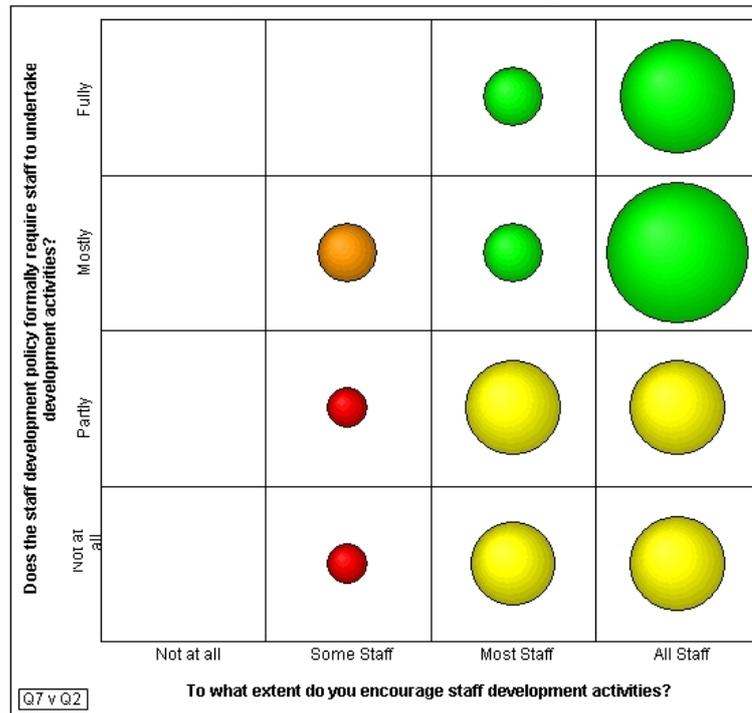


Figure 5.126: Staff development policy requirement v encouragement for staff development (Q7 v. Q2).

For data see Table 5A.70, Appendix 5A.10.19.

In the cross-tabulation using a four-by-four contingency table it was found that as there were no responses to the first element of the question (this resulted in a zero value for the first column of the contingency table) SPSS automatically disregards the column and treats the contingency table as a three-by-four matrix, having six degrees of freedom ($df = 6$). Even this process still resulted in one cell containing a zero value so the Chi-square Test results cannot be regarded as usable (see Table 5A.70).

Consolidating the data to a two-by-two matrix reveals a total of twenty-two companies (48.89%) claiming to have both staff development policies mostly or fully implemented and to be encouraging most or all of their staff to undertake that activity (see Table 5A.72). No company claimed that they did not encourage staff to undertake development activities and only two companies claimed (4.44%) to be encouraging only a few staff, irrespective of the existence, or otherwise, of any staff development policy requirement. However, nineteen companies (42.22%) claimed to encourage staff development amongst most or all staff even though their staff

development policy had little or no requirement for any staff development activity (see Figure 5.127 below).

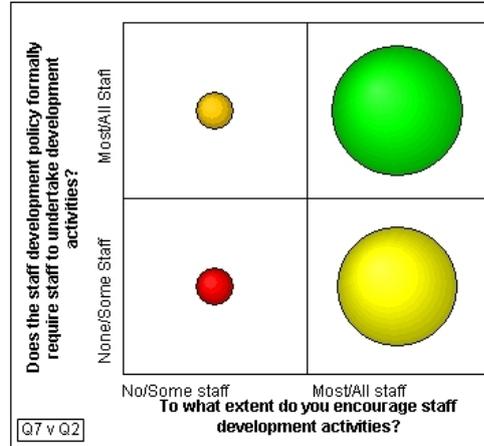


Figure 5.127: Consolidated: Staff development policy requirement v encouragement for staff development (Q7 v. Q2).

For data see Table 5A.72, Appendix 5A.19.

The two-by-two cell contingency table still resulted in two cells with values below the expected value of 5, but above the expected minimum value of 1.87. Here the results should be treated with caution. The Chi-square Tests results [$\chi^2 = 0.020$; $\rho = 0.889$] and [$\Lambda = 0.020$; $\rho = 0.889$] (see Table 5A.73) indicate that there is only a very weak association between the two variables, but this is not statistically significant in either case as $\rho > 0.05$. Fisher's Exact Test [$\rho_F = 1.000$] confirms that the association between the variables has a very low statistical significance and that the association is very weak. In the Symmetrical Measures [ϕ and $V = 0.021$; $\rho = 0.889$] and [$C_c = 0.021$; $\rho = 0.889$] again show that there is only a very weak association between the two variables and the result is not statistically significant (see Table 5A.74). Here it can be concluded that the null-hypothesis H_0 can neither be accepted nor rejected due to the very high probability of the results occurring by chance.

As both Question 7 and Question 2 have been aligned with Mumford and Gold's (2004) 'concern for learning' no meaningful comparison can be made with their 'types of management development'. Never-the-less it can be seen that even for those companies lacking formal requirements for construction managers to undertake staff development activities they are still encouraged to do so. This would tend to

suggest that Type 1 ‘informal managerial development’ is rather more prevalent amongst those companies than type 2 ‘integrated management development’. Again those that claim neither requirement nor encouragement of staff development are found to be those companies predominantly operating in the house-building sector.

5.6.6.2 Cross-tabulation of Question 7 and Question 3

Question 7: To what extent does your organisation encourage staff development activities?

Question 3: To what extent is the staff development policy implemented?

Here the cross-tabulation is to test the null-hypothesis H_0 that there is no association between the extent to which companies encourage staff development and the extent to which staff appraisal policies are implemented. The statistical analysis of this cross-tabulation is given in Appendix 5A.10.20. When the level of encouragement for staff development activities is compared to the level of implementation of staff development policies a different pattern emerges, as shown in Figure 5.128 below.

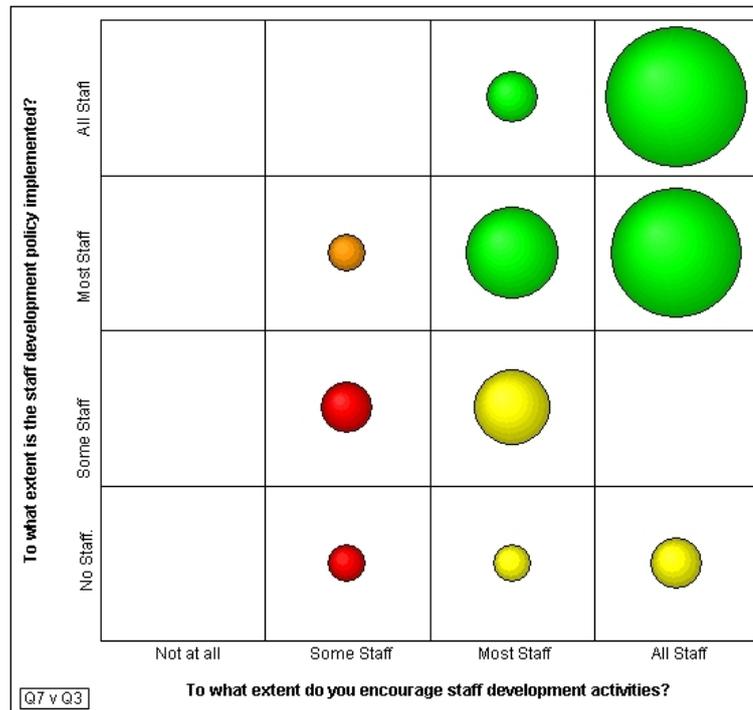


Figure 5.128: Staff development policy implementation v encouragement for staff development (Q7 v. Q3).

For data see Table 5A.75, Appendix 5A.10.20.

Fourteen companies (31.11%) claim to have both a fully implemented staff development policy and to encourage staff development activities for all staff (see Table 5A.75). As in previous comparisons, both the four-by-four cell contingency table and the reduced three-by-four contingency table failed to meet the criteria for a successful Chi-square Test due to zero value cells, and therefore would not result in useable results (see Table 5A.76).

Using the consolidated two-by-two matrix (see Table 5A.77) reveals that thirty-four companies (75.56%) with staff development policies either mostly or fully implemented amongst staff encourage staff development activities. Seven companies (15.56%) that claim little or no implementation of their staff development policy also claim to encourage most or all of their staff to undertake staff development activities. Just three companies (6.67%) claimed neither as shown in Figure 5.129 below.

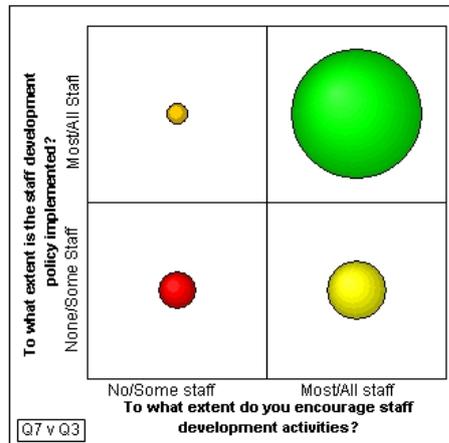


Figure 5.129: Consolidated: Staff development policy implementation v encouragement for staff development (Q7 v. Q3).
For data see Table 5A.77, Appendix 5A.10.20.

Using the consolidated two-by-two cell contingency table resulted in data that almost meets the criteria for a successful Chi-square Test (see Table 5A.78). Two cells have values below the expected value of 5, but above the minimum expected value of 0.36, so the results need to be treated with caution. The results [$\chi^2 = 7.075$; $\rho = 0.008$] and [$\Lambda = 5.697$; $\rho = 0.017$] tend to indicate that the association is statistically significant. This is confirmed by Fisher’s Exact Test [$p_F = 0.030$] which indicates a

statistically significant association. The Symmetrical Measures (see Table 5A.79) reveal that the strength of the association between the two variables is weak [ϕ and $V = 0.397$; $\rho = 0.008$] and [$C_c = 0.369$; $\rho = 0.008$] as both show that the association between the two variables to be weak with a high degree of statistical significance. Based on the above the null-hypothesis H_0 can be rejected with little risk of a Type I error occurring.

As Question 3 has been aligned with Mumford and Gold's (2004) 'concern for learning', no meaningful comparison can be made with their 'types of management development'. Nevertheless, this comparison provides a useful indication of the level of encouragement given to construction managers to undertake staff development activities with the extent of the implementation of companies' staff development policies. Clearly where staff development policies are implemented there is a high level of commitment to the encouragement of construction managers to undertake staff development activities. This tends to suggest that these companies have reached or are operating at the level of Stage 3 'planned management development' or Stage 4 'planned strategic management development'. This also indicates a good level of consistency and confidence in the responses given for these questions.

5.6.6.3 Cross-tabulation of Question 7 and Question 5

Question 7: To what extent does your organisation encourage staff development activities?

Question 5: To what extent is the staff appraisal policy implemented?

Here the level of encouragement given to staff development activities is compared to the level of implementation of staff appraisal policies, as shown in Figure 5.130 overleaf. The cross tabulation is to test the null-hypothesis H_0 that there is no association between the extent to which companies encourage staff development and the extent to which staff appraisal policies are implemented. The statistical analysis for the analysis of this cross-tabulation is given in Appendix 5A.10.21. Eleven companies (24.44%) claimed to both encourage all staff to undertake development activities and to have a fully implemented staff appraisal policy for all staff. As in previous cross-tabulations, the four-by-four contingency table and the reduced four-

by-three contingency table, both having one or more zero value cells, could not produce useable Chi-square Test results.

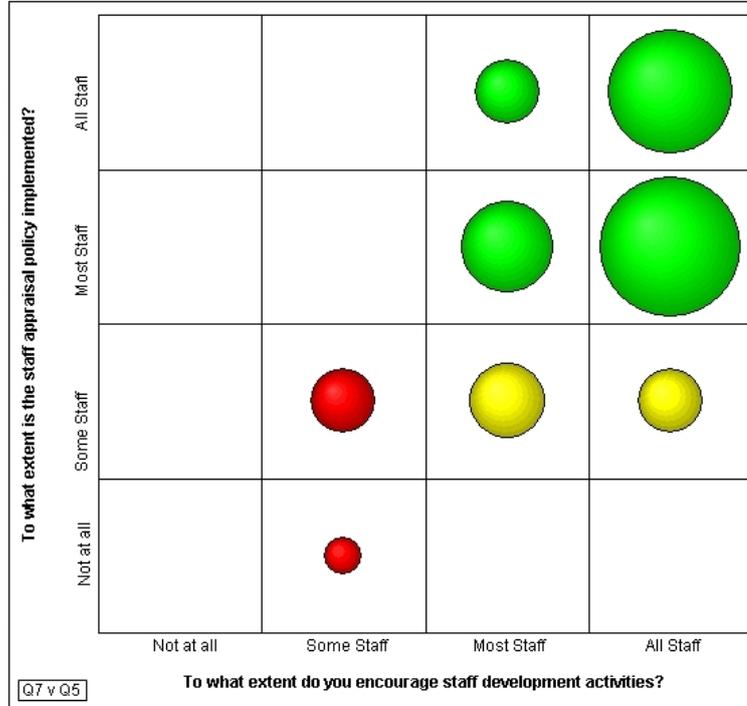


Figure 5.130: Staff appraisal policy implementation v encouragement for staff development (Q7 v. Q5).
 For data see Table 5A.80, Appendix 5A.10.21.

However, by consolidating the table into a two-by-two cell matrix (see Table 5A.82) it was found that thirty-four companies (75.56%) were claiming to have a staff appraisal policy implemented for most or all staff were also claiming that they encouraged most or all staff to undertake development activities. Only four companies (8.89%) that claimed they only encourage some staff to undertake development activities were also found to have little or no implementation of a staff appraisal policy. The remaining seven companies (15.56%) were found to claim to encourage most or staff to undertake staff development activities despite the company having little or implementation of a staff appraisal policy. See Figure 5.131 overleaf.

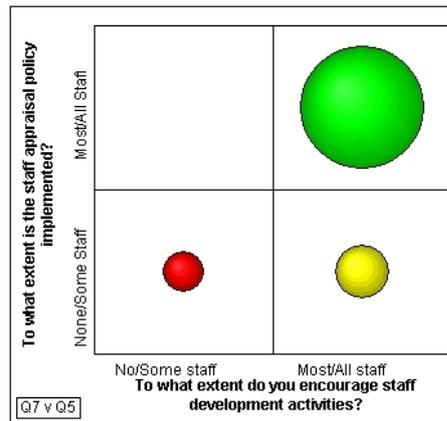


Figure 5.131: Consolidated: Staff appraisal policy implementation v encouragement for staff development (Q7 v. Q5).

For data see Table 5A.82, Appendix 5A.10.21.

The consolidated two-by-two table also contained one cell with a zero value, so therefore the outputs from the Chi-square tests must be considered unusable (see Table 5A.83). The Symmetric Measures results [ϕ and $V = 0.549$; $\rho = 0.000$] (see Table 5A.84) and [$C_c = 0.481$; $\rho = 0.000$] both indicate a moderate degree of association between the variables, and a very high degree of significance. Here, if the null-hypothesis H_0 is rejected, there is a moderate risk of a Type I occurring; and if H_0 is accepted then there is a moderate risk of a Type II error occurring.

As with the previous comparison both questions have been aligned with Mumford and Gold's (2004) 'concern for learning' so again no direct comparison can be made with their 'types of management development'. Similarly where the staff appraisal policy has been implemented a high level of claims are made for encouraging staff development activities amongst construction managers, adding support to the previous indications of Stage 3 'planned management development' and Stage 4 'planned strategic management development' amongst these firms (Mumford and Gold, 2004). However there still a number of firms indicating that they are still operating at the lower Stages 1 and 2.

5.6.6.4 Cross-tabulation of Question 7 and Question 6

Question 7: To what extent does your organisation encourage staff development activities?

Question 6: Does the appraisal policy include staff development opportunities?

The last cross-tabulation undertaken in this section compares the inclusion of staff development in the appraisal policy to the claimed level of encouragement to undertake staff development activities. The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between the extent to which companies encourage staff development and the inclusion of staff development in appraisal policies. The statistical analysis for the analysis of this cross-tabulation is given in Appendix 5A.10.22. Twenty-four companies (53.33%) claimed to have both a staff appraisal policy that includes staff development activities for all staff and claimed to encourage staff development activities amongst all staff, as shown in Figure 5.132 below. Yet again, the four-by-four contingency tables and reduced three-by-four contingency table both yield cells with zero values (see Table 5A.85), so no useable Chi-square test results can be obtained (see Table 5A.86).

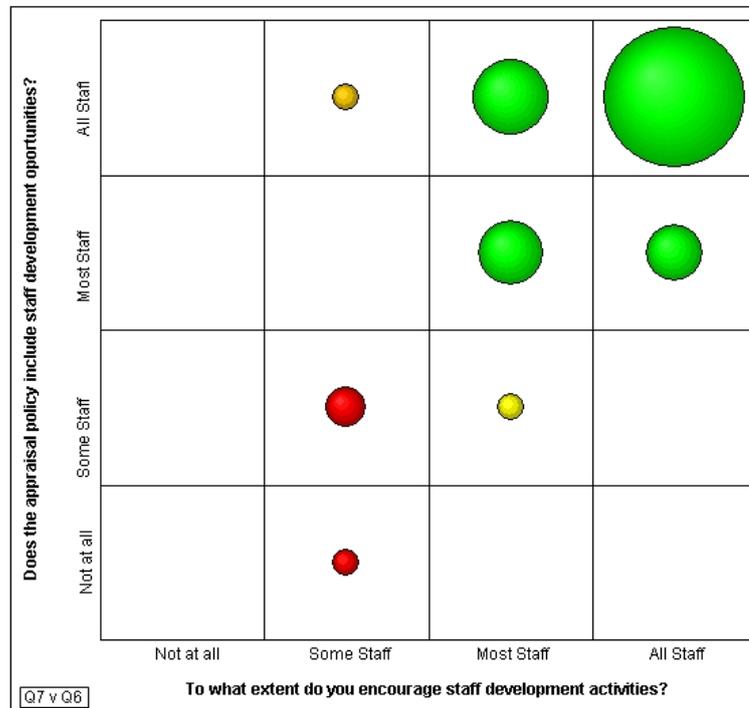


Figure 5.132: Appraisal policy for staff development opportunity v encouragement for staff development (Q7 v. Q6).

For data see Table 5A.85, Appendix 5A.10.22.

If this is expanded to include claims for most or all staff by using the consolidated two-by-two cell matrix (see Table 5A.87) then in both cases the number rises to forty companies (88.89%) as shown in Figure 5.133 below. Only three companies (6.69%) that claimed to have an appraisal policy having little or no inclusion of staff development activities also claimed to give little or no encouragement to staff development activity. Just one company (2.22%) claimed to encourage staff development activities amongst most or all staff even though they had little or no inclusion in their staff appraisal policy for staff development activities. The remaining one company (2.22%) claimed to have staff appraisal policies that include staff development activities for most or all staff but also claimed only to provide little or no encouragement to staff to undertake development activities.

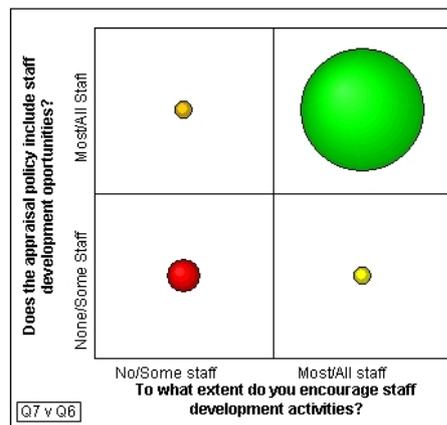


Figure 5.133: Consolidated: Appraisal policy for requirement staff development opportunity v encouragement for staff development (Q7 v. Q6).
For data see Table 5A.87, Appendix 5A.10.22.

Using the consolidated two-by-two contingency table produces two cells below the expected value of 5, but both are above the minimum expected value of 0.36, thus the results must be treated with caution. The results of the Chi-square tests [$\chi^2 = 23.693$; $\rho = 0.000$] and [$\Lambda = 13.095$; $\rho = 0.000$] (see Table 5A.88) both indicate that there is a statistically significant strong relationship between the two variables. Fisher's Exact test [$\rho_F = 0.000$] also confirms the statistical significance of the association between the variables. The Symmetric Measures [ϕ and $V = 0.726$; $\rho = 0.000$] and [$C_c = 0.587$; $\rho = 0.000$] (see Table 5A.89) both show a strong association between the variables, with a very high statistical significance, therefore the null-hypothesis H_0 can be rejected with little risk of a Type I error occurring.

In this final comparison for the encouragement of staff development activity both questions are aligned with Mumford and Gold's (2004) 'concern for learning'. Again it can be seen that where staff development opportunities are included in staff appraisal policies then construction managers are generally encouraged to undertake staff development activities, further supporting the previous findings (Q7 v Q5) for Mumford and Gold's (2004) 'stages of management development'. The indication here is again that companies have achieved Stage 4 'planned strategic management development' or Stage 3 'planned management development'.

5.6.6.5 Implications of Encouragement of Staff Development

Whilst the majority of companies actually encourage most staff to undertake development activities, encouragement was not found to be related to the presence of a staff development policy requirement, but on whether or not the policy was implemented.

Encouragement of staff development was much more evident where appraisal policies were implemented amongst staff, and especially where appraisal policies included staff development opportunity. This encouragement of staff development has been found to be greatest where companies have staff appraisal policies that include staff development activities, but earlier findings would suggest that this is very much focussed on meeting short-term production and financial targets that would also include statutory health and safety requirements.

This again supports earlier findings that the majority of the UK's top 150 construction companies are not as advanced in their management development and appraisal schemes as might be expected, but are further advanced in terms of their staff appraisal schemes than in their overall management development schemes. This continues to support the earlier findings that most companies are operating at Stage 3 'planned management development' and Stage 4 'planned strategic management development' (Mumford and Gold, 2004), supported by Type 2

‘integrated management development’ and Type 3 ‘formal management development’ (Mumford and Gold, 2004).

5.6.7 Employment Contract Requirements

5.6.7.1 Responses to Question 8

Question 8: Do your employee’s contracts of employment have a formal staff development requirement?

Here it was found that, despite all the claims by companies to encourage staff development, only three companies (6.82%) claimed that staff development was a requirement of their employee’s employment contracts (mean R = 1.45), see Figure 5.134 below, with a further four companies (9.09%) claiming it was a requirement for most staff. In total, seven companies (16.01%) claimed that staff development was a requirement of their staff employment contracts for most or all staff, leaving thirty-seven companies (83.99%) having little or no requirement for staff development in their employees’ contracts of employment, with thirty-four companies (77.27%) having no contractual requirement.

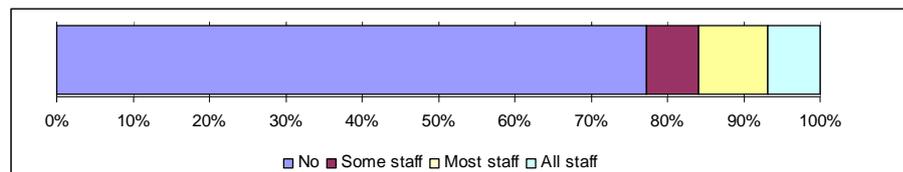


Figure 5.134: Responses to Question 8

For data see Table 5.68, Appendix 5A.17.

The existence of contractual requirements for staff development in contracts in employment can be aligned with both a company’s ‘concern for task’ and an indication of their strategic approach to management development (Mumford and Gold, 2004). The absence of contract of employment requirements for staff development in thirty-seven (83.99%) companies and just seven companies (16.01%) having some form of requirement reinforces earlier findings that management development is far from fully integrated into the Stage 4 ‘planned strategic

management development' level of companies business plans for long-term organisational development needs (Mumford and Gold, 2004).

In the sections below the above responses will be cross-tabulated with previous responses to see if there are any significant associations in the various responses.

5.6.7.2 Cross-tabulation of Question 8 and Question 1

Question 8: Do your employee's contracts of employment have a formal staff development requirement?

Question 1: To what extent does your organisation have a formal staff development policy?

This cross-tabulation looks at the requirement for all staff to undertake development activities and compares the responses to those of the extent of staff development policy and the staff appraisal policy, as shown in Figure 5.135 overleaf. The null-hypothesis H_0 to be tested is that there is no association between employees' contracts of employment having a staff development requirement and the company having a staff development policy. The data for this analysis is Appendix 5A.10.23. As Question 8 identified that most companies do not have a contract of employment requirement to undertake staff development it is to be expected that most of the findings of the cross-tabulation will reflect this.

Here it was found that only one company (2.27%) claimed to have a fully implemented staff development policy and that all contracts of employment have a requirement for staff to undertake development activities (see Table 5A.90). Conversely, nine companies (20.45%) claimed to have neither a formal staff development policy nor a contractual requirement for staff to undertake development activities. Again, it was not possible to obtain any useable results from the Chi-square tests using the four-by-four cell contingency table as fourteen of the sixteen cells contained data that failed to meet the expected criteria, including four cells with zero values.

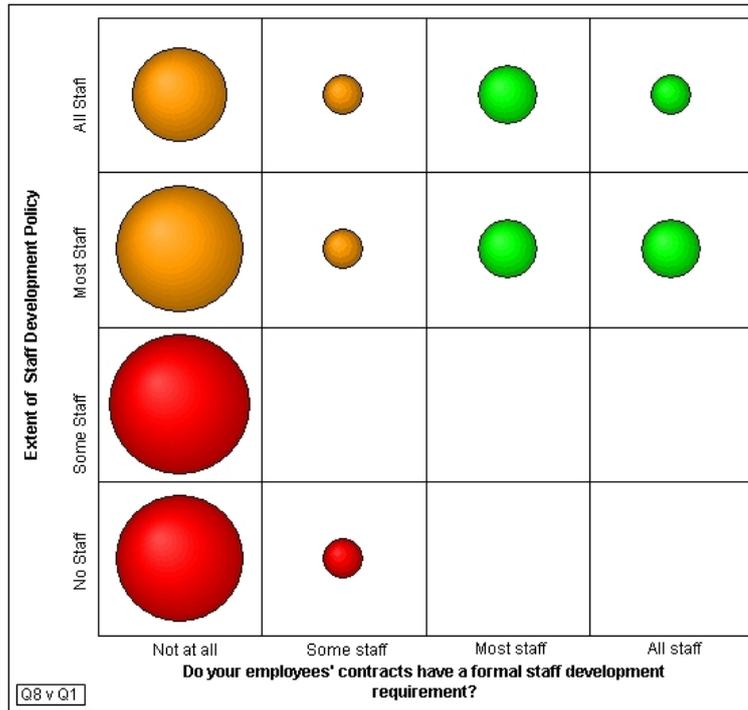


Figure 5.135: Staff development policy extent v employment contract staff development requirement (Q8 v. Q1).

For data see Table 5A.90 Appendix 5A.10.23.

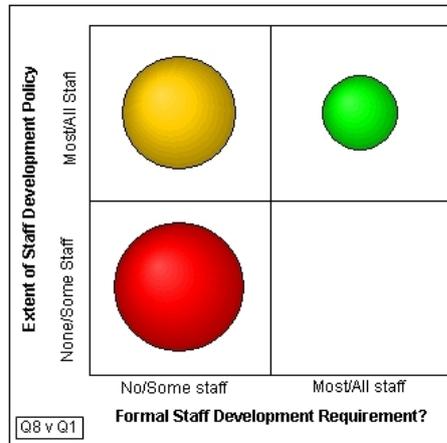


Figure 5.136: Consolidated staff development policy extent v employment contract staff development requirement (Q8 v. Q1).

For data see Table 5A.92, Appendix 5A.10.23.

If the table is consolidated to a two-by-two cell matrix (see Table 5A.92), then this increases to just seven companies (15.91%) claiming to have a fully or mostly implemented staff development policy and all contracts of employment that have a requirement for staff or most staff to undertake development activities. This increases to twenty-one companies (47.73%) that have little or no staff development policy or contract of employment requirement for staff development as shown in

Figure 5.136 above. The remaining sixteen companies (36.36%), although claiming to have a staff development policy for most or all staff, also claim to have little or no employment contract requirement for staff development.

Consolidating the data into a two-by-two cell contingency table also failed to produce any useable results as one cell contained a zero value, however a weak association between the variable might be expected (see Table 5A.93). The Symmetric Measures [ϕ and $V = 0.326$; $\rho = 0.118$] and [$C_c = 0.230$; $\rho = 0.118$] indicate a weak association between the variables, but the result is not statistically significant (see Table 5A.94). Thus although the null-hypothesis H_0 can appear to be accepted there is a high risk of making a Type II error in that H_0 should be rejected.

As both comparators have been aligned with a company's 'concern for task' no meaningful comparison can be made with Mumford and Gold's (2004) 'Types of Management Development'. Nevertheless a strong indication is given of the task culture endemic in even the largest construction companies in the industry by the overwhelming lack of contract of employment requirement for staff development, with only seven companies (25.91%) having any form of contractual requirement.

5.6.7.3 Cross-tabulation of Question 8 and Question 4

Question 8: Do your employee's contracts of employment have a formal staff development requirement?

Question 4: To what extent does your organisation have a staff appraisal policy?

Here the cross-tabulation compares the extent of a company's staff appraisal policy and the contract of employment requirement for staff development. The null-hypothesis H_0 to be tested is that there is no association between employee's contracts of employment having a formal staff development requirement and the extent to which a company has a staff development policy. The data for this analysis is Appendix 5A.10.24. Again, results were expected to be concentrated under the response column for not having a contractual requirement for employees to undertake development activities. Just three companies (6.82%) were found to have both a staff appraisal policy covering all staff together with a contract of employment

requirement for all staff to undertake staff development activities, whilst nineteen (43.18%) claim to have a staff appraisal policy for all staff, but no contractual requirement to undertake staff development as shown in Figure 5.137 below. As with the previous cross-tabulation it was not possible to obtain any usable Chi-square test results using the four-by-four cell contingency table as the data did not meet the expected criteria, including seven cells with containing zero values (see Table 5A.96).

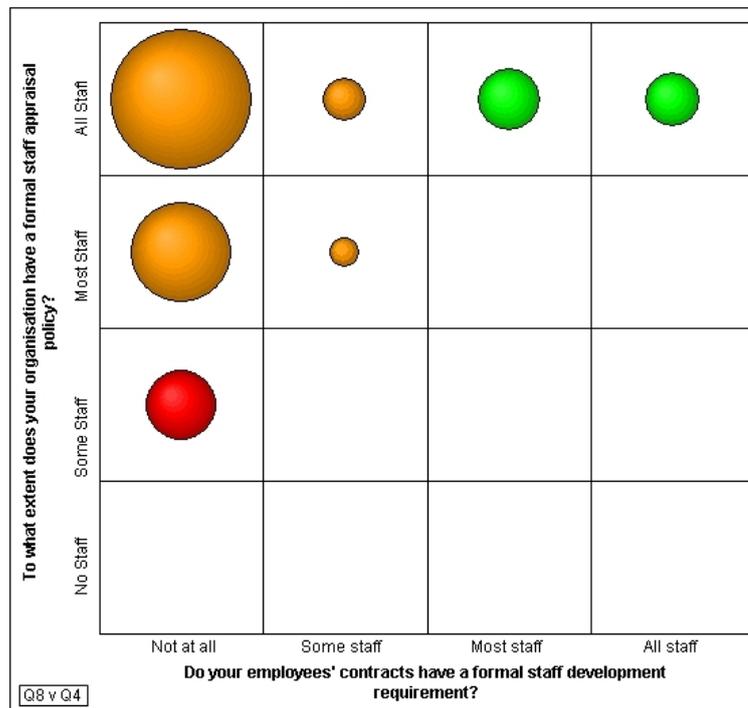


Figure 5.137: Staff appraisal policy extent v employment contract staff development requirement (Q8 v. Q4).
 For data see Table 5A.95, Appendix 5A.10.24.

If the data is consolidated into a two-by-two matrix (see Table 5A.97) then an increase to seven companies (15.91%) with a full staff appraisal policy having a contract of employment requirement for most or all staff to undertake development activities is revealed, as shown in Figure 5.138 below.

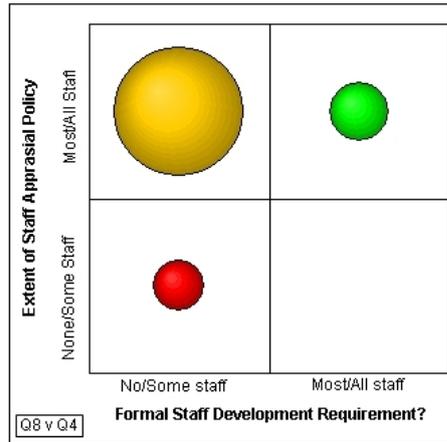


Figure 5.138: Consolidated: Staff appraisal policy extent v employment contract staff development requirement (Q8 v. Q4).

For data see Table 5A.97, Appendix 5A.10.27.

Similarly an increase to thirty-two companies (72.73%) claiming to have staff appraisal policies for most or all staff had contracts of employment with little or no requirement for staff to undertake development activities was also found. The remaining five companies (11.36%) were found to have little or no appraisal policy or contractual requirement for staff development activity.

Using the consolidated two-by-two contingency table produced very unreliable results as one cell still contained a zero value, although the test results tend to indicate, as expected, a weak association that is not statistically significant (see Table 5A.98). The Symmetric Measures [ϕ and $V = 0.156$; $\rho = 0.302$] and [$C_c = 0.154$; $\rho = 0.302$] confirm the very weak association and low statistical significance. Here the null-hypothesis H_0 can be accepted, but there is a high risk of a Type II error occurring and that the null-hypothesis H_0 should have been rejected.

Again, as both variables have been aligned with a company's 'concern for task' no meaningful comparison can be made with Mumford and Gold's (2004) 'Types of Management Development'. The dominant task culture is evidenced here by both a lack of contractual requirement for staff development together with an overwhelming existence of appraisal policies within these companies. Thus companies' emphasis here is on the lower level task (production) requirements rather than a higher level corporate strategic requirements.

5.6.7.4 Implications of Contracts of Employment

A good indicator of the degree of emergence of staff development is the extent to which contracts of employment incorporate requirements for staff development. Here it was found that very few companies include staff development requirements within the contracts of employment. In the cross-tabulation with both staff development policies and staff appraisal policies, no discernable associations were found. Thus, in terms of education, training and development contractual obligations are uncommon and therefore limit the level of obligation on both employers and employees alike to both provide and undertake staff development. This, therefore, suggests that in terms of Mumford and Gold's (2004) 'Stages in Management Development' construction companies have generally reached Stage 2 'unplanned reactive management development' and Stage 3 'planned management development', but few can be considered to have reached Stage 4 'planned strategic management development'. This is perhaps not unsurprising given the dominant task culture with its relatively shorter tactical and operational timeframes. The lack of contractual obligations and their being less well implemented than policies for staff development and appraisal lend further weight to the level of emergence of these policies in construction industry employment.

5.6.8 Organisational Approaches to Staff Development

5.6.8.1 Responses to Question 9

Question 9: Which of the following best describes your organisation's approach to staff development?

This question seeks to establish whom companies believe should be responsible for staff development. The overwhelming majority of forty-two companies (93.33%) (Mean R = 3.91) claimed that staff development was a joint responsibility between the employer and the employee, as shown in Figure 5.139 below. Only two companies (4.44%) claimed that staff development should be the sole responsibility of the employer with the remaining one company (2.22%) claiming it is solely the employee's responsibility.

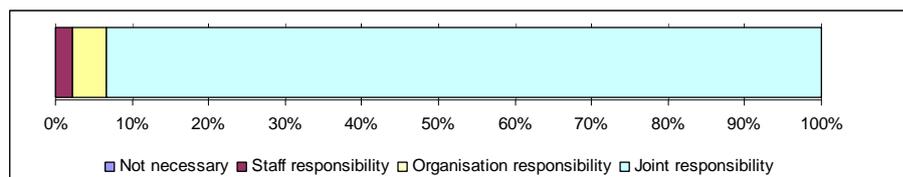


Figure 5.139: Responses to Question 9
For data see Table 5.69, Appendix 5A.10.18.

As this question comprises discreet responses no direct association can be made with Mumford and Gold's (2004) 'Types of Management Development' but it can provide an insight into the companies alignment with their 'Stages in Management Development'. Here the results suggest that the higher Stage 3 'planned management development' and Stage 4 'planned strategic management development' should exist in companies although responses to earlier questions suggest management development is predominantly Stage 3 rather than Stage 4. The only company responding that staff development was entirely the staffs' (or individual's) responsibility, i.e. indicating Stage 1 or Stage 2 management development was found upon further investigation to operate predominantly in the house-building sector.

In the following comparisons with Question 9 no meaningful alignment can be made with Mumford and Gold's (2004) 'Types of Management Development' as Question

9 does not align with any of the variables within their model, although further comparisons may be made with their ‘stages in management development’ model.

5.6.8.2 Cross-tabulation of Question 9 and Question 3

Question 9: Which of the following best describes your organisation’s approach to staff development?

Question 3: To what extent is the staff development policy implemented?

This cross-tabulation examines the extent of the implementation of the staff development policy with the company’s approach to staff development. The null-hypothesis H_0 to be tested here is that there is no association between a company’s approach to staff development and the extent to which staff development policy is implemented. The data for this cross-tabulation is provided in Appendix 5A.10.25. Fifteen companies (33.33%) who claimed to have a fully implemented staff development plan also claimed that staff development should be a joint responsibility between employer and employee, see Figure 5.140 below.

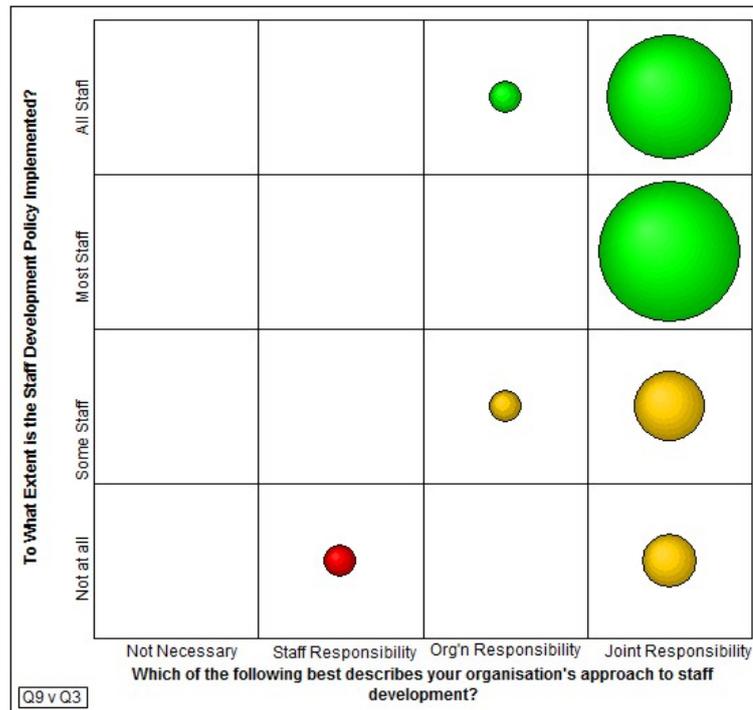


Figure 5.140: Staff appraisal policy implementation v company approach to staff development (Q9 v. Q3).
For data see Table 5A.100, Appendix 5A.10.25.

Due to the nominal nature of the data for Question 9 the data could not be consolidated into a two-by-two contingency table, instead a four-by-two table has

been used, giving 3 degrees of freedom ($df = 3$). This increases to thirty-four companies (75.56%) having both staff development policies that are mostly or fully implemented, and claim staff development is a joint responsibility. Just one company (2.22%) was found not to have an implemented staff development policy also felt that the responsibility for staff development should lie solely with the employee. A further eight companies (17.78%) claimed to have little or no implementation of their staff development policy and also claimed that staff development was a joint responsibility, whilst one company claimed (2.22%) it should be entirely the responsibility of the company to organise staff development.

With this cross-tabulation no useable results could be obtained using the four-by-four cell contingency table as nine cells failed to meet the expected value of 5, all with zero values. As Question 9 consists of nominal value responses, the contingency table cannot be consolidated into a two-by-two cell table as in previous examples. It is possible to reduce the four-by-four cell contingency table by consolidating the responses into two cells to create a four-by-two cell contingency table.

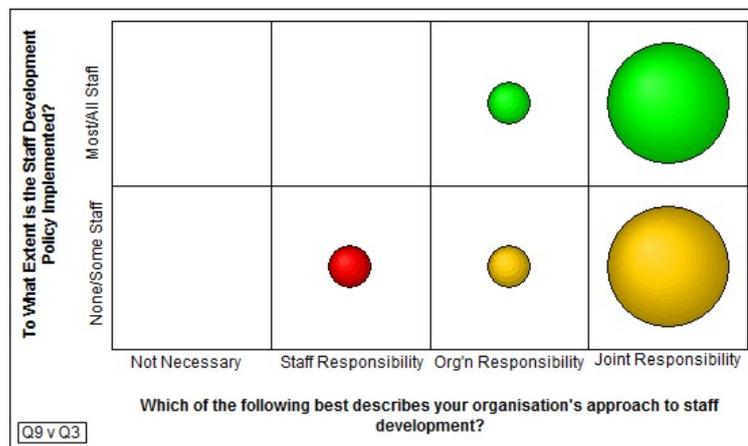


Figure 5.141: Consolidated staff development policy implementation v company approach to staff development (Q9 v. Q3).

See Table 5A.102 for data (Appendix 5A.10.25).

As one column contains all zero values SPSS reduces the table to three-by-two cells, see Figure 5.141 above, giving two degrees of freedom [$df = 2$] to perform the Chi-square test. As there remains one cell with a zero value the results from this test must also be considered unusable, even though the indication that the association between the variables is weak and not statistically significant. Fishers Exact test

could not be performed as the contingency table was not two-by-two cells (see Table 5A.103).

The Symmetric Measures [ϕ and $V = 0.321$; $\rho = 0.098$] and [$Cc = 0.306$; $\rho = 0.098$] (see Table 5A.104) confirm that the association is weak and not statistically significant. Again, the null-hypothesis H_0 can be accepted, but as the result is not statistically significant there is only a low risk of a Type II error occurring, and that the null-hypothesis H_0 should have been rejected.

Here the cross-tabulation suggests that, irrespective of a company's 'concern for task' (Mumford and Gold, 2004) as indicated by the responses to Question 3, there is an overwhelming belief that staff development should be a joint responsibility between company (employer) and employee. This tends to indicate that companies are aware of the most effective form of commitment to staff development regardless of whether or not their staff development policies are implemented. Again, the notable exception is that of a company operating predominantly in the house-building sector.

5.6.8.3 Cross-tabulation of Question 9 and Question 5

Question 9: Which of the following best describes your organisation's approach to staff development?

Question 5: To what extent is the staff appraisal policy implemented?

The second cross-tabulation for Question 9 is with the implementation of the staff appraisal policy. Here the null-hypothesis H_0 to be tested is that there is no association between a company's approach to staff development and the extent to which the staff appraisal policy is implemented. The data for the statistical analysis for this cross-tabulation is given in Appendix 5A.10.26. Twelve companies (26.67%) claimed to have a fully implemented staff appraisal policy and considered staff development to be a joint responsibility between employee and employer (see Figure 5.142 overleaf). In this last cross-tabulation of this section it was again found that the Chi-square test could not be performed to produce useable results using the four-by-four cell contingency table as nine cells failed to meet the expected criteria, all having zero values (see Table 5A.105).

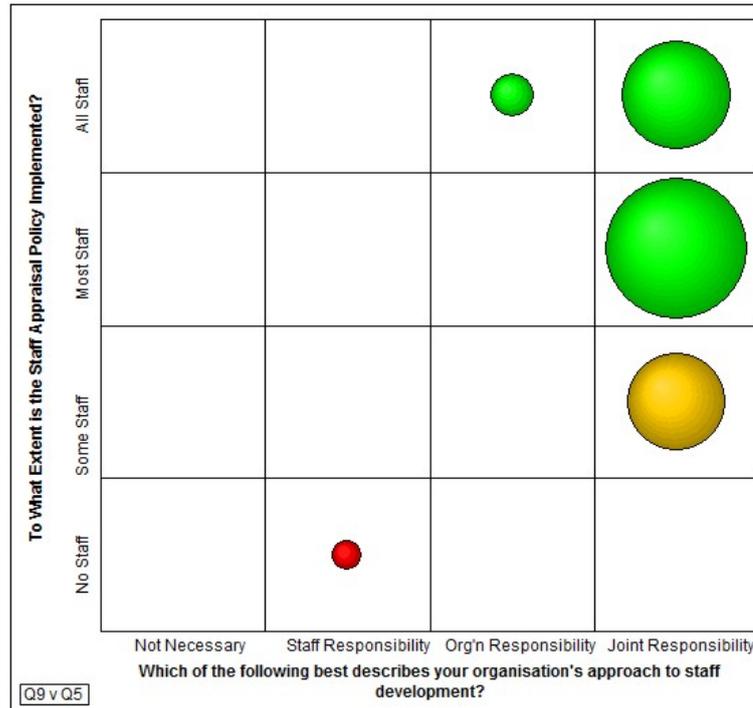


Figure 5.142: Staff appraisal policy implementation v company approach to staff development (Q9 v. Q5).

For data see Table 5A.105, Appendix 5A.10.26.

Removing the blank column and consolidating the table to a four-by-two matrix (see Table 5A.107) reveals a rise to thirty-two companies (71.11%) that have their staff appraisal policies implemented for most or all staff. Two companies (4.44%) felt that staff development should be the responsibility of the company alone. A further ten companies (22.22%) claiming to have little or no implementation of their staff appraisal policies also considered that staff development was a joint responsibility, whilst the remaining one company (2.22%) felt it was solely the employee’s responsibility. See Figure 5.143 overleaf.

Again consolidating the contingency table further to three-by-two cells still yielded cells with zero values so it still could not be used for reliable Chi-square Tests (see Table 5A.108). The Symmetric Measures [ϕ and $V = 0.289$; $\rho = 0.154$] and [$C_c = 0.277$; $\rho = 0.154$] (see Table 5A.109) reveal that there is only a very weak association between the two variables and that the association is not statistically significant. Here the null-hypothesis H_0 can be accepted but there is a high risk of a Type II error occurring, and the null-hypothesis H_0 should have been rejected.

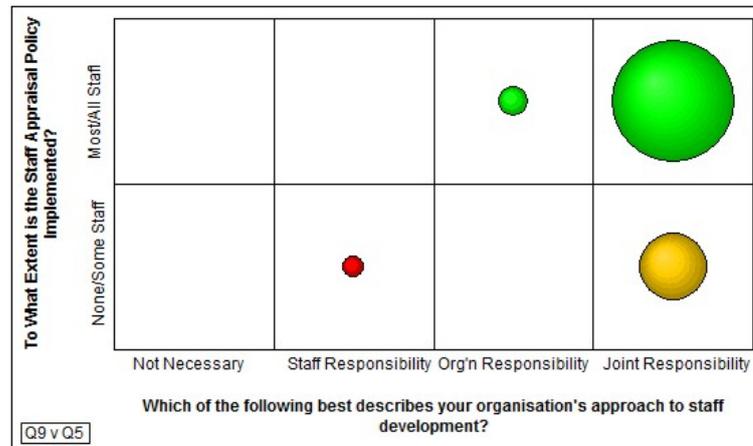


Figure 5.143: Consolidated: Staff appraisal policy implementation v company approach to staff development (Q9 v. Q5).

See Table 5A.107 for data (Appendix 5A.10.26).

Here, like the previous cross-tabulation, this cross-tabulation that irrespective of a company's 'concern for task' (Mumford and Gold, 2004) as indicated by the responses to Question 5, a far stronger commitment to appraisal and staff development being a joint responsibility is evident.

5.6.8.4 Implications of Organisation Approaches to Appraisal and Staff Development

Here it is revealed that more than 90% of companies believed that staff development was a joint responsibility between the employee and the employer. In the cross-tabulation with staff development policy implementation it is revealed that in some instances companies believe that responsibility should lie entirely with the employer. Those companies not having an implemented staff appraisal policy also believe that staff development is the sole responsibility of the employee. The implication here is that the company approach that staff development is a joint responsibility is embedded in both staff development and staff appraisal policies, and seems to gain staff commitment to development where such policies are implemented.

This would again suggest that construction companies have a strong commitment to appraisal systems, greater than that to staff development, as appraisal systems tend to be linked to task performance rather than to more strategic staff development. This

is in line with the expectations of companies operating at Stage 2 ‘unplanned reactive management development’ and Stage 3 ‘planned management development’ rather than Stage 4 ‘strategic management development’ (Mumford and Gold, 2004).

5.6.9 Staff Development/Training Units

5.6.9.1.1 Responses to Question 10

Question 10: Does your organisation have a formal staff development/training unit?

In this simple yes/no question it was found that twenty-seven companies (61.11%) claimed to have a staff development/training unit, whilst the remaining seventeen companies (38.89%) did not, as shown in Figure 5.144 below. One company commented that they were a conglomerate and it was up to each business unit to make their own decisions, thus some units had staff development/training units, whilst others did not. Their response was divided equally in the percentages above.

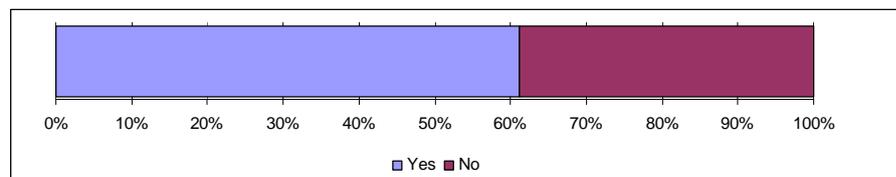


Figure 5.144: Responses to Question 10
For data see Table 5.110, Appendix 5A.10.27.

As this question has been aligned with Mumford and Gold’s (2004) ‘Stages in Management Development’ it can be seen that the seventeen construction companies (38.89%) responding ‘no’ can be considered to be at the lower Stage 1 ‘unplanned experiential management development’ and Stage 2 ‘unplanned reactive management development’, with Stage 2 being the more likely level. However, twenty-seven companies (61.11%) responding ‘yes’ can be considered to be at either at Stage 3 ‘planned management development’ or Stage 4 ‘planned strategic management development’. As has been revealed by earlier question responses most of these companies appear to be at Stage 3 rather than Stage 4.

The existence, or otherwise, of staff development units are cross-tabulated with other question responses in the following sections. The cross-tabulations have been

performed using only a two-by-two cell contingency table as there are only two possible responses to Question 10.

5.6.9.2 Cross-tabulation of Question 10 and Question 1

Question 10: Does your organisation have a formal staff development/training unit?

Question 1: To what extent does your organisation have a formal staff development policy?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between a company having a staff development/training unit and the extent to which they have a staff development policy. The data analysis for this cross-tabulation is given in Appendix 5A.10.29. The cross-tabulation of the responses to Questions 10 and 1 (see Table 5A.111) reveals that twenty-five companies (55.56%) that claimed to have a staff development/training unit also had a formal staff development policy, whilst ten companies (22.22%) that had a formal staff development policy did not have a staff development/training unit. It was also found that seven companies (15.56%) had neither a staff development/training unit nor a staff development policy. The remaining three companies (6.67%) claimed to have a staff development/training unit even though they claimed not to have a staff development policy. See Figure 5.145 below.

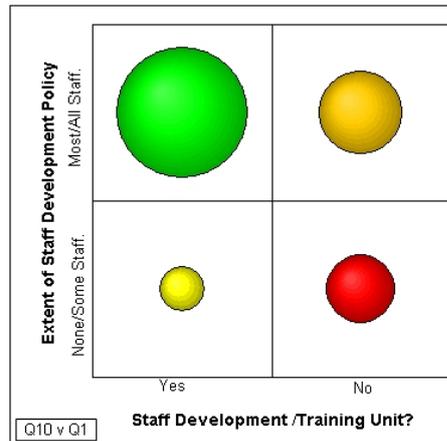


Figure 5.145: Consolidated: Staff development/training unit v extent of staff development policy (Q10 v. Q1).

For data see Table 5A.111, Appendix 5A.10.28.

In undertaking the cross-tabulation the two-by-two contingency table reveals that one cell has a value of less than the expected value of 5 and less than the minimum expected value of 3.78%, thus the results may be unreliable and must be treated with caution. The Chi-square Tests [$\chi^2 = 5.679$; $p = 0.017$] and [$\Lambda = 5.571$; $p = 0.018$] (see

Table 5A.112) show a strong association between the variables with a high degree of statistical significance. Fisher's Exact test [$\rho_F = 0.027$] confirms the statistical significance of the tests. The Symmetrical Measures results [$\phi = -0.355$; $\rho = 0.017$], [$V = 0.355$; $\rho = 0.017$] and [$Cc = 0.335$; $\rho = 0.017$] (see Table 5A.59) indicate that the association between the variables is weak, but with a high degree of statistical significance. Therefore the null-hypothesis H_0 can be accepted, but with a risk of a Type II error occurring.

Whilst the null-hypothesis indicates that statistically there only a weak, but statistically significant, association between the existence of a staff development policy and the existence of a staff development/training unit this relationship exists in twenty-five companies (55.56%). This suggests, never-the-less, that a staff development/training unit is most likely to occur where a company has a staff development policy, again reinforcing earlier findings that these companies are operating at a higher level in the 'stages in management development' (Mumford and Gold, 2004) ; either at Stage 3 'planned management development' or at stage 4 'planned strategic management development'.

5.6.9.3 Cross-tabulation of Question 10 and Question 4

Question 10: Does your organisation have a formal staff development/training unit?

Question 4: To what extent does your organisation have a staff appraisal policy?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between a company having a staff development/training unit and the extent to which they have a staff appraisal policy. The data analysis for this cross-tabulation is given in Appendix 5A.10.30. In this cross tabulation with the extent of the existence of a staff appraisal policy (see Table 5A.117) it was found that twenty-eight companies (62.22%) claimed to have both a staff appraisal policy for most or all staff and a staff development/training unit. A further twelve companies (26.67%) having a staff appraisal policy for most or all staff stated they did not have a staff development/training unit. See Figure 5.146 overleaf.

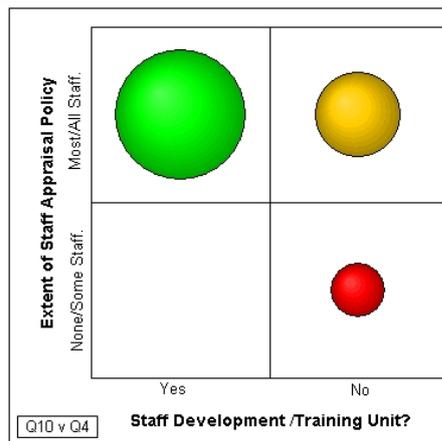


Figure 5.146: Consolidated: Staff development/training unit v extent of staff appraisal policy (Q10 v. Q4).

For data see Table 5A.114, Appendix 5A.10.29.

The remaining five companies (11.11%) with little or no staff appraisal policy were also found not to have a staff development/training unit. No company was found to have a staff development/training unit and little or no staff appraisal policy.

In the cross-tabulation the two-by-two contingency table contains one cell with a zero value so the Chi-square Test results cannot be utilised (see Table 5A.118). The Symmetrical Measures [$\phi = -0.454$; $\rho = 0.002$], [$V = 0.454$; $\rho = 0.002$] and [$Cc = 0.413$; $\rho = 0.002$] indicate only a moderate degree of association, but with a very high statistical significance. Thus the tendency here is to accept the null-hypothesis H_0 , but with a considerable risk of making a Type II error.

The null-hypothesis here indicates that there is a moderate, but statistically significant, association between the existence of a staff appraisal policy and the existence of a staff development/training unit. The association between these two variables is stronger than the previous cross-tabulation, but there is still the risk of a Type II error occurring. Here it can be seen that twenty-eight companies (62.22%) have both a staff appraisal policy and a staff development/training unit. This tends to suggest a clear division between those companies with both a staff appraisal policy and a staff development/training unit that can be considered to be operating at Stage 3 'planned management development' or Stage 4 'planned strategic management development' (Mumford and Gold, 2004), and those without either a staff appraisal policy and/or a staff development/training unit operating at either Stage 2 'unplanned

reactive management development’ or Stage 1 ‘unplanned experiential management development’.

5.6.9.4 Cross-tabulation of Question 10 and Question 7

Question 10: Does your organisation have a formal staff development/training unit?

Question 7: To what extent does your organisation encourage staff development activities?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between a company having a formal staff development/training unit and the extent to which staff development is encouraged. The data analysis for this cross-tabulation is given in Appendix 5A.10.30. In this test of association (see Table 5A.117) it was claimed by twenty-seven companies (60.00%) that they had staff appraisal policies that included staff development opportunities and that they also had a staff development/training unit, compared to fourteen companies (31.11%) who stated they did not have a staff development/training unit. Just one company (2.22%) claimed to have little or no staff development opportunity in their staff appraisal policies also claimed they did not have a staff development/training unit. The remaining three companies (6.67%) claimed neither a staff appraisal policy with staff development opportunities, nor a staff development/training unit. See Figure 5.147 below.

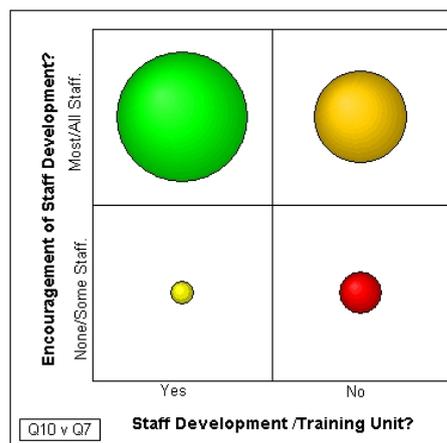


Figure 5.147: Consolidated: Staff development/training unit v encouragement of staff development (Q10 v. Q4).

See Table 5A.117 for data (Appendix 5A.10.30).

In the cross-tabulation only one cell of the two-by-two cell contingency table did not meet either the expected value or the minimum expected value, so the Chi-square tests must be treated with caution. The Chi-square Test results [$\chi^2 = 2.588$; $\rho = 0.108$] and [$\Lambda = 2.524$; $\rho = 0.112$] (see Table 5A.118) do not indicate a statistically significant association, as confirmed by Fisher's Exact test [$\rho_F = 0.144$]. The Symmetrical Measures (see Table 5A.119) also indicate a weak association [$\phi = -0.240$; $\rho = 0.108$], [$V = 0.240$; $\rho = 0.108$] and [$Cc = 0.233$; $\rho = 0.108$] that is not statistically significant. Here the null-hypothesis H_0 can be accepted, but with little risk of making a Type II error.

Here again the null-hypothesis indicates that there is only a weak and statistically insignificant association between the existence of a staff development/training unit and those firms that do/do not encourage staff development activities but with a high risk of making a type II error, thus any comparison made with Mumford and Gold's (2004) 'stages in management development must be treated with considerable caution. Never-the-less it can be seen that those companies with a staff development/training unit are most likely to encourage staff development (twenty-seven companies, 60%). This again reinforces earlier findings that these companies are operating at a higher stage in Mumford and Gold's (2004) 'stages in management development', either at Stage 3 'planned management development' or Stage 4 'planned strategic management development'. Fourteen companies (31.11% indicating they encourage staff development activities but lack a formal staff development/training unit would tend to suggest that staff development is occurring at a lower stage, Stage 2 'unplanned reactive management development' at an operational level within those companies. The remaining four companies (8.89%) would appear to be operating at Stage 1 'unplanned experiential management development'.

5.6.9.5 Cross-tabulation of Question 10 and Question 8

Question 10: Does your organisation have a formal staff development/training unit?

Question 8: Do your employee's contracts of employment have a formal staff development requirement?

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between a company having a staff development/training unit and an employee's contract of employment having a staff development requirement. The data analysis for this cross-tabulation is given in Appendix 5A.10.31. The final comparison of this section compares the existence of a formal contract of employment requirement to undertake staff development with that of the existence of a staff development/training unit (see Table 5A.120). Here, due to the large number of companies that claimed not to have a contractual staff development requirement, a different outcome pattern is expected, as shown in Figure 5.148 below.

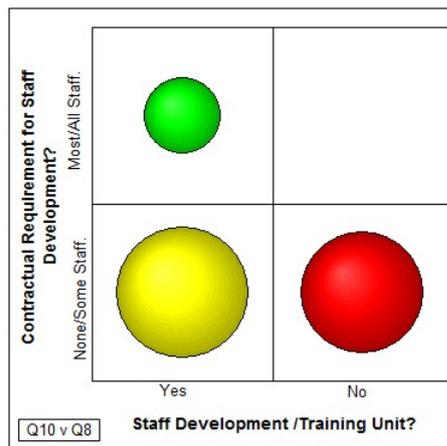


Figure 5.148: Consolidated: Staff development/training unit v extent of staff appraisal policy (Q10 v. Q4).

For data see Table 5A.120, Appendix 5A.10.31.

Only seven companies (15.56%) that claimed to have an employment contract requirement for staff development also claimed to have a staff development/training unit, whilst conversely, seventeen companies (37.78%) claimed to have neither. It was also found that twenty companies (44.44%) that claimed to have little or no contractual requirement for staff development also lacked a staff development/training unit. No companies were found to have a formal employment contract requirement for staff development without having a staff development/training unit.

In the cross-tabulation no useable Chi-square Test results were obtainable as one cell of the two-by-two cell contingency table contained a zero value (see Table 5A.121). However, the Symmetric Measures (see Table 5A.122) indicate a weak but statistically significant association between the variables [$\phi = -0.345$; $\rho = 0.022$], [$V = 0.345$; $\rho = 0.022$] and [$Cc = 0.326$; $\rho = 0.022$]. Thus the null-hypothesis H_0 can be accepted with only a low risk of a Type II error occurring.

This final cross-tabulation in this section again finds that the null-hypothesis indicates on a weak and statistically insignificant association between a company having a contract of employment requirement and the existence of a staff development/training unit, but with a low risk of making a Type II error, and again caution must be exercised when making a comparison with Mumford and Gold's (2004) 'stages in management development'. The seven companies (15.56%) claiming to have both a contract of employment requirement for staff development and a staff development/training unit can be considered to be operating at Stage 4 'planned strategic management development' as clearly the decision to include such a requirement in a contract of employment is one of company strategy. Those without a contract of employment requirement, but with a staff development/training unit can be considered to be operating at Stage 3 'planned management development'. Finally those having neither a contract of employment requirement nor a staff development/training unit can be considered as operating at the lower stages of Stage 2 'unplanned reactive management development', or stage 1 'unplanned experiential management development'.

5.6.9.6 Implications of Staff Development/Training Units

Here it has been found that only 61% of the top construction companies have a staff training/development unit. Little association was found between the existence of this facility and the existence of staff development policies, but there was a greater level of association with the existence of staff appraisal policies. Similarly, the level of encouragement of staff development was also found to be greater where the company has a training and development unit.

This may well be a consequence of the level of development of the HR function within construction companies as Jones, Comfort and Hillier (2006:142) note that ‘there is a general recognition that human resources management is relatively poorly developed within the construction industry’.

5.6.10 Non-employee Training and Development

Question 11: Does your organisation offer or provide staff development/training opportunities to non-employees (e.g. subcontractors’ / suppliers’ staff)?

The very high degree of subcontracting that is present in the construction industry, both in terms of trades subcontractors and/or self-employment in its various guises, has already been established in previous chapters. This question sought to establish the extent of staff training and development that is provided by construction companies for their subcontractors, i.e. the non-core elements of the companies. See Figure 5.149 below.

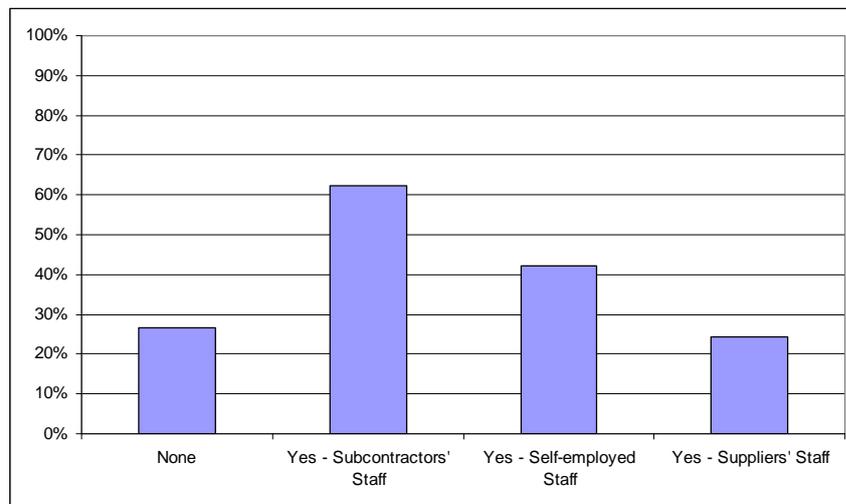


Figure 5.149: Responses to Question 11
For data see Table 5A.123, Appendix 5A.10.32

Twelve companies (26.67%) did not provide any form of staff development or training to those not considered their employees, i.e. to non-core elements. However, twenty-eight companies (62.22%) claimed they provided staff training and development opportunities for subcontractors’ staff, although a number of companies commented that this provision was to meet statutory health and safety training requirements only. For self-employed staff nineteen companies (42.22%) claimed to provide staff training and development opportunities, again reflecting the relatively

high level of construction managers that engaged in a 'self-employed' basis. Finally, it was found that eleven companies (24.44%) also claimed to provide staff development and training opportunities for suppliers' staff. In order to establish the extent of integration of the non-employee staff-training and development the comparative bar chart, Figure 5.150 below, shows the various combinations of staff development and training provision for non-employees.

Twelve companies (26.67%) claimed not to provide any training and development other than for their own employees. Ten companies (22.22%) claimed to provide staff development and training opportunities for subcontractors' staff only, with a further eight companies (20.00%) claiming to providing opportunities for both subcontractors' and self-employed staff.

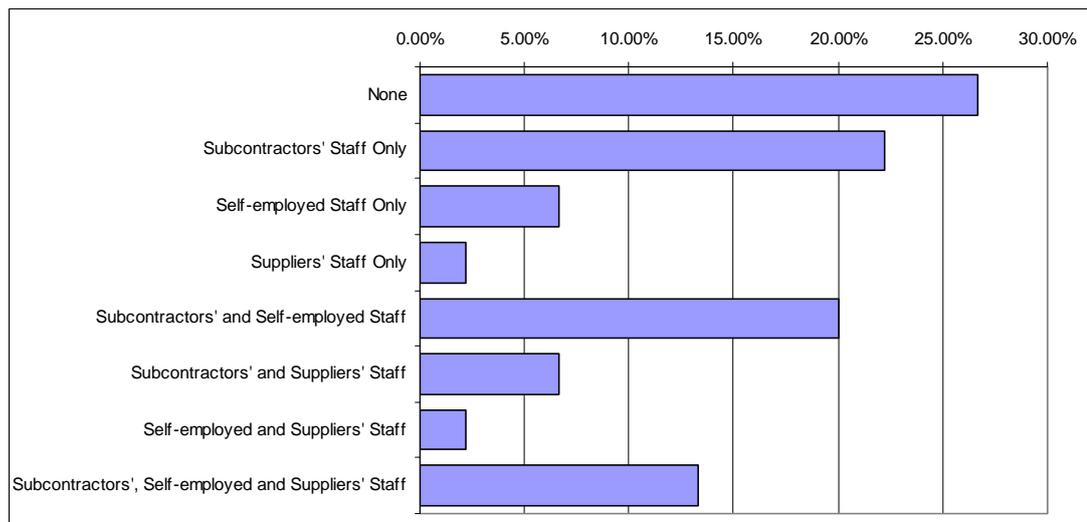


Figure 5.150: Non-Employee Staff Development Training Provision
For data see Table 5.124, Appendix 5A.10.32

Six companies (13.33%) claimed to provide staff development/training opportunities for all non-employees, i.e. subcontractors' staff, self-employed and suppliers' staff. Just three companies (6.67%) claimed to provide staff development/training for self-employed staff only (in addition to their own employees), and another three companies (6.67%) for subcontractors' and suppliers' staff only. Only one company (2.22%) claimed to provide staff development/training opportunities for suppliers' staff, and only one (2.22%) claimed to provide training only for supplier's staff.

5.6.11 Common Reasons for Not Undertaking Staff Development

Question 12: Below are a number of reasons commonly given by organisations for not undertaking staff development. Please indicate your organisations approach to each statement:

Question 12 asks respondents to indicate the extent of their agreement with a number of commonly given reasons for companies not undertaking staff development and training, as shown in Figure 5.151 below. The collation of the individual responses to each statement is given in Appendices 5 A.10.36 to 5A.10.44.

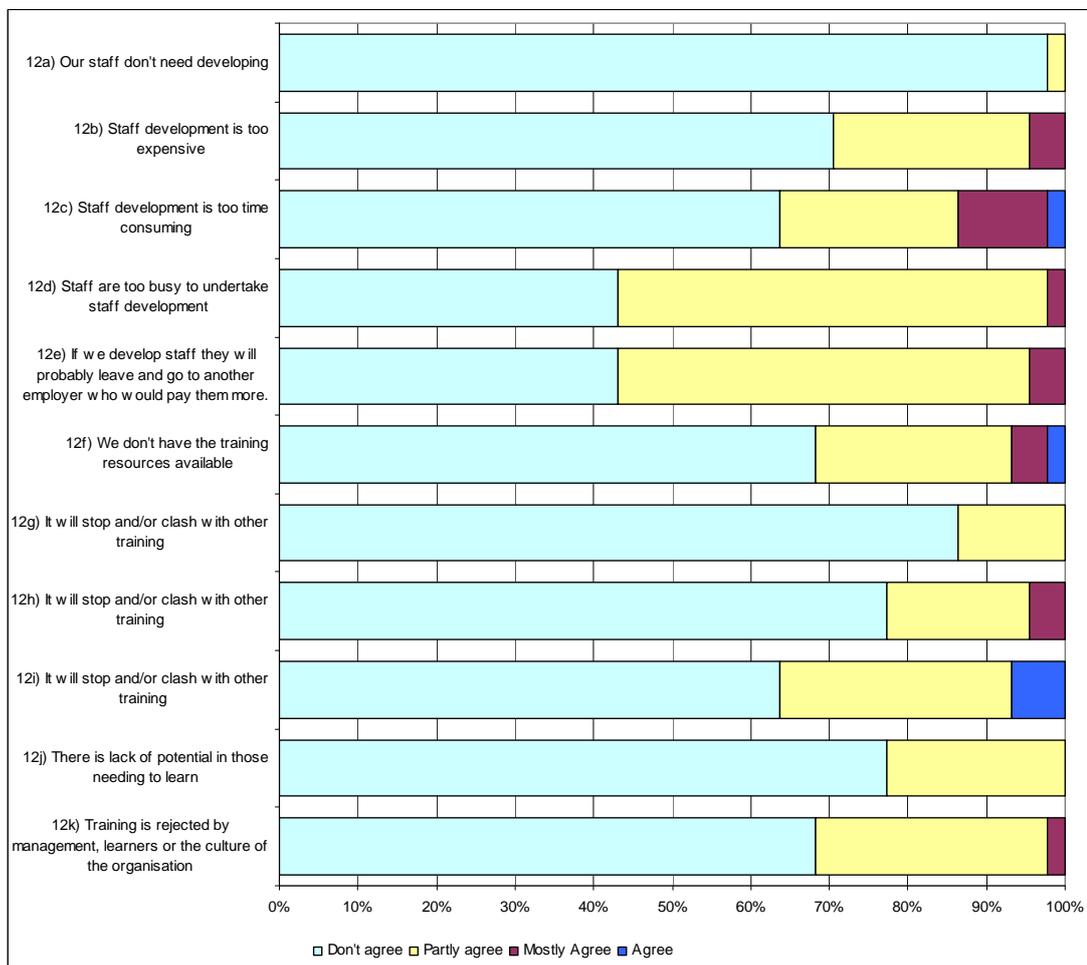


Figure 5.151: Responses to Question 12.
For data see Tables 5A.126 to 5A.136, Appendices 5A.10.34 to 5A.10.44

It is not the intention here to consider the individual responses to each statement, but to determine the overall importance of each statement in terms of a ranked series as shown in Table 5.26 below. Here it must be remembered that the Relative

Importance Index shows the strength of the rejection of the statement, i.e. the disagreement with it.

Table 5.26: Ranked Importance Indices for Responses to Question 12

| Rank | Below are a number of reasons commonly given by organisations for not undertaking staff development. Please indicate your organisations approach to each statement. | Relative Importance Index RI |
|------|---|------------------------------|
| 1 | 12e) If we develop staff they will probably leave and go to another employer who would pay them more. | 84.66 |
| 2 | 12d) Staff are too busy to undertake staff development | 85.23 |
| 3 | 12c) Staff development is too time consuming | 86.93 |
| 4 | 12i) Those needing to learn lack the skills to learn | 87.50 |
| 5 | 12f) We don't have the training resources available | 89.77 |
| 6 | 12b) Staff development is too expensive | 91.48 |
| 6 | 12k) Training is rejected by management, learners or the culture of the organisation. | 91.48 |
| 8 | 12h) Staff development takes too long | 93.18 |
| 9 | 12j) There is a lack of potential in those needing to learn | 94.32 |
| 10 | 12g) It will stop and/or clash with other training | 96.59 |
| 11 | 12a) Our staff don't need developing | 99.43 |

The Relative Importance Indices have a high level of importance in each instance being grouped in the range of 84.66 to 99.43, indicating there is generally a very strong consensus of opinion amongst the respondents. The highest ranked statement (1), rejected most strongly [RI = 99.43], is that 'our staff don't need developing', thus recognising the need that, above all other reasons, staff do need developing. From the Relative Importance Indices ranked 2 to 6 there is clearly little reason for companies not to undertake staff development as the responses show that all staff are capable of learning, the development process does not take too long, it is not too expensive nor rejected in principle. The lowest Relative Importance Index [RI = 84.66] shows that companies are most concerned that if they develop staff they will then leave for another employer. A similar concern was also revealed in Document 3, and also by Morby (2008). The second lowest Relative Importance Index [RI = 85.23] for 'staff are too busy to undertake staff development' provides a clear reflection of the strong task culture in the construction industry, with a dominant concern for production, rather than for people.

5.6.12 Links to Higher Education

Question 13: Does your organisation support/encourage employees' interaction with higher education institutions (universities) in any of the following [listed] ways?

Question 14: Does your organisation support formal links with higher education institutions (universities) in any of the following [listed] ways?

These two linked questions, questions 13 and question 14, seek to establish the nature of the interaction between construction companies and higher education institutions. Figure 5.152 below shows the responses to Question 12. For a detailed collation of the individual responses to each question see Appendix 5A.10.46

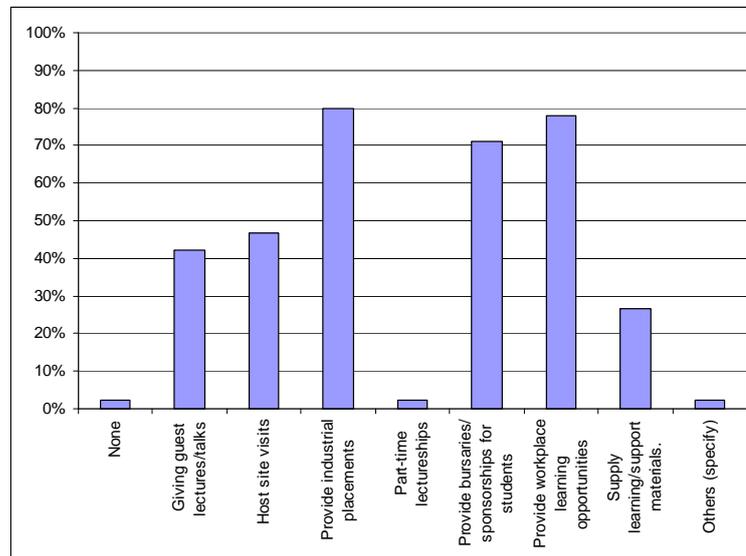


Figure 5.152: Responses to Question 13

For data see Table 5.138, Appendix 5A.10.46

Thirty-six companies (80.00%) provided industrial training placements for students, with thirty-five companies (77.78%) providing workplace learning opportunities. Additionally thirty-two companies (71.11%) also claimed that they provided bursaries for students. These three forms of interaction are all closely linked to the recruitment of students into the company into companies and form an important part of the supply chain for future potential construction managers.

At the lower level, twenty-one companies (46.67%) claimed they hosted site visits for students whilst nineteen companies (42.22%) claimed to give guest lectures and

talks to students. Again these activities provide recruitment opportunities for companies seeking to recruit as site visits provide a show-case for companies and raise corporate profiles in the minds of students for potential future recruitment. Similarly guest lectures and talks all serve to raise corporate profiles in the eyes of the students. Provision of learning support materials to higher education is claimed by twelve companies (26.67%). Here again the opportunity for showcasing the company and providing recruitment opportunities is substantially lower so clearly receives less support. The remaining three interactions were each supported by just one company (2.22%), including no interaction.

The considerations above are further supported by the responses to Question 14, links to Higher Education, which are shown in Figure 5.153 below. The detailed collation of responses to the question can be found in Appendix 5A.10.46.

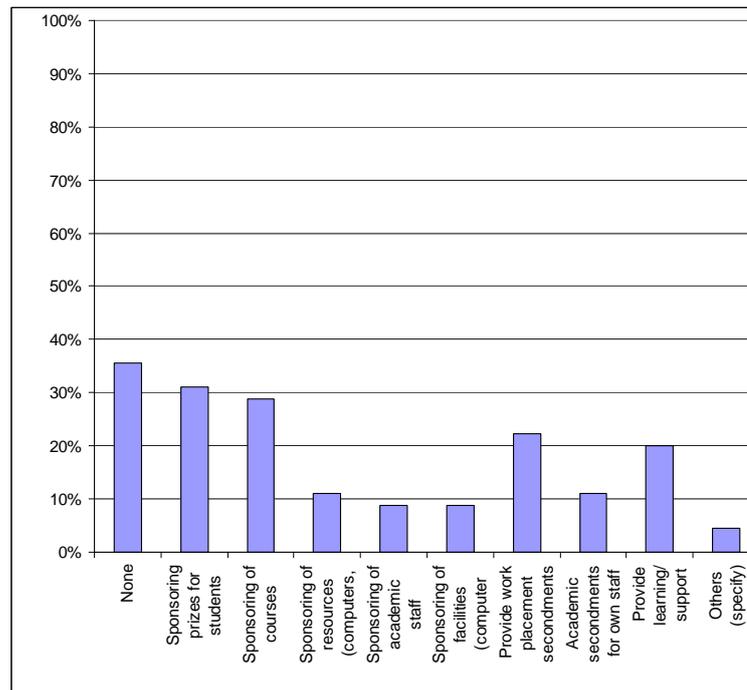


Figure 5.153: Responses to Question 14
For data see Table 5A.138, Appendix 5A.10.46

Here, where there is generally little or no opportunity for recruitment there is substantially less involvement. Some sixteen companies (35.56%) claimed not to support any links with Higher Education. Where there is limited potential for

recruitment and/or raising the company profile then a low level of support is encountered. Typically this includes fourteen companies (31.11%) sponsoring prizes for students and providing work-place secondments for academic staff is claimed by ten companies (22.22%). Only a very low level of support was found for those activities where there was little or no opportunity for show-casing the company to students and/or recruiting opportunities. These included: sponsoring courses claimed by five companies (11.11%); sponsoring academic staff, five companies (11.11%); and four (8.89%) companies sponsoring facilities.

5.6.13 Non-academic Education, Training and Development Opportunities

Question 15: Which of the following [listed methods of] non-academic education, training and development opportunities does your organisation support/employ?

Question 16: How effective does your organisation find each of the following [listed methods] in meeting its needs:

These paired questions seek to establish the extent and effectiveness of various non-academic educational, training and development opportunities supported by construction companies. Question 15 (see Figure 5.154 overleaf) reveals that the most popular method found was that of using in-house management/training staff, claimed by forty-one companies (91.11%). This is perhaps a surprising result as only twenty-seven companies (61.11%) claimed to have a formal staff development/training unit (see Question 10). This would tend to suggest that the other eighteen companies (38.89%) are using their own managers to train their own staff, however thirty-four companies (75.56%) claim to use their own managers for in-house management-led talks and seminars.

The use of external management/training consultants was found to be the second most popular method, supported by thirty-eight companies (84.44%) followed closely by the use of CPD events accredited by professional institutions supported by thirty-seven companies (82.22%). The responses to the question of effectiveness of each of the stated methods (Question 16) is shown in Figure 5.155 overleaf.

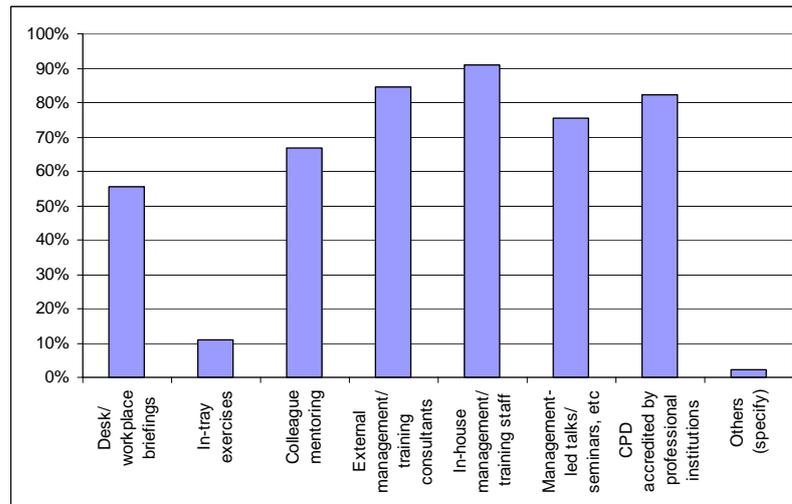


Figure 5.154: Responses to Question 15
For data see Table 5A.139, Appendix 5A.10.47

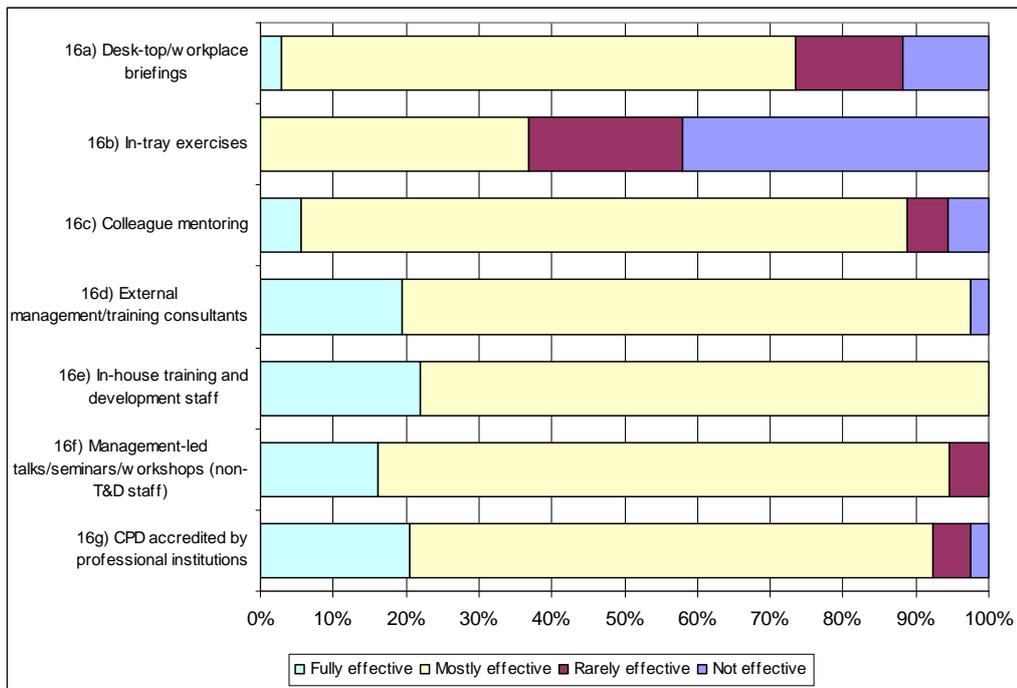


Figure 5.155: Responses to Question 16
For data see Tables 5.141~147, Appendices 5A.10.48~55.

Here, not only did forty-one companies (91.11%) claim to use in-house management training resources but it also had the highest rating for effectiveness [RI = 80.49], with the use of external management/training consultants having the second highest Relative Importance Index [RI = 78.66], marginally above that of management led seminars and talks [RI = 77.70] and accredited CPD [RI = 77.56]. Less popular were the use of colleague mentoring arrangements used by thirty companies (66.67%)

with a relative Importance index [RI= 72.22] and desk/workplace briefings used by twenty-five companies (55.56%) [RI = 66.18]. In-tray-exercises were used by just five companies (11.11%) and received the lowest Relative Importance Index [RI = 48.68]. They are also the least formal of the methods used. Table 5.27 below shows the ranking of the Relative Importance indices.

Table 5.27: Importance Indices of Responses to Question 16

| Rank | How effective does your organisation find each of the following in meeting its needs: | Relative Importance Index RI |
|------|---|------------------------------|
| 1 | 16e) In-house management/training courses | 80.49 |
| 2 | 16d) External management/training courses | 78.66 |
| 3 | 16f) Management-led talks/seminars, etc. | 77.70 |
| 4 | 16g) CPD accredited by professional institutions | 77.56 |
| 5 | 16c) Colleague mentoring | 72.22 |
| 6 | 16a) Desk/workplace briefings | 66.18 |
| 7 | 16b) In-tray exercises | 48.68 |

5.6.14 Formal Academic Education, Training and Development Opportunities.

Question 17: Which of the following [listed] academic education, training and development opportunities does your organisation support/employ?

Question 18: How effective does your organisation find each of the following [listed] academic education, training and development opportunities in meeting its needs?

Complementing the previous questions Question 17 and Question 18 seek to determine the use and effectiveness of academic education, training and development opportunities which have formal academic recognition, i.e. the lead to formal academic qualifications at either sub-degree (post-compulsory education), degree, or post-graduate degree level. The responses here are considered both in terms of their overall use (see Figure 5.156 overleaf) and claimed effectiveness (see Figure 5.157 overleaf). Effectiveness is considered both in overall terms and in the three academic levels.

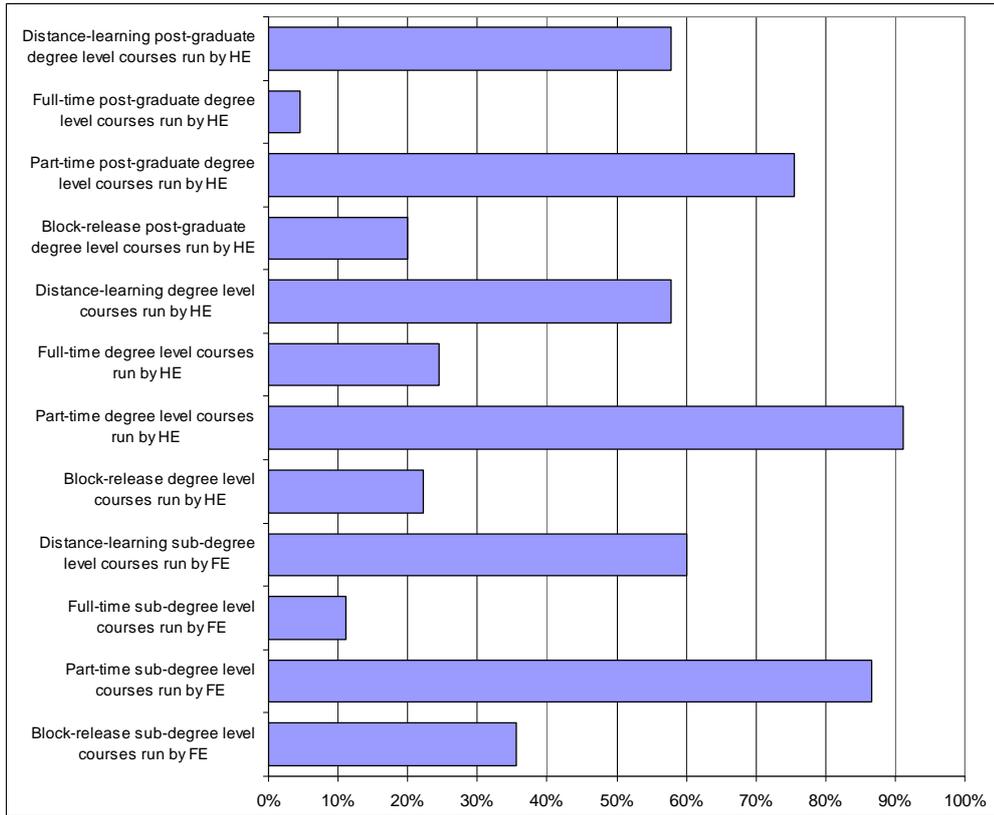


Figure 5.156: Responses to Question 17
 For data see Table 5A.148, Appendix 5A.10.56

The most widely used form of academic education training and development used by construction companies was found to be part-time courses, degree level used by forty-one companies (91.11%), sub-degree level courses by thirty-nine companies (86.67%) and post-graduate courses used by thirty-four companies (75.56%). Distance-learning courses are revealed as being the second most widely used group of academic courses. Of the distance-learning courses, sub-degree level courses were found to be used by twenty-seven companies (60.00%), degree level courses by twenty-six companies (57.78%) and post-graduate courses by twenty-six companies (57.78%). Generally block-release courses were the third most popular form of academic education, training and development used by construction companies, but significantly less than part-time and distance-learning courses.

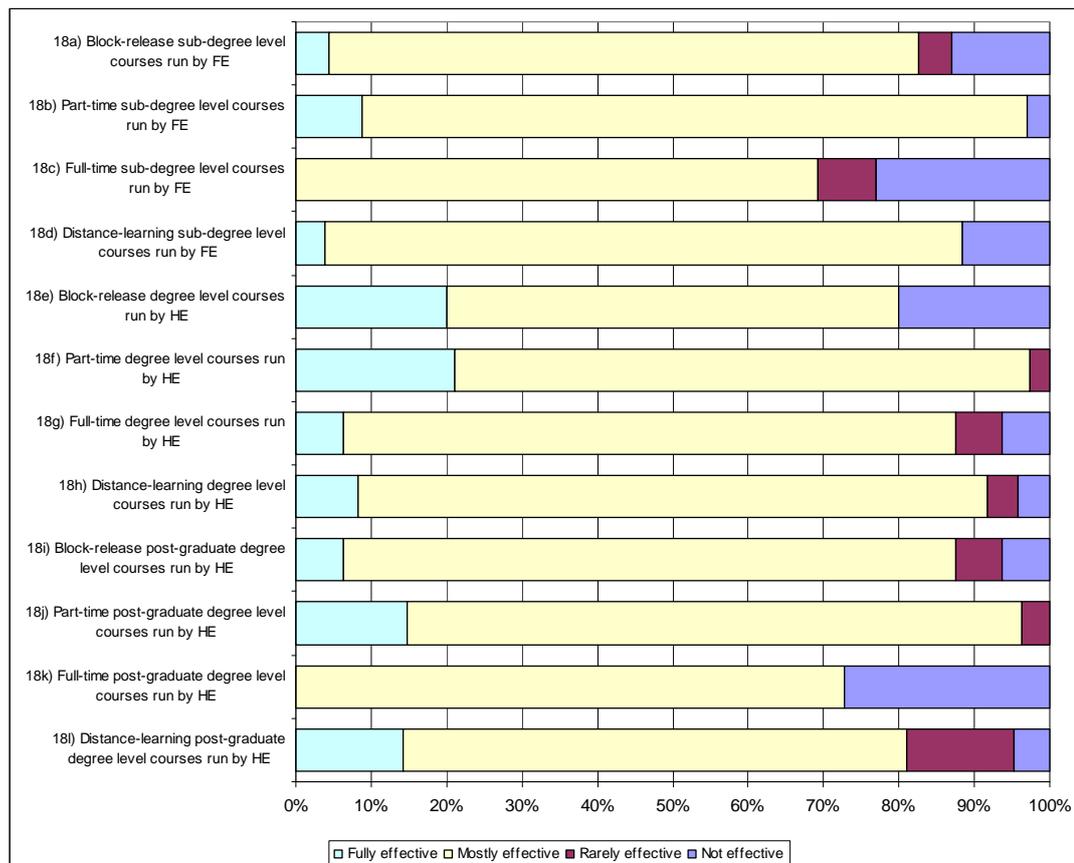


Figure 5.157: Responses to Question 18
 For data see Tables 5A.151~162, Appendices 5A.10.58~69

Full-time courses, with the exception of degree-level courses, were found to be poorly supported by companies. Full-time degree level courses were found to be supported by eleven companies (24.44%), a level of support which might be higher than expected due to inclusion of sponsored students already in full-time education, rather than the release of staff to undertake full-time education. The support for full-time post-graduate education is very low at just two companies (4.44%), which is likely to be accounted for by these courses having a target market of more senior members of staff who are, perhaps, less able or willing to take a sabbatical from their employment to undertake these courses, or employers not willing to sponsor staff for an absence of a year or more in some instances.

The level of support for all the various academic opportunities is not necessarily an indicator of the level of effectiveness of these courses in meeting the needs of the employer. This has been established by using the Relative Importance Index (RI),

the results of which are shown in Table 5.28 below. Here it can be seen that the results cover a relatively narrow band from 61.36 to 79.61.

Table 5.28: Relative Importance Index for Responses to Question 18

| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index RI |
|-------------|---|-------------------------------------|
| 1 | 18f) Part-time degree level courses run by HE institutions | 79.61 |
| 2 | 18j) Part-time post-graduate degree level courses run by HE institutions | 77.78 |
| 3 | 18b) Part-time sub-degree level courses run by FE institutions | 75.74 |
| 4 | 18h) Distance-learning degree level courses run by HE institutions | 73.96 |
| 5 | 18l) Distance-learning post-graduate degree level courses run by HE institutions | 72.62 |
| 6 | 18g) Full-time degree level courses run by HE institutions | 71.88 |
| 6 | 18i) Block-release post-graduate degree level courses run by HE institutions | 71.88 |
| 8 | 18d) Distance-learning sub-degree level courses run by FE institutions | 70.19 |
| 9 | 18e) Block-release degree level courses run by HE institutions | 70.00 |
| 10 | 18a) Block-release sub-degree level courses run by FE institutions | 68.48 |
| 11 | 18c) Full-time sub-degree level courses run by FE institutions | 61.54 |
| 12 | 18k) Full-time post-graduate degree level courses run by HE institutions | 61.36 |

The courses with the highest Relative Importance Indices were found to be the part-time degree courses [RI = 79.61], part-time post-graduate courses [RI = 77.68] and part-time sub-degree level courses [RI = 75.74]. The least effective forms of courses were found to be full-time post-graduate course [RI = 61.36], full-time sub-degree level courses [RI = 61.54] and block-release sub-degree level courses [RI = 61.36]. Tables 5.29, overleaf, shows the respective rankings for each level of course provision.

Table 5.29: Relative Importance Index for Grouped Responses to Question 18

| Sub-degree Level Courses | | |
|------------------------------------|---|-------------------------------------|
| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index RI |
| 1 | 18b) Part-time sub-degree level courses run by FE institutions | 75.74 |
| 2 | 18d) Distance-learning sub-degree level courses run by FE institutions | 70.19 |
| 3 | 18a) Block-release sub-degree level courses run by FE institutions | 68.48 |
| 4 | 18c) Full-time sub-degree level courses run by FE institutions | 61.54 |
| Degree Level Courses | | |
| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index RI |
| 1 | 18f) Part-time degree level courses run by HE institutions | 79.61 |
| 2 | 18h) Distance-learning degree level courses run by HE institutions | 73.96 |
| 3 | 18g) Full-time degree level courses run by HE institutions | 71.88 |
| 4 | 18e) Block-release degree level courses run by HE institutions | 70.00 |
| Post-graduate Level Courses | | |
| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index RI |
| 1 | 18j) Part-time post-graduate degree level courses run by HE institutions | 77.78 |
| 2 | 18l) Distance-learning post-graduate degree level courses run by HE institutions | 72.62 |
| 3 | 18i) Block-release post-graduate degree level courses run by HE institutions | 71.88 |
| 4 | 18k) Full-time post-graduate degree level courses run by HE institutions | 61.36 |

The scatter diagram (Figure 5.158 overleaf) shows the relationship observed between the extent of the usage of courses by companies and the extent to which the companies claim that the courses meet their needs. Here it can be seen clearly that the preferred method of academic education and training is through the use of part-time courses.

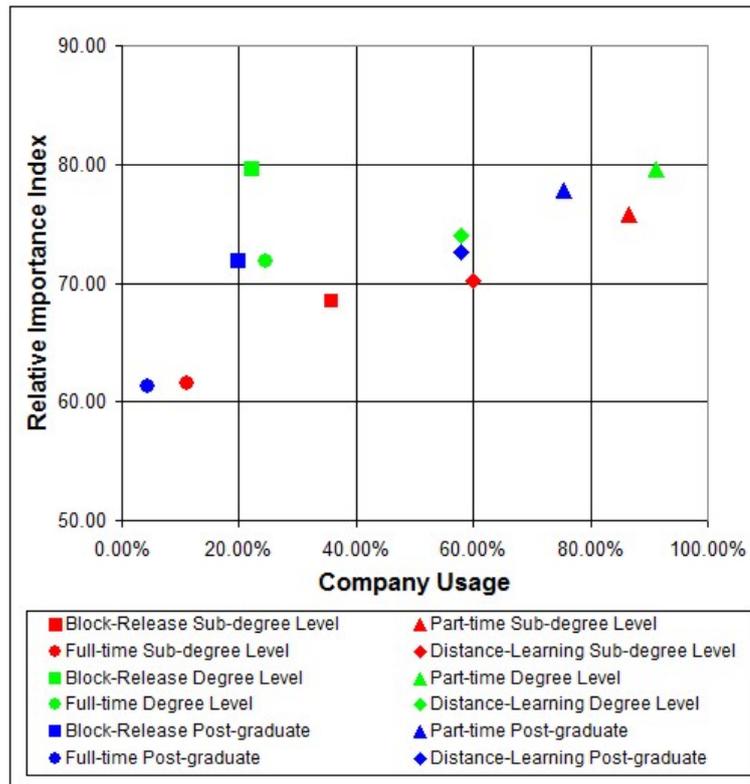


Figure 5.158: Scatter diagram for company usage and effectiveness of courses

5.6.15 Reasons for Education, Training and Development of Staff

Question 19: Please indicate your organisation's use of education/training and development in respect of the following [listed] situations (other than for trainees and induction of new employees):

Question 19 seeks to establish the reasons behind companies' use of education, training and development. Figure 5.159 overleaf shows the responses for each stated reason.

The Relative Importance Indices (see Table 5.30 overleaf) for each set of responses shows a fairly narrow grouping, however the highest relative importance revealed is the use of education, training and development by construction companies to overcome current skills/knowledge deficiencies amongst staff [RI = 76.11] and to maintain current effectiveness of skills and knowledge [RI = 72.16].

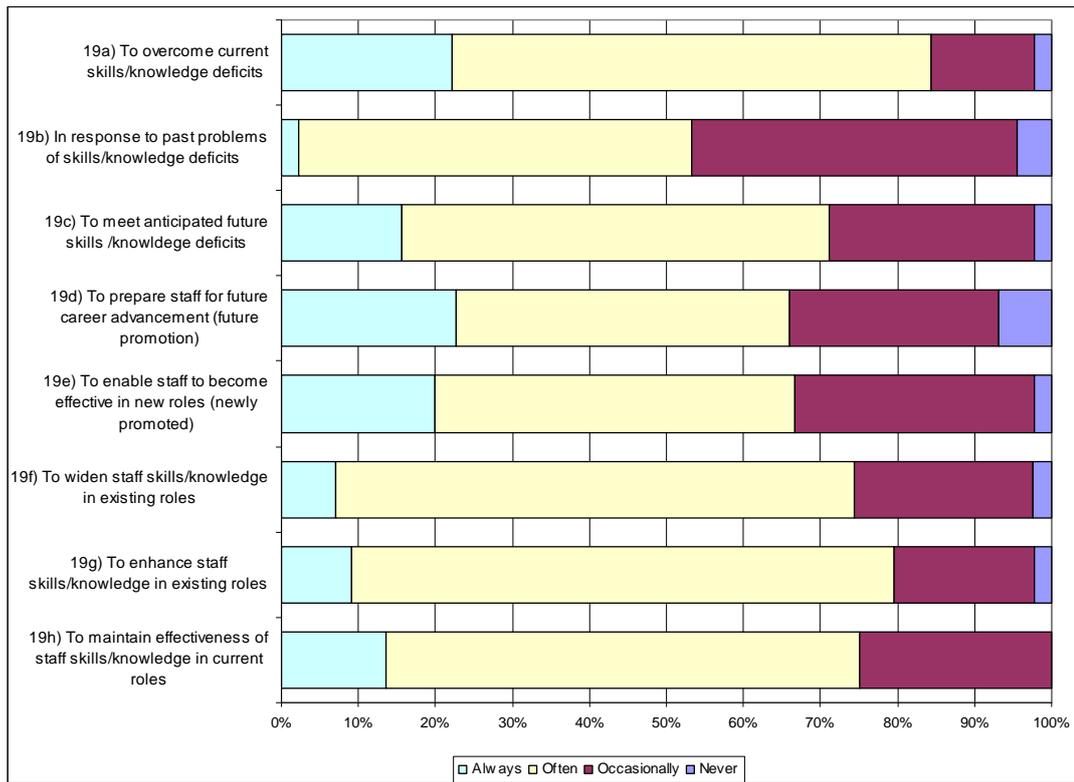


Figure 5.159: Responses to Question 19.
For data see Tables 5A.164~171, Appendices 5A.10.71~78

Table 5.30: Ranked Importance Indices for Responses to Question 19

| Rank | Please indicate your organisation’s use of education/training and development in respect of the following situations (other than for trainees and induction of new employees): | Relative Importance Index RI |
|------|--|------------------------------|
| 1 | 19a) To overcome current skills/knowledge deficit | 76.11 |
| 2 | 19h) To maintain effectiveness of staff skills/knowledge in current roles | 72.16 |
| 3 | 19g) To enhance staff skills/knowledge in existing roles | 71.59 |
| 4 | 19c) To meet anticipated future skills/knowledge deficits | 71.11 |
| 4 | 19e) To enable staff to become effective in new roles (newly promoted) | 71.11 |
| 6 | 19d) To prepare staff for future career advancement (future promotion) | 70.45 |
| 7 | 19f) To widen staff skills/knowledge in existing roles | 69.77 |
| 8 | 19b) In response to past problems of skills/knowledge deficits | 62.78 |

Those situations dealing with meeting future needs and demands of the company fared less well, suggesting that the companies’ focus tends to be on short-term/immediate needs, rather than on more strategic issues ‘meeting anticipated future skills/knowledge deficits’ and ‘enabling staff to become effective in new

roles' both having Relative Importance Indices of [RI = 71.11] and 'preparing staff for future roles' [RI = 70.45]. Dealing with 'past problems of skills/knowledge deficits' received a Relative Importance Index of only [RI = 62.78], well below that of other situations, reflecting a tendency of construction companies to disregard what has past and not learn lessons from it.

5.6.16 Preferences for Staff Development Activities

Question 20: To what extent does your organisation believe that staff training and development activities should be linked to [listed activities]?

This question seeks to ascertain companies' preferences for linking staff training and development activities to meeting various needs. Figure 5.160 below shows the responses to the various needs.

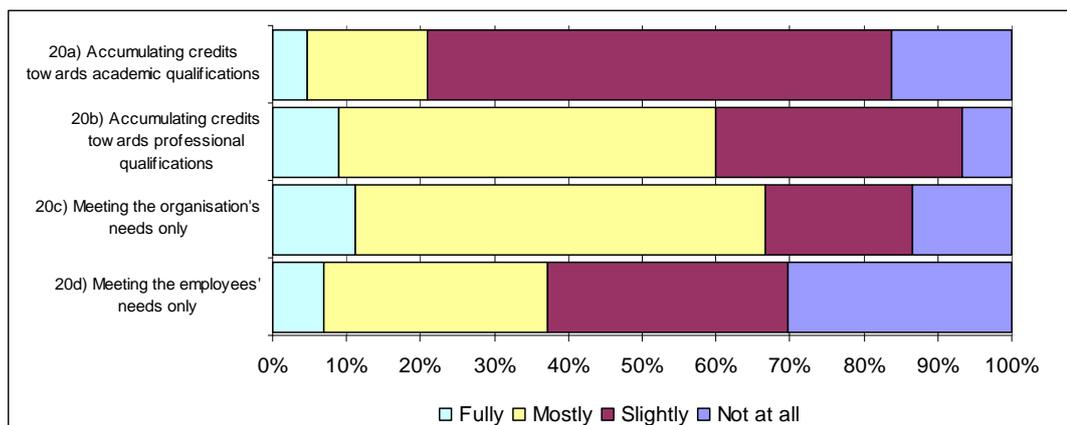


Figure 5.160: Responses to Question 20
For data see Tables 5A.10.173~176, Appendices 5A.80~83

Using the Relative Importance Indices (see Table 5.31 below) it was found that companies attached most importance to staff development activities that met the organisation's needs [RI = 66.11], closely followed by staff development activities that would lead to professional qualifications [RI = 65.56]. Those staff development activities which would meet the employees' needs only were rated less favourably [RI = 53.49], whilst those activities which would accumulate credits towards academic qualifications were rated least [RI = 53.49].

Table 5.31: Ranked Importance Indices for Responses to Question 20

| Rank | To what extent does your organisation believe that staff training and development activities should be linked to | Relative Importance Index RI |
|------|--|------------------------------|
| 1 | 20c) Meeting the organisation's needs only | 66.11 |
| 2 | 20b) Accumulating credits towards professional qualifications | 65.56 |
| 3 | 20d) Meeting the employee's needs only | 53.49 |
| 4 | 20a) Accumulating credits towards academic qualifications | 52.33 |

5.6.17 ICT Access and Usage

Question 21: Does your organisation have a formal policy about the use of computers and internet access?

The final section of questions consider various aspect relating to provision, access and usage of ICT by construction companies and their managers for staff education, training and development.

Question 21 is a simple yes/no question that seeks to establish whether or not the company has an ICT policy embracing computer access and usage. An overwhelming forty-four companies (97.78%) claimed to have such a policy. The following questions seek to establish more information about these policies and the access and that staff have to ICT facilities and the internet, and the usage they make of such facilities.

5.6.18 Using the Internet for Work

Question 22: To what extent are your staff permitted to use the internet during working hours?

Question 23: To what extent does your staff use the internet for work purposes?

The responses to Question 22 (Mean R = 2.69) reveals that 47.67% of companies restrict the use of the internet during working hours for their staff, whilst a further seventeen companies (37.78%) claim to impose few restrictions on internet access. No company claimed that staff were denied access to the internet, whilst the remaining seven companies (15.56%) claimed that staff had unrestricted internet access. The responses are shown in Figure 5.161 below.

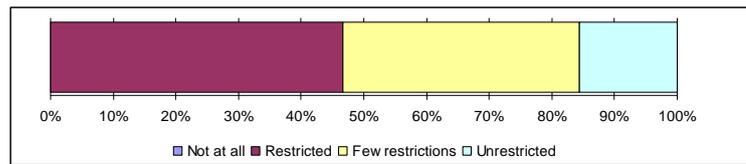


Figure 5.161: Responses to Question 22
For data see Table 5A.178, Appendix 5A.10.85

A recent pan-industry study by Scott-Jackson *et al* (2007) found that on average 73% of managers had full access to the internet at work compared to 52% in the construction industry, whilst 25% had restricted access compared to 48% in the construction industry.

Question 23 (also Mean R = 2.69) reveals that twenty-four companies (53.33%) claim that staff made frequent use of the internet for work purposes, with a further sixteen companies (35.36%) claiming that staff made moderate use of the internet for work purposes. Only one company (2.22%) claimed that their staff made little or no use of the internet, compared to four companies (8.89%) that claimed their staff made extensive use of the internet for work purposes. The responses are shown in Figure 5.162 below.

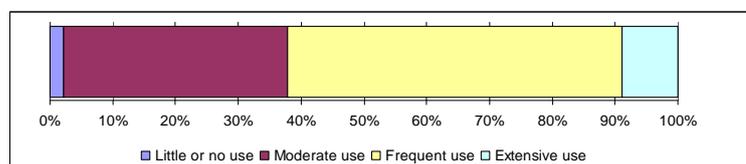


Figure 5.162: Responses to Question 23.
For data see Table 5A.179, Appendix 5A.10.23

The responses to this question are cross-tabulated with the previous question in the section below.

5.6.18.1 Cross-tabulation of Question 22 and Question 23

A cross-tabulation of responses to the above two questions (see Table 5A.180) was carried out to determine the relationship between the permitted access to the internet for work purposes and the actual use made of the internet for work purposes, as shown in Figure 5.163 below. The null-hypothesis H_0 to be tested here is that there is no association between the extent to which staff are permitted to use the internet and the extent to which it is actually used during working hours.

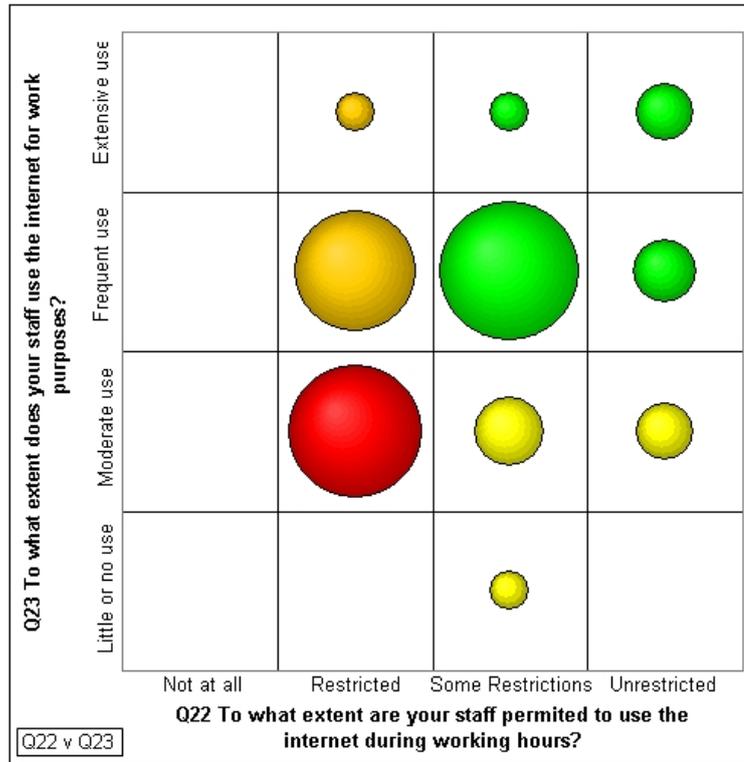


Figure 5.163: Permitted Access to the Internet v Staff Usage of the Internet for Work Purposes. For data see Table 5.180, Appendix 5A.10.87

Here it can be seen that frequent use of the internet with some access restrictions was claimed by twelve companies (26.67%), whilst moderate use of restricted use was claimed by another eleven companies (24.44%). No company claimed to prohibit the use of the internet.

Using a four-by-four contingency revealed that no usable Chi-square Test results could be obtained as the table contained six cells with zero values. A reduced contingency table of three-by-four cells was obtained as one column contained all zero value cells. Again, this was also found to be unusable as the table still contained two cells with zero values (see Table 5A.181). Using a consolidated two-by-two cell contingency table (see Table 5A.182) yielded usable test results as all the cells met the criteria for a successful Chi-square test, as shown in Figure 5.164 overleaf.

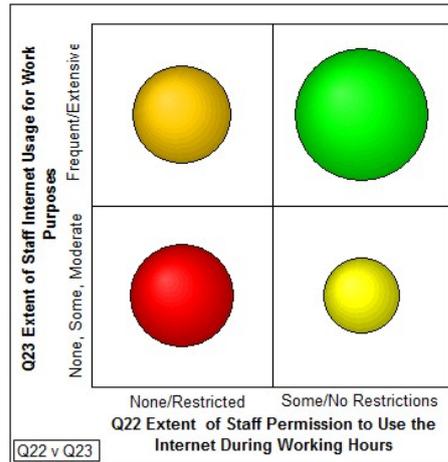


Figure 5.164: Consolidated: Permitted Access to the Internet v Staff Usage of the Internet for Work Purposes.

For data see Table 5.182, Appendix 5A.10.87

The Chi-square Tests results [$\chi^2 = 3.572$, $\rho = 0.059$], [$\Lambda = 3.610$, $\rho = 0.057$] (see Table 5A.181) and Fisher's Exact test [$\rho = 0.073$] show a statistical significance for the association that is just outside the accepted limit of $\rho < 0.05$. The Symmetric Measures (see Table 5A.182) confirm that the association between the variables is weak [ϕ and $V = 0.282$, $\rho = 0.059$] and [$Cc = 0.271$, $\rho = 0.059$]. Again it is confirmed that the weak association is just outside the accepted level of statistical significance of $\rho < 0.05$, therefore the null-hypothesis H_0 can be accepted, but there is a small risk of a Type II error occurring.

5.6.18.2 Implications of Using the Internet for Work

Here it can be surmised that most firms allow their staff to use the internet for work purposes (subject to usage policies that restrict the use of corporate ICT facilities for certain types of activities) as there is no discernable association between the degree of restriction placed on employees and the level of use made of the internet. Whilst some firms do allow unrestricted access to the internet, the majority do place restrictions on staff. The amount of use that is made of the internet will vary according to the nature of the employment. This has positive implications for management education, training and development as all managers should be able to have reasonable access to internet based learning resources, be that technical information, formal academic course material and other education and development material, including professional institutions and CPD activity logging. The

assumption here is that firms accept education, training and development as being a work or work-related activity, which, based on the responses to earlier questions would appear to be the case. The next section considers the use of the internet for non-work purposes.

5.6.19 Internet Access and Usage for Non-work Purposes.

Question 24: To what extent are your staff permitted to use the internet for non-work purposes?

Question 25: To what extent does your staff use the internet for non-work purposes?

The previous two questions considered the access and usage of the internet for work purposes. Here the questions consider the access and usage of the internet for non-work purposes. The null-hypothesis H_0 to be tested is that there is no association between the extent to which staff are permitted to use the internet for non-work purposes and the extent to which they use the internet for non-work purposes. Question 24 (Mean R = 2.13) establishes that thirty-two of companies (71.11%) restrict staff access to the internet for non-work purposes, whilst a further six companies (17.78%) claimed to impose few restrictions on access for non-work purposes. However, four companies (8.89%) reported that they did not permit non-work use of the internet whilst only one company (2.22%) claimed to allow unrestricted access for non-work purposes. Figure 5.165 below shows the responses for Question 2.

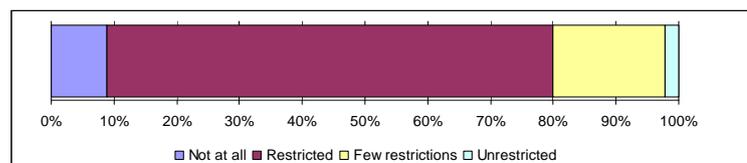


Figure 5.165: Responses for Question 24

For data see Table 5A.185, Appendix 5A.10.88

In establishing the extent to which staff used the internet Question 25 (see Figure 5.166 below, Mean R = 1.89) revealed that thirty companies (68.18%) claimed that staff made moderate use of the internet for non-work purposes, whilst nine companies (20.45%) claimed that staff made little or no use of the internet for non-work purposes. Only four companies (9.09%) claimed their staff made frequent use

of the internet for non-work purposes and just one company (2.27%) claimed their staff made extensive of the internet for non-work purposes.

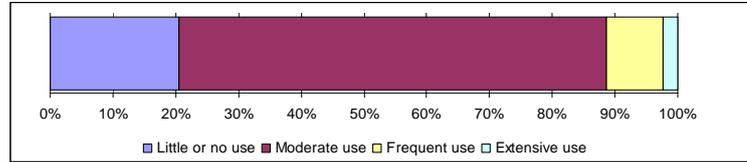


Figure 5.166: Responses for Question 25
For data see Table 5A.186, Appendix 5A.10.89

The cross-tabulation of the above questions is considered below.

5.6.19.1 Cross-tabulation of Question 24 and Question 25

The cross-tabulation here is to test the null-hypothesis H_0 that there is no association between the extents to which staff are permitted to use the internet for non-work purposes and the extents of the use made of the internet for non-work purposes. The data for this cross-tabulation can be found in Appendix 5A.10.90.

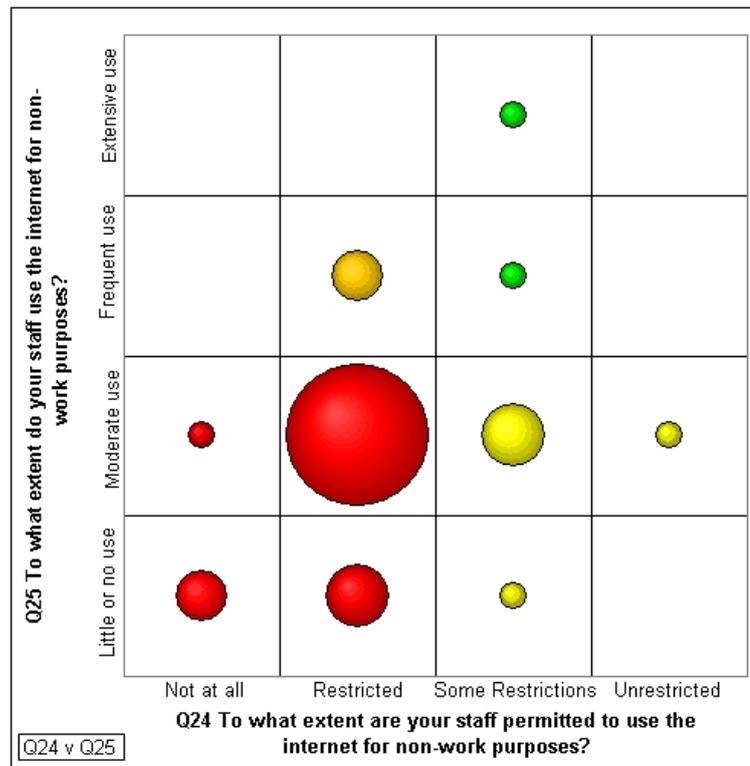


Figure 5.167: Permitted Access to the Internet v Staff Usage of the Internet for Non-work Purposes
For data see Table 5A.187, Appendix 5A.10.90

As expected, the four-by-four cell contingency table (see Table 5A.187) could not be used for an acceptable Chi-square Test as six cells contain zero values (see Table 5A.188) as shown in Figure 5.167 above. Using the consolidated two-by-two cell contingency table (see Figure 5.168 below) resulted in just two cells having cell values of less than the expected value of 5, but above the minimum expected value of 1.20, so the results from the Chi-square test must be treated with caution, see Table 5A.190.

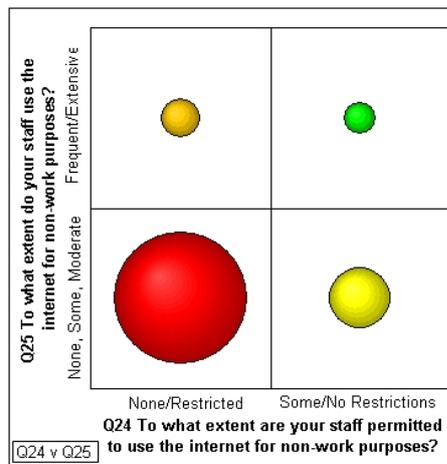


Figure 5.168: Consolidated: Permitted Access to the Internet for Non-work purposes v Staff Usage of the Internet for Non-work Purposes.
For data see Table 5.169, Appendix 5A.10.90

The Chi-square Tests results [$\chi^2 = 0.769$, $\rho = 0.380$], [$\Lambda = 0.690$, $\rho = 0.406$] and Fisher's Exact test [$\rho = 0.583$] (see Table 5A.190) indicate that there is not a statistically significant association between the variables, i.e. the association is weak. The Symmetrical Measures confirm the very weak association [ϕ and $V = 0.131$, $\rho = 0.380$] and [$Cc = 0.131$, $\rho = 0.380$] and lack of statistical significance, thus although the level of association tends to indicate that the null-hypothesis H_0 can be accepted there is also a very low risk of making a Type II error.

5.6.19.2 Implications of Internet Access and Usage for Non-work Purposes.

Here it can be surmised, perhaps not unexpectedly, that few firms permit the use of the internet for non-work purposes and correspondingly few staff make use of the internet for these purposes. There are implications for education, training and development here as a great deal of internet usage for education, training and

development could be difficult to classify as ‘work activity’, such as, for example, searching for academic books and other academic related publications and material from internet-based suppliers. The next section will consider the extent to which employers encourage staff to use the internet for development purposes.

5.6.20 Encouragement to Use the Internet for Staff Development

Question 26: To what extent do you or would you encourage your staff to use the internet for staff development purposes?

Question 23: To what extent does your staff use the internet for work purposes?

The previous questions and cross-tabulations considered the access and use of the internet for both work and non-work purposes. Here the companies’ encouragement of staff to use the internet for staff development purposes is considered. The null-hypothesis H_0 to be tested is that there is no association between the extent staff are encouraged to use the internet for staff development purposes and the extent staff use the internet for work purposes. Question 26 establishes that twenty-four companies (53.33%) claimed to place few restrictions on staff using the internet for staff-development purposes. Only seven companies (15.56%) claimed to allow staff unrestricted access. Restricted access only is permitted by twelve companies (26.67%), whilst just two companies (4.44%) claim that they do not allow staff to use the internet for staff development purposes. The responses to Question 26 (Mean R = 2.80) are shown in Figure 5.169 below.

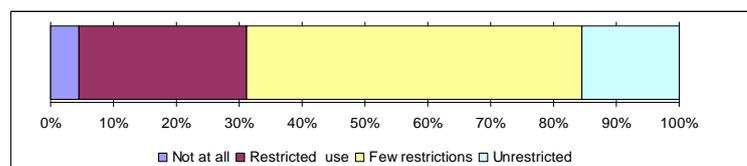


Figure 5.169: Responses for Question 26
For data see Table 5A.192, Appendix 5A.10.91

The cross-tabulation of these responses is given below.

5.6.20.1 Cross-tabulation for Question 26 and Question 23

The data for this cross-tabulation is given in Appendix 5A.10.92. As is to be expected, the four-by-four cell contingency table (see Table 5A.193) does not permit usable results to be obtained for the Chi-square Test (see Table 5A.194) as six cells contain zero values. See Figure 5.170 below.

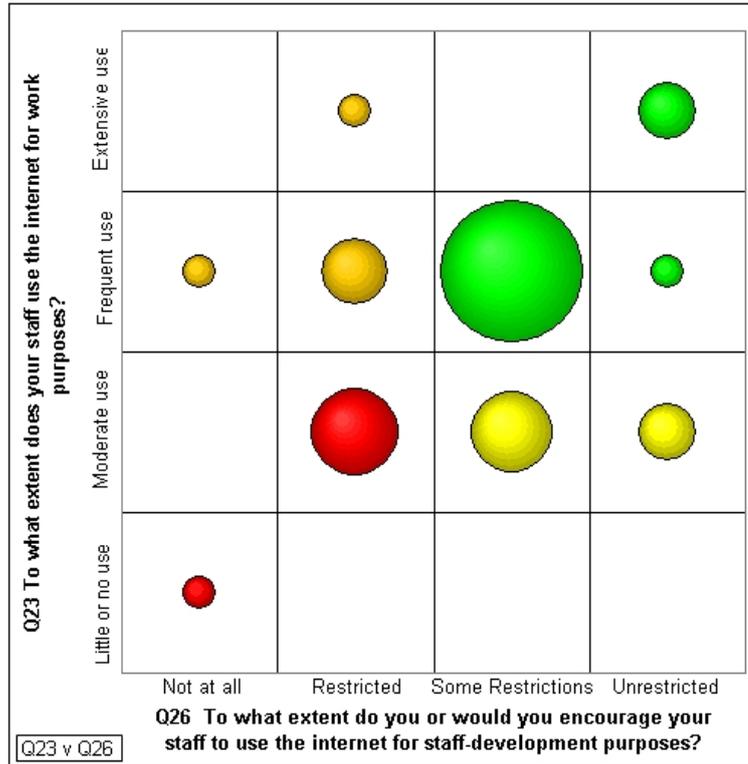


Figure 5.170: Encouragement to Use the Internet v Staff Usage of the Internet for Staff Development Purposes.
 For data see Table 5.193, Appendix 5A.10.92

Using a consolidated two-by-two cell contingency table (see Figure 5.171 below, and Table 5A.195) yields data that meets the criteria for a successful Chi-square Test. The Chi-square Tests results [$\chi^2 = 3.242, \rho = 0.072$], [$\Lambda = 3.194, \rho = 0.074$] and Fisher’s Exact test [$\rho = 0.101$] (see Table 5A.196) indicate that the association between the variables does not have a strong statistical significance as $\rho > 0.05$. This is confirmed by the Symmetrical Measures results [ϕ and $V = 0.268, \rho = 0.072$] and [$Cc = 0.259, \rho = 0.072$] (see Table 5A.197) which show a weak association the same statistical significance as the Chi-square Tests. Here the null-hypothesis H_0 can be accepted with only a low risk of a Type II error occurring.

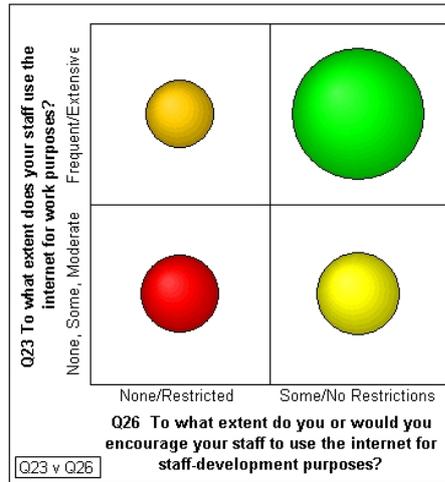


Figure 5.171: Encouragement to Use the Internet v Staff Usage of the Internet for Staff Development Purposes.

For data see Table 5A.195, Appendix 5A.10.92

5.6.20.2 Implications of Encouragement to Use the Internet for Staff

Development

In this final cross-tabulation, it can be surmised that staff are generally permitted and encouraged by the firms to use the internet, within their company's terms and conditions of ICT usage, for staff development purposes. However, there are a significant number of firms that do not appear to exhibit any commitment to staff development through the level of internet access permitted or through the level of encouragement given to make use of the internet.

What has yet to be addressed is the accessibility of ICT facilities to staff within the companies, as clearly companies with very limited access to ICT facilities are unlikely to have many staff making use it, or for there to be encouragement for its use.

5.6.21 Access to ICT Facilities

Question 27: Please indicate ... the level of access your staff have to computer facilities.

In the light of previous questions this question seeks to establish the level of access that staff have to ICT facilities such as desktop PCs, laptops, notebook PCs. It was intended that the answer to each of the three questions would be mutually exclusive. This turned out not to be so as a number of respondents indicated that their staff had

access to both ICT facilities for their exclusive use and to shared ICT facilities, but did not indicate the extent to which staff had both exclusive and shared access compared to those who had either exclusive access or shared access. The questions asked respondents to indicate the percentage of access in ten-percent bandings from 0% to 100%. Due to the limited number of responses this resulted in too fragmented data (see Appendix 5.10.93), so the responses have been consolidated into four bandings comprising 0% - 20%, 30% - 50%, 60% - 80% and 90% - 100% resulting in a far clearer image of the access staff have to ICT facilities.

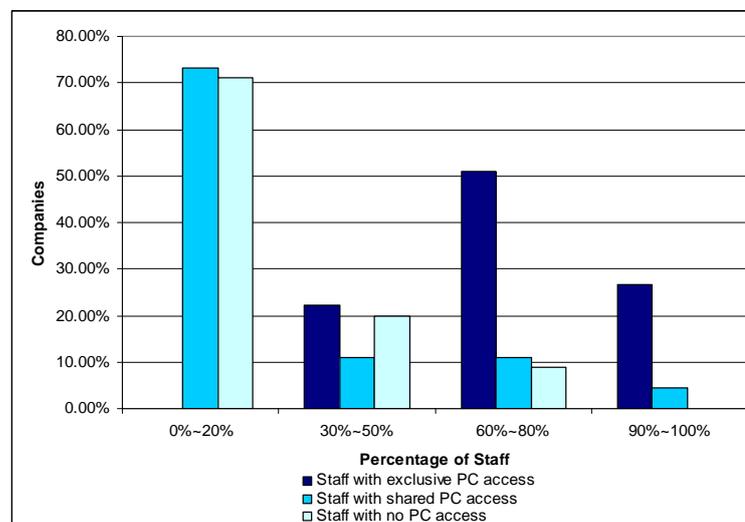


Figure 5.172: Responses to Question 27

For data see Tables 5A.199, 201 & 203, Appendices 5A.10.93~95

The responses to the three categories are shown in the bar-chart (Figure 5.172) above so that an easy comparison can be made. Here, twenty-three companies (51.11%) responded that 60% - 80% of their staff had exclusive use of a computer, with a further twelve companies (26.67%) claiming that 90% - 100% of their staff had exclusive access to a computer. However, ten companies (22.22%) claimed that only 30% - 50% of staff had exclusive use of a computer. No company claimed that less than 20% of their staff had exclusive access to a computer.

Conversely it was found that thirty-three companies (73.33%) claimed 20% or less of staff have to share a computer, with thirty-two companies (71.11%) also claiming that 20% or less of staff did not have access to a computer in the workplace. For those with shared access to a computer five companies (11.11%) claimed that 30% -

50% of staff had to share, whilst another five companies (11.11%) claimed that 60% - 80% of staff had to share access to computers. Only two companies (4.44%) claimed 90% - 100% of staff had shared access to a computer.

For companies where staff had access to computers, nine companies (20.00%) claimed that 30% - 50% of staff did not have access to a computer, with four companies (8.89%) claiming that 60% - 80% of staff did not have access to a computer. No company claimed that their staff had no access to a computer.

5.6.22 Site ICT Connectivity

Question 28: Please indicate below your organisation's level of computer connectivity for construction sites.

As many construction managers spend a great deal of time working away from their main offices on construction sites, the final question seeks to establish the extent to which construction sites have computer connectivity with their main office and the internet, or internet enabled access to staff development resources. The responses are shown in Figure 5.173 overleaf.

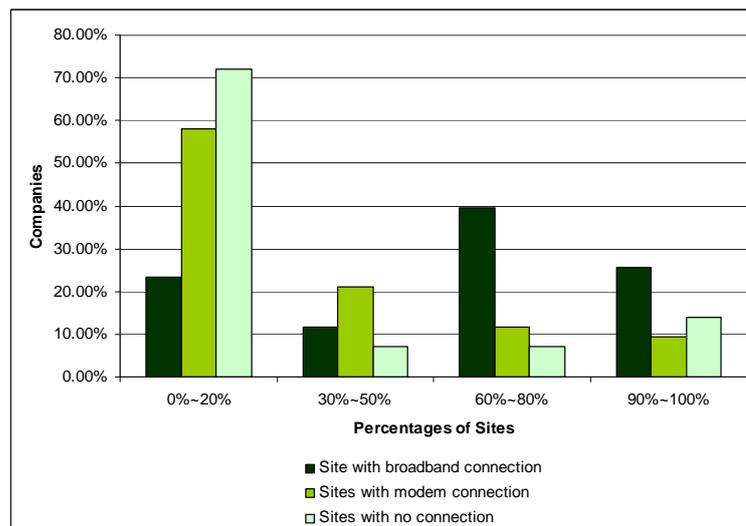


Figure 5.173: Responses to Question 28
For data see Tables 5a.205,207 & 209, Appendices 5A.10.96-98

For sites having broadband connectivity providing the greatest degree of access only eleven companies (25.58%) claimed that 90% or more of its sites were connected in this way, with a further seventeen companies (39.53%) claiming a connection rate of 60% - 80%, thus twenty-eight companies (65.11%) claimed to have more than 50% of their sites connected via broadband. Ten companies (23.26%) claimed that none of their sites had broadband connections; with the remaining five companies (11.63%) claiming 30% - 50% of construction sites are connected via broadband.

In the case of construction sites having modem connections twenty-five companies (58.14%) claimed not to have modem connections on sites, with a further nine companies (20.93%) claiming a modem connectivity rate of 30% - 50%. Thus thirty-four companies (69.07%) claimed that 50% or less of their construction sites are not connected by modem, leaving just nine companies (20.93%) claiming more than 50% of their construction sites have modem connections. Just four companies (9.30%) claimed that 90% - 100% of their construction sites have modem connections.

This leaves the consideration of sites that have no form of connection via broadband or modem. Here thirty-one companies (72.09%) claimed that 20% or less of their sites lacked any form of connection, with a further three companies (6.98%) claiming 30% - 50% of sites having no connections. Only six companies (13.95%) claimed that 90% or more of their sites did not have any form of connectivity, with a further three companies (6.98%) having 60% - 80% of sites with no connections.

5.6.23 Conclusions

The thread of this research has sought to answer the second research sub-question ‘What continuing education, training and development of construction managers is currently undertaken by construction companies?’ by using the second element of the critical realist research model ‘mechanism’ to identify and examine the agential factors and causal mechanisms within the construction industry that either promote or inhibit the education, training and development of construction managers.

Three specific areas were identified for further investigation which would provide a unique insight into the component of ‘mechanism’, these being:

- Company policies towards continuing education training and development of managers, and methods used by construction companies for continuing education, training and development of managers;
- Company policies and attitudes towards links with Higher Education institutions; and
- ICT provision and access availability that could be used to support continuing education, training and development of managers.

These areas were investigated by means of a postal questionnaire survey to the UK’s top 150 construction companies in order to obtain an insight into the current state of education, training and development of construction managers in the construction industry.

The postal questionnaire, after three rounds of issue to the top 149 construction companies in the UK, yielded forty-five positive replies. Whilst this response rate was slightly better than the anticipated response rate for postal questionnaires to industry, it was not sufficient to permit valid statistical analysis using Chi-square Tests for associations of data from the four-part Likert scales used in many questions. In order to make this possible it would have been necessary to survey the top 500 UK construction companies to provide a sufficient level of responses assuming the existing response rate was maintained. Unfortunately, a survey of this magnitude was beyond the author’s available resources.

In addition to the Chi-square Tests, Symmetrical Measures tests were performed as these are more reliable for small samples of data. SPSS (v.15) was used to carry out the statistical analysis for both the Chi-square Tests and the Symmetrical Measures. Other statistical analysis such as the Likert mean and the Relative Importance Index were performed using MS Excel[®].

The findings from the analyses of the questions are now consolidated in the following sections in order that an overview be obtained for each of the three areas of 'mechanism' selected for investigation.

5.6.23.1 Company policies towards continuing education training and development of managers, and methods used by construction companies for continuing education, training and development of managers.

The first of the three areas of 'mechanism' selected for investigation has revealed that amongst the top companies in the UK construction industry there is no consistent approach to staff development and staff appraisal policies, either in their existence or their implementation. It was noted that staff appraisal is slightly more embedded in these companies than staff development as it can be more easily linked to production and financial targets for managers. It has also been shown that where staff appraisal is more deeply embedded in a company then so too is there likely to be a staff training and development department.

By aligning the questions and responses with Mumford and Gold's (2004) models of 'types of development' and 'stages of development' it has been shown that management development of construction managers does not appear to be extensively embedded within construction companies' strategic plans, and is itself not as well developed as in many other industries. This may well be a reflection of the human resource function that has been found by Jones, Comfort and Hillier, (2004) to be not as well developed in construction companies as in other industries.

Notwithstanding this, it would appear that almost all companies do encourage their staff to undertake development activities; however, this has yet to become incorporated into contracts of employment in the majority of companies. The majority of companies were of the opinion that staff development was a joint responsibility between employee and employer, yet this opinion was not found to have any consistency with the implementation of staff development and staff appraisal policies.

When considering the provision of staff training and development for those not in the direct employment of construction companies (i.e. those staff in the employment of subcontractors and suppliers) it was found that over 60% of companies provided training and development for subcontractor's staff, possibly reflecting their responsibilities under the CDM regulations. Only 40% of companies did so for self-employed staff despite their statutory obligations. Some 27% of companies did not provide training and development opportunities other than for their own staff.

Consideration of the reasons for not providing training and development revealed that the most common reasons given were that companies did not want staff to leave for another employer who would pay them more, and that staff were too busy to take (or be allowed to take) time out for training and development activities. Companies overwhelmingly rejected the notion that education, training and development is too time consuming or too costly especially as they recognised the need for their staff to undergo development.

5.6.23.2 Company policies and attitudes towards links with Higher Education institutions.

The second of the three areas of 'mechanism' selected for investigation has revealed that there is little substantive interaction between construction companies and higher education institutions, beyond companies seeking potential employees. Here it has been found that the highest level of interaction with higher education (around 80% of companies) is through provision of student placements and workplace learning

opportunities, with around 70% of companies providing bursaries and sponsorships for students. All of these are interactions that give employers direct access to students, i.e. potential recruits. Where this potential is less, such as site visits and giving talks and lectures, then the level of interaction with higher education is considerably less at around 40% to 50% of companies. Interaction is reinforced by the support activities where again the highest level of support is with activities that give some companies direct access to students, such as sponsoring courses and prizes (around 30% of companies) and substantially lower (generally less than 10% of companies) involved in other support activities.

In terms of education, training and development of staff in-house training and development courses were given the highest rating by companies, followed by external provision, with CPD activities accredited by professional institutions being found to be the forth most effective method. However, when consideration is given to formal academic education, training and development it was found that part-time course provision was claimed to be the most effective in meeting companies' needs. The least effective methods were claimed to be full-time sub-degree level courses and full-time post-graduate courses, but these were rarely used by companies whereas part-time courses were used extensively. Thus if the standards of education, training and development in the construction industry are to be increased then much greater emphasis and focus on part-time formal courses is required by educational providers.

Where education, training and development is provided it is revealed that its primary purpose is to overcome current skills and/or knowledge deficiencies and for staff to remain effective, or become more effective, in their current roles. Education, training and development for future needs, i.e. strategic development, all fell in the lower order of the rankings thus demonstrating and further reinforcing the short-term/immediacy outlook of construction companies rather than a longer-term strategic approach to education, training and development.

Finally in this section, it was revealed that companies believe staff training and development should be linked to a company's needs and that the training and development should also contribute towards gaining professional qualifications for staff. Gaining academic qualifications was considered the least important requirement.

5.6.23.3 ICT provision and access availability that could be used to support continuing education, training and development of managers.

The third of the three areas of 'mechanism' to be investigated has revealed that construction companies have a wide range of policies regarding staff usage of the internet and also the level of ICT provision for managers. No manager was found to be denied access to the internet, although, not unexpectedly, most were subject to varying degrees of regulation. This would suggest that all managers should be able to access the internet and have access to a wide range of educational, training and development materials. However, for those managers based on construction sites the situation is less certain. As the top construction companies in the UK also tend to undertake the largest projects it might be expected that ICT facilities and internet access would be essential.

It was however found that over 70% of companies reported that up to 20% of their construction sites did not have any form of computer connection and 33% of companies reported that none of their sites had any computer connections. Where broadband connection is available on sites managers should be able to access education, training and development material; but where only modem connection is available access might be restricted. Thus, it can be surmised that the majority of construction managers have a reasonable level of access to the internet to enable education, training and development to be undertaken, whether accessing in-house material, formal academic material, or less-formal material for CPD purposes.

5.6.23.4 Implications of the Questionnaire Findings

In the above sections three selected areas of ‘mechanism’ have been investigated as separate strands of research undertaken through the use of a single postal questionnaire survey. Together these areas reveal a construction industry that appears less than enthusiastic about education, training and development of its managers, and engagement with higher education. The industry still appears drawn by a short-term focus of meeting its immediate operational needs, thus strategic initiatives such as staff development policies and appraisal policies are not fully embedded within the industry, and indeed entirely absent in some companies. This may well be as a result of the construction industry having both less well developed human resources functions and less well developed management development strategies and policies compared to other industries. It must be remembered that the respondents to the questionnaire were from the top 149 construction companies in the UK in terms of their annual financial turnover, where it might reasonably be expected to find the most developed human resource functions, management development strategies and policies together with the largest budgets available for education, training and development of their workforces.

There is also evidence that education, training and development is still seen as a cost, not as an investment, in many companies, fuelled by an irrational fear that if they provide education, training and development for their workers then they will be more attractive to competitors who will be prepared to pay their workers more than they are. Therefore, they believe, their employees will leave for those companies. This reinforces the fact (as was also revealed in Document 3) that many construction companies seemingly place little value in education, training and development, and in particular qualifications, for construction managers.

This short-term focus is further evidenced by the nature of companies’ relationships with higher education. Relationships are strongest where companies can gain access to students, i.e. potential recruits, and weakest where they are providing support for higher education such as through part-time lecturing, talks, etc. However, alternative forms of staff education, training and development can be provided through CPD

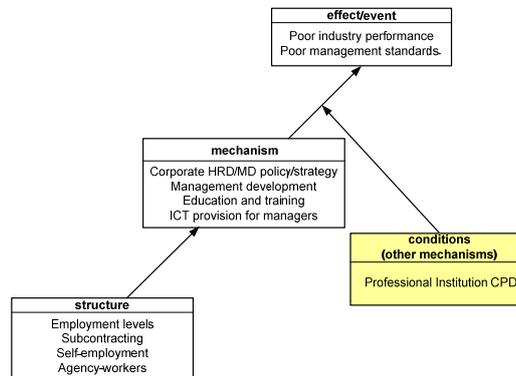
initiatives and less formal academic arrangements. Again, construction companies indicated little support for these forms of development when linked to formal academic qualifications, but were more enthusiastic when they were linked to gaining professional qualifications.

The long-hours and presenteeism culture that is endemic within the construction industry severely limits time available out of the workplace for education, training and development, particularly for those undertaking formal academic qualifications which require attendance at an academic institution. This suggests that alternative means of delivering education, training and development whereby the student could study at the workplace might be a more attractive option for both construction companies and those wanting to progress. However, companies indicated that they did not feel that distance-learning courses met their needs particularly well, paradoxically stating that traditional part-time courses were best able to meet their needs, and in particular part-time undergraduate courses. If alternative forms for delivery of education, training and development are to be developed using flexible internet delivery systems in the workplace then access to the internet is a critical factor. Both the level of provision of computers and access to the internet in construction companies for managers is critical. This, however, is inconsistent across companies, varying from to virtually non-existent to extensive.

Whilst computer and internet access is widely available to office-based staff many construction managers work away from the office, on construction sites, often for long periods of time where access to computers and the internet is often lacking. This then makes access to education, training and development via the internet very difficult, if not impossible for those without regular internet access via broadband connections. Never-the-less, there is a significant level of computer and internet access within companies to which managers do have access and most companies claimed that they would encourage the use of the internet for the purposes of staff education, training and development. Thus, an opportunity exists for the development of flexible part-time undergraduate and CPD programmes that can be delivered into the workplace via the internet.

The next chapter, Chapter 5.7, Conditions: Professional Institution CPD requirements, considers the third component of the critical realist research model, 'Conditions'. It will seek to establish the role the professional institutions are playing in raising and maintaining standards of education, training and development of construction industry professionals, through the implementation of CPD for their members. This will be considered in the light of both the structural components of the industry identified in the previous chapter, and the mechanisms that exist within the construction companies that have been identified in this chapter as the professional institutions both comprise of, and serve their members working within the construction industry.

5.7 Conditions: Professional Institution CPD Requirements



5.7.1 Introduction

This chapter comprises the findings of the third element, ‘conditions – other mechanisms’, of the critical realist research model, and seeks to address the third research sub-question ‘How do the professional institutions serving the construction industry influence the continuing education, training and development of construction managers?’. Thus, it seeks to identify the contribution of the professional institutions in education, training and development in terms of continuing professional development of their members, as construction managers can have many varied backgrounds and be members of any one or more of the professional institutions.

A desk-top study has been undertaken to attempt to identify the agential factors and causal mechanisms external to construction companies that impact upon the education, training and development of construction managers. It has been shown in earlier chapters that CPD is becoming an increasingly important component in education, training and development in the construction industry for construction managers and other professionals. To date there is no survey of the CPD requirements in the industry, partly because the highly fragmented nature of the industry and professions makes this difficult to accomplish. Due to the rapid and widespread adoption of the internet by the professional institutions information and material is more readily available and accessible. An understanding of CPD requirements provides an essential foundation for understanding management

education, training and development in the construction industry. This chapter presents the findings of the desktop survey of the CPD requirements for members of the seventeen principal professional institutions that serve the construction industry. The survey data collected from each institution is tabulated in Appendix 5A.11 *et seq.*

The aspects of the construction industry's professional institutions' CPD requirements are considered under the following headings:

- Number of members;
- CPD approach adopted;
- CPD requirement;
- Monitoring of members' CPD activities;
- Sanctions for non-compliance;
- Acceptable CPD activities; and
- Adoption of the EUSCCCIP/CIC CPD model.

The survey provides a snap-shot of the CPD requirements of the various professional institutions' requirements for the undertaking and monitoring of their members' CPD activities. It was conducted by inspection and examination of the professional institutions' websites and down-loadable documentation relating to their CPD requirements. Where information was missing, unclear, or not publicly available, i.e. in 'members only' areas, the institutions were contacted by telephone to obtain clarification or to obtain missing information. All institutions that were contacted in this way supplied the information without hesitation, with some offering copies of documentation and other information, that was not even being requested. Although all institutions readily provided information some institutions that did not have well-developed CPD policies were unable to supply documentation or information simply because it did not exist, but even they were more than willing to assist in answering questions, with one institution expressing delight that someone was actually taking an interest in what they were doing!

The growing recognition of the importance of CPD in education, training and development has led to the creation of the Institute of Continuing Professional Development (ICPD) in 2003, a subsidiary Continuing Professional Development Foundation, an educational charitable trust, established in 1981. At present, only two of the construction industry's professional institutions are members of the ICPD, those being the RICS and the CIOB whose members, having satisfied their institution's CPD requirements are directly eligible for Fellowship grade membership of the ICPD.

5.7.2 Membership

Table 5.32 overleaf shows the number of members of each of the institutions surveyed and the percentage of the overall membership. In many instances the membership figures quoted by the institutions are subject to a considerable amount of rounding, sometimes to the nearest hundred members, whilst others are rounded to the nearest thousand. Enquiries with institutions also revealed that many were unable to give precise figures for membership so the figures quoted must be treated with caution and considered as indicative rather than definitive. It must also be remembered that some construction professionals are members of more than one institution so there is therefore a small element of over-counting in the overall membership number. As the institutions do not maintain records of what other institutions their members are also members of, the over-measure cannot be easily determined, but as the over-measure is not believed to be significant, coupled with the approximate membership numbers quoted by the institutions, the likely margin of error is small and therefore will be ignored.

Table 5.32: Professional Institution Membership Level

| Institution | All Institutions | | Chartered Institutions | | Non-chartered Institutions | |
|-----------------|------------------|---------------|------------------------|---------------|----------------------------|------------|
| | Membership | Percentage | Membership | Percentage | Membership | Percentage |
| ABE | 6,000 | 1.58% | | | 6,000 | 10.96% |
| BIFM | 10,250 | 2.69% | | | 10,250 | 18.72% |
| CIAT | 7,500 | 1.97% | 7,500 | 2.30% | | |
| CIBSE | 17,000 | 4.47% | 17,000 | 5.22% | | |
| CIOB | 41,600 | 10.93% | 41,600 | 12.77% | | |
| ICE | 80,000 | 21.02% | 80,000 | 24.55% | | |
| ICES | 3,500 | 0.92% | | | 3,500 | 6.39% |
| ICWGB | 2,200 | 0.58% | | | 2,200 | 4.02% |
| IPHE | 12,000 | 3.15% | | | 12,000 | 21.92% |
| IHIE | 3,000 | 0.79% | | | 3,000 | 5.48% |
| IHT | 11,000 | 2.89% | | | 11,000 | 20.09% |
| IMBM | 1,800 | 0.47% | | | 1,800 | 3.29% |
| IStructE | 20,000 | 5.26% | 20,000 | 6.14% | | |
| L-I | 5,000 | 1.31% | | | 5,000 | 9.13% |
| RIBA | 30,000 | 7.88% | 30,000 | 9.21% | | |
| RICS | 110,000 | 28.91% | 110,000 | 33.76% | | |
| RTPI | 19,700 | 5.18% | 19,700 | 6.05% | | |
| Institutions | 17 | | 8 | | 9 | |
| Total | 380,550 | 100% | 325,800 | 85.61% | 54,750 | 14.39% |

One of the notable characteristics of these institutions is the large variation in their sizes, varying from a mere 1,800 members to some 110,000 members, the largest institution (the RICS) being some sixty-one times the size of the smallest (the IMBM). This range is illustrated in Figure 5.174 overleaf.

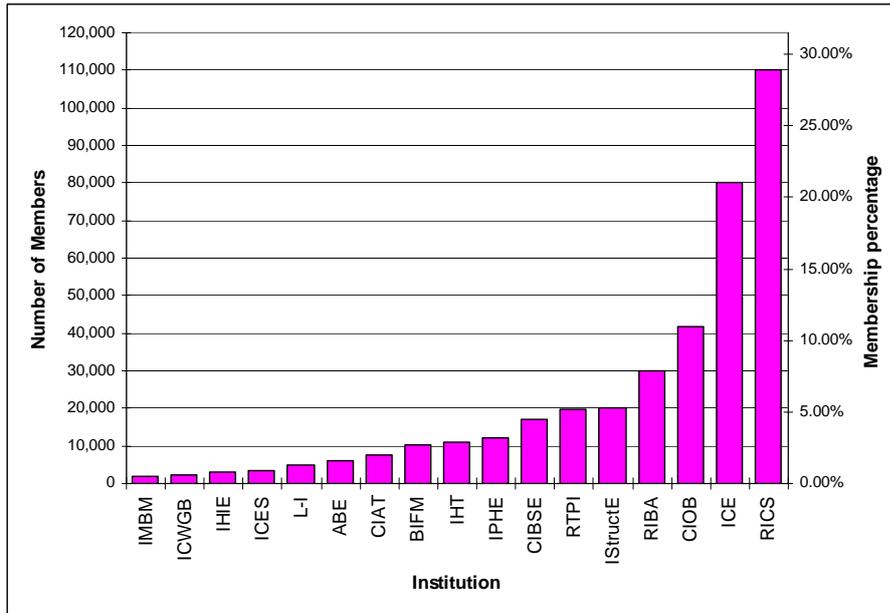


Figure 5.174: Professional Institution Membership Levels

In considering the membership of the professional institutions it is important to consider the relative positions of those institutions which have a Royal Charter and those that do not, and whether or not this results in any difference in their willingness, or otherwise, to adopt and implement CPD policies and requirements.

It is a condition precedent in the granting a of Royal Charter to a professional institution that the institution has in place rules and regulations to ensure that their members' knowledge and skills are kept up to date and maintained to a professional standard. This condition is normally incumbent on members of the professional institutions through their bye-laws, regulations and rules that have to be approved by the Privy Council before a Royal Charter can be granted. These bye-laws, regulations and rules also empower the institution to set professional standards and codes of professional conduct with which members must comply. Failure to comply can lead to suspension or expulsion from the institution. For example, the Institution of Civil Engineer's Rules of Professional Conduct state:

5. All members shall develop their professional knowledge, skills and competence on a continuing basis and shall give reasonable assistance to further the education, training and continuing professional development of others.

ICE (2006: 39)

Whilst the CIOB's Royal Charter states ...

3. ... the Institute shall have the following powers:-

(a) to establish and maintain appropriate standards of competence and conduct of those who engage, or are about to engage in the science and practice of building and construction;

CIOB (2005a:6)

This is then embodied in the 'Rules and Regulations of Professional Competence and Conduct' which state:

13. Members shall keep themselves informed of current thinking and developments appropriate to the type and level of their responsibility. They should be able to provide evidence that they have undertaken sufficient study and personal development to fulfil their professional obligations in accordance with current guidelines for Continuing Professional Development (CPD).

CIOB (2005b:3)

Figure 5.175 overleaf identifies the professional institutions having Royal Charters and those that do not. Here it can be seen that the seven largest institutions have all been granted Royal Charters, whilst the CIAT, the most recent institution to be granted a Royal Charter in July 2005, is still relatively small. Table 5.33 below shows the years in which the seven professional institutions considered in this thesis gained their Royal Charters, whilst Figure 5.175 overleaf shows the respective sizes of the chartered and non-chartered institutions.

Table 5.33: Granting of Royal Charters

| Professional Institution | Year Royal Charter Granted |
|--------------------------|----------------------------|
| ICE | 1828 |
| RIBA | 1834 |
| RICS | 1881 |
| IStructE | 1934 |
| RTPI | 1959 |
| CIBSE | 1976 |
| CIOB | 1980 |
| CIAT | 2005 |

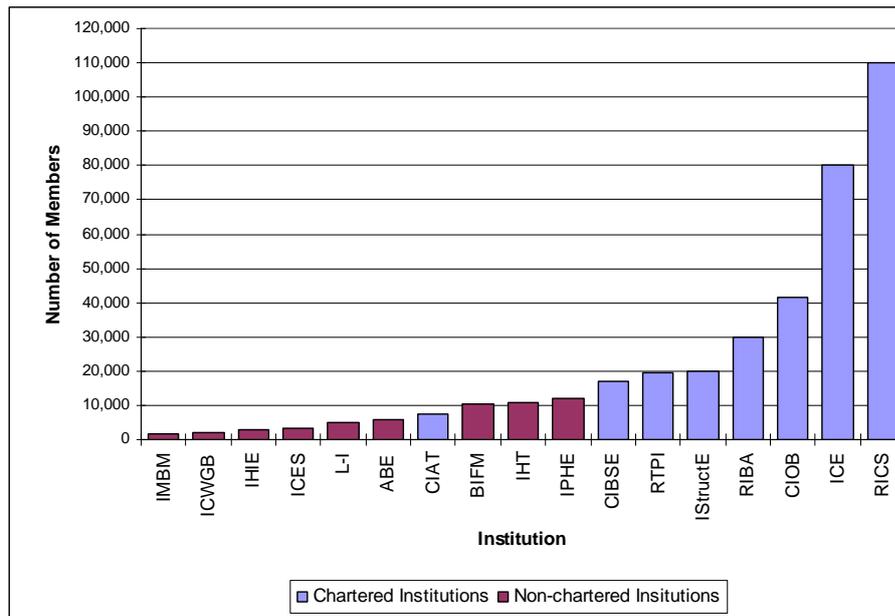


Figure 5.175: Chartered and Non-chartered Institution Membership

In the following sections chartered institutions will be shown with heavy borders in bar charts and bold font in tables.

5.7.3 CPD approach adopted

Whilst the term CPD is normally taken to mean ‘Continuing Professional Development’, it can also be taken to mean ‘Continuing Personal Development’, and occasionally ‘Continuing Personal and Professional Development’ although this also often abbreviated to CPPD. These three interpretations can be considered to form a continuum from purely professional development to purely personal development, as shown in Figure 5.42 on page 5.91, depending upon the mix of activities that are accepted or permitted by the professional institutions as ‘CPD’.

Each of the professional institutions’ websites content was examined to establish which interpretation was being applied, be it explicit or implicit. Table 5.34 overleaf shows the interpretations evident within the professional institutions’ websites.

Table 5.34: Approaches to CPD

| Approach | Continuing Professional Development | Continuing Professional /Personal Development | Continuing Personal Development |
|-----------------------------------|-------------------------------------|---|---------------------------------|
| Institution | | | |
| ABE | 6,000 | | |
| BIFM | | 10,250 | |
| CIAT | 7,500 | | |
| CIBSE | 17,000 | | |
| CIOB | 41,600 | | |
| ICE | 80,000 | | |
| ICES | 3,500 | | |
| ICWGB | 2,200 | | |
| IHIE | 3,000 | | |
| IHT | 11,000 | | |
| IMBM | 1,800 | | |
| IPHE | | 12,000 | |
| IStructE | | 20,000 | |
| L-I | 5,000 | | |
| RIBA | 30,000 | | |
| RICS | 110,000 | | |
| RTPI | 19,700 | | |
| Total | 338,300 | 42,250 | 0 |
| | 88.90% | 11.10% | 0.00% |
| Institutions | 14 | 3 | 0 |
| Chartered Institutions | | | |
| Total | 305,800 | 20,000 | 0 |
| | 80.36% | 5.26% | 0.00% |
| Institutions | 7 | 1 | 0 |
| Non-Chartered Institutions | | | |
| Total | 32,500 | 22,250 | 0 |
| | 8.54% | 5.85% | 0.00% |
| Institutions | 7 | 2 | 0 |

Fourteen institutions have adopted the approach that CPD shall be confined to continuing professional development, accepting only those activities that relates directly to a member's professional position, as also shown in Figure 5.176 overleaf. These fourteen institutions comprise a total of 338,000 members, 88.90% of the total institution membership. Only three institutions (BIFM, IPHE, and IStructE) had adopted a more flexible approach to CPD in their acceptance of a limited amount of personal development activity that is not directly related to their members'

professional situation. These typically include the acceptance of activities such as learning a foreign language or being involved in ‘community activities’. These three institutions account for some 42,250 members, 11.10% of the total membership.

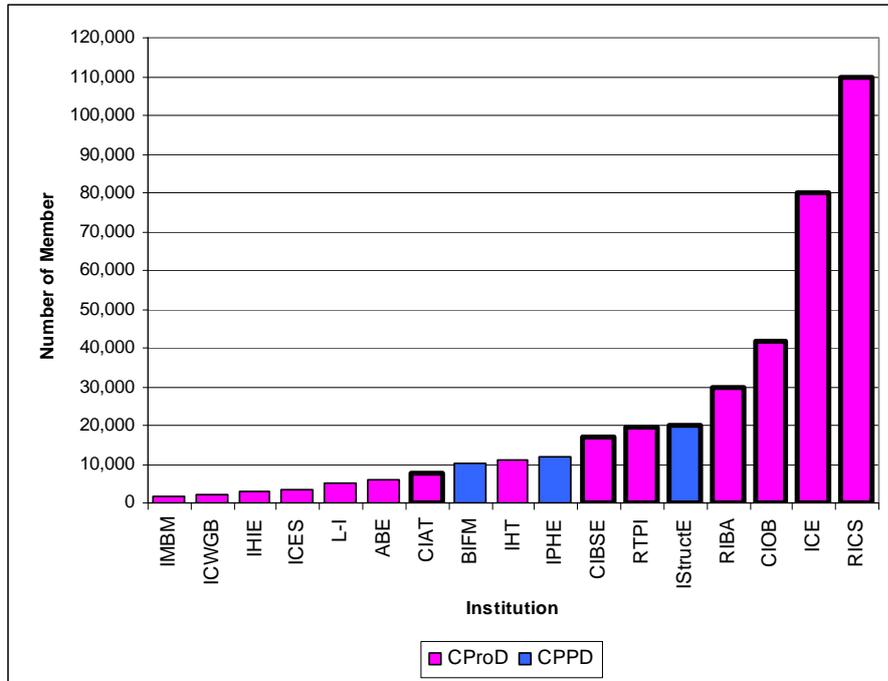


Figure 5.176: Profession Institution Approach to CPD

Most of the professional institutions that had adopted the ‘professional’ interpretation accepted a wide range of activities for CPD but with the proviso that such activities would only be admissible as CPD if they maintained or enhanced a member’s professional position or status. Here again it can be observed that of the eight chartered professional institutions, the IStructE (2006), is the only one to accept some aspects of personal development that it terms ‘Horizon Broadening Activities’ as admissible for CPD, amongst which it lists ‘Community and public service involvement, (e.g. careers talks to schools, involvement in community clubs)’.

5.7.4 CPD Time-based Requirements

The CPD time-based requirements of the professional institutions are shown in Table 5.35 overleaf. Five professional institutions were found to have a minimum annual hours CPD requirement. Two institutions, the RIBA (2006) and the CIAT (2006), required their members to undertake at least thirty-five hours CPD per year, whilst the other three (IMBM, IPHE and L-I) had a requirement for a minimum of twenty hours per year. Together these five professional institutions comprise 56,300 members, 14.79% of the total membership.

A further five professional institutions were found to require an aggregated minimum over either two or three years, thus allowing their members a greater degree of flexibility in when they can undertake CPD, which can, to some extent, influence the type of activity they undertake. Two institutions, the IPHE (2007) and the RTPi (2001), allow their members to aggregate their CPD over two years, with a minimum requirement of forty hours and fifty hours respectively. The other three institutions allowed their members to aggregate their CPD over three years, varying from thirty-five hours (ABE, 2007) to seventy-five hours (IHT, 2007), with only the RICS (2006) with a sixty-hour requirement also specifying an annual minimum of ten hours. These five professional institutions account for 149,700 members, 39.34% of the total membership.

A total of seven professional institutions were found not to have any time-based requirement for their members' CPD activity. These professional institutions accounted for 174,550 members, 45.87% of the total membership.

Table 5.35: Institutional CPD Hours Requirement

| | Minimum Annual Hour Requirement | | Aggregated Hour Requirement | | No Hours Specified |
|-----------------------------------|---------------------------------|-----------|-----------------------------|---|--------------------|
| | Members | Hours | Members | Requirement | Members |
| ABE | | | 6,000 | 35 hrs/ 3 yrs | |
| BIFM | | | | | 10,250 |
| CIAT | 7,500 | 35 | | | |
| CIBSE | | | | | 17,000 |
| CIOB | | | | | 41,600 |
| ICE | | | | | 80,000 |
| ICES | | | | | 3,500 |
| ICWGB | | | | | 2,200 |
| IHIE | | | 3,000 | 40 hrs/ 2 yrs | |
| IHT | | | 11,000 | 75 hrs/ 3 yrs | |
| IMBM | 1,800 | 20 | | | |
| IPHE | 12,000 | 20 | | | |
| IStructE | | | | | 20,000 |
| L-I | 5,000 | 20 | | | |
| RIBA | 30,000 | 35 | | | |
| RICS | | | 110,000 | 60 hrs/ 3 yrs, min 10 hrs/yr | |
| RTPI | | | 19,700 | 50 hrs/ 2 yrs | |
| | 56,300 | | 149,700 | | 174,550 |
| Percentage | 14.79% | | 39.34% | | 45.87% |
| Institutions | 5 | | 5 | | 7 |
| Chartered Institutions | | | | | |
| Members | 37,500 | | 129,700 | | 158,600 |
| Percentage | 9.86% | | 34.08% | | 41.68% |
| Institutions | 2 | | 2 | | 4 |
| Non-Chartered Institutions | | | | | |
| Members | 18,800 | | 20,000 | | 15,950 |
| Percentage | 4.94% | | 5.26% | | 4.19% |
| Institutions | 3 | | 3 | | 3 |

It can be seen in Figure 5.177 overleaf that there is no relationship between the number of members that a professional institution has and the time-based requirement for their members' CPD activities. It can also be seen that four of the eight chartered professional institutions (CIBSE, CIOB, ICE and IStructE) have policies which follow the EUSCCCIP recommendation of not specifying a minimum hour-based requirement, whilst two (RICS and RTPI) have aggregated hours policies. The other two chartered professional institutions (RIBA and CIAT) have a

prescribed minimum hours polices. Here it should be noted that CIAT have based their policies on those of the RIBA.

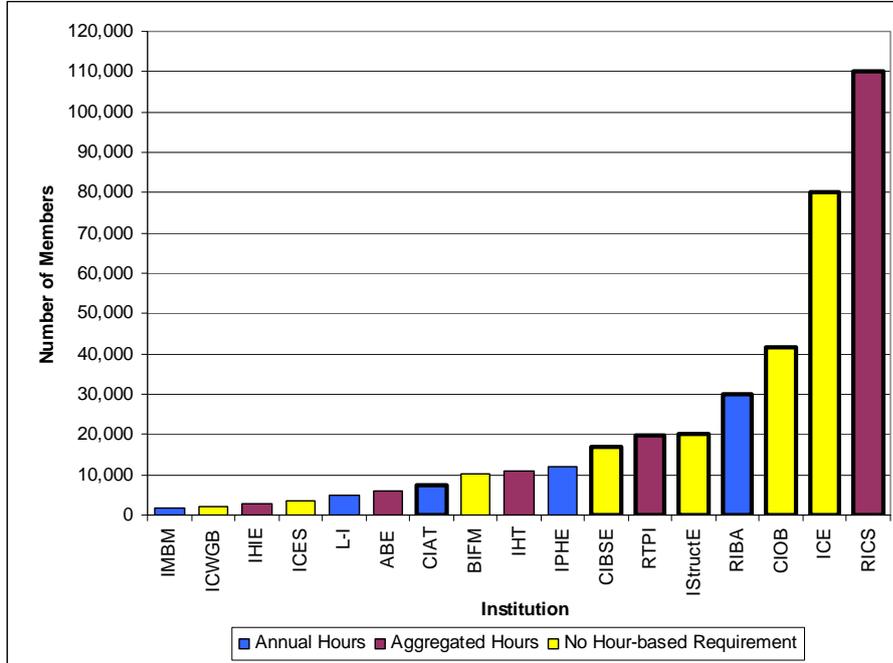


Figure 5.177: Professional Institution CPD Hours Requirements

5.7.5 Monitoring of CPD Activities

A key component in any professional institution’s CPD policy is its ability and willingness to monitors its members’ compliance with the policy. Here it was found that monitoring took three distinct forms:

- Annual monitoring of a fixed percentage of members;
- Half-yearly monitoring of fixed number of members; and
- No monitoring at all of members.

Table 5.36 overleaf shows the professional institutions’ sampling policy of their members’ CPD carried out. The numbers shown in Table 5.36 are based on the stated policies/claims of the institutions, and the assumption that the policies are actually fully implemented.

Table 5.36: Sampling of Members' CPD Records

| | Percentage Sampled per Annum | | | | | Fixed Annual Quota | No Sampling | |
|-----------------------------------|------------------------------|--------|--------|---------|-------|--------------------|-------------|----|
| | 2% | 5% | 8% | 10% | 50% | 100 half-yearly | | |
| ABE | | 6,000 | | | | | | |
| BIFM | | | | | | | 10,250 | |
| CIAT | | 7,500 | | | | | | |
| CIBSE | | | | | | 17,000 | | |
| CIOB | | | 41,600 | | | | | |
| ICE | | | | | | | 80,000 | |
| ICES | | | | | | 3,500 | | |
| ICWGB | | | | | | | 2,200 | |
| IPHE | | | | | | | 12,000 | |
| IHIE | | 3,000 | | | | | | |
| IHT | | | | 11,000 | | | | |
| IMBM | | | | | 1,800 | | | |
| IStructE | | | | | | | 20,000 | |
| L-I | | | | | | | 5,000 | |
| RIBA | | 30,000 | | | | | | |
| RICS | | | | 110,000 | | | | |
| RTPI | 19,700 | | | | | | | |
| 251,100 | 19,700 | 46,500 | 41,600 | 121,000 | 1,800 | 20,500 | 129,450 | |
| Institutions | 1 | 4 | 1 | 2 | 1 | 2 | 6 | |
| Annually Sampled | | | | | | 9 | 11 | 17 |
| 19,447 | 394 | 2,325 | 3,328 | 12,100 | 900 | 400 | - | |
| 5.11% | | | | | | | | |
| Chartered Institutions | | | | | | | | |
| 225,800 | 19,700 | 37,500 | 41,600 | 110,000 | - | 17,000 | 100,000 | |
| Institutions | 1 | 2 | 1 | 1 | 0 | 1 | 2 | |
| Annually Sampled | | | | | | 5 | 6 | 8 |
| 16,797 | 394 | 1,875 | 3,328 | 11,000 | - | 200 | - | |
| 4.41% | | | | | | | | |
| Non-Chartered Institutions | | | | | | | | |
| 25,300 | 0 | 9,000 | 0 | 11,000 | 1,800 | 3,500 | 29,450 | |
| Institutions | 0 | 2 | 0 | 1 | 1 | 1 | 4 | |
| Annually Sampled | | | | | | 4 | 5 | 9 |
| 2,650 | 0 | 450 | 0 | 1,100 | 900 | 200 | - | |
| 0.70% | | | | | | | | |

Of the professional institution membership of 338,000, eleven institutions comprising 251,000 members (74.26% of total membership) sampled their members' CPD activities records for compliance with their institutional requirements. The

remaining six professional institutions with 129,000 members (25.74% of total membership) did not sample their members' CPD activities records. Of the eleven professional institutions that sampled their members' CPD records, nine did so on the basis of a set percentage each year, normally varying between two percent and ten percent of the membership as shown in Table 5.28 above and in Figure 5.146 below. However, the IMBM, the smallest of the professional institutions, claimed to sample fifty percent of its membership each year (900 members) with this being done at local branch level rather than centrally as undertaken by all the other professional institutions, whilst the RTPI sampled just two percent of its membership (394 members) annually. The majority of those using annual percentage sampling ranged from five percent to ten percent annually. Two institutions claimed policies of sampling a set number of members (one hundred) on a twice yearly basis, totalling just four hundred members per year out of their total combined membership of 20,500 members (1.95% of their membership).

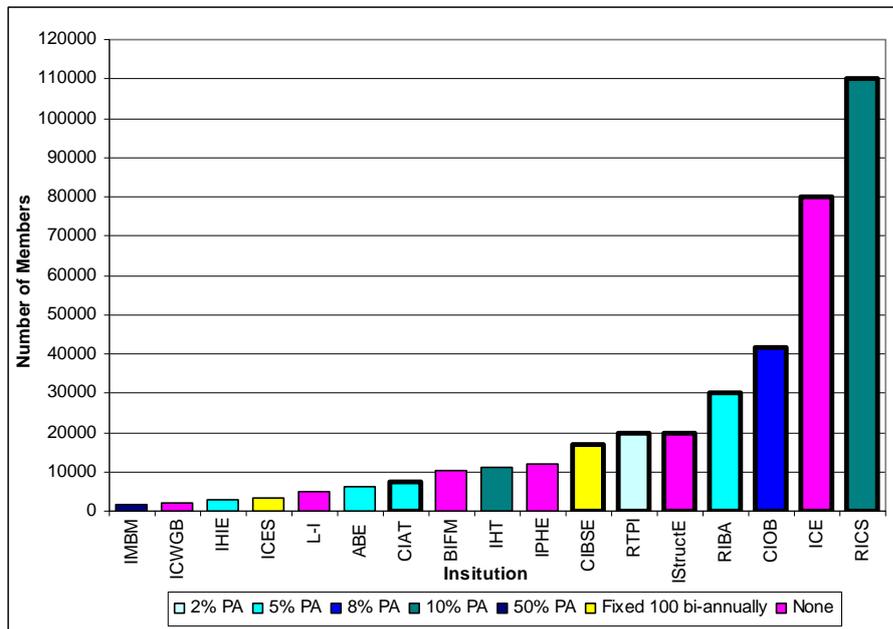


Figure 5.178: Institutions' Monitoring of CPD

All combined, a total of 19,447 members of professional institutions (7.75% of the sampled membership) are actually subjected to sampling of their CPD records each year, an overall amount of just 5.11% of the total professional institution membership. Figure 5.178 above shows the distribution of the monitoring policies

by the professional institutions where it can be seen that the sampling policy employed is not dependent upon the size of the institution.

In terms of the consideration of chartered and non-chartered status of the professional institutions only two of the chartered professional institutions, the ICE and the IStructE, accounting for 100,000 members did not sample their members' CPD records, compared to four non-chartered institutions (BIFM, ICWGB, IPHE and L-I) with 29,450 members. Only one chartered institution, CIBSE with 17,000 members, sampled a fixed quota of 100 members on a half-yearly basis, compared with one non-chartered institution, the ICES with 3,500 members that had adopted the same policy. The remaining five chartered professional institutions (CIAT, CIOB, RIBA, RICS, and RTPI with 225,800 members) used varying percentages of sampling compared to four non-chartered professional institutions (ABE, IHIE, IHT and IMBM with 21,800 members) with similar sampling policies.

5.7.6 Sanctions for Non-compliance with CPD Requirements

Whilst all the professional institutions strongly promote the benefits of CPD to their members, the undertaking of CPD is almost invariably a requirement for becoming a member and/or upgrading the membership grade. Failing to comply with CPD requirements will prevent membership and/or progression of membership. This, however, does not include the vast majority of members who have already gained their corporate membership and are unlikely to progress their membership to a higher grade, such as Fellow. Figure 5.179 below shows the distribution of professional institutions by size and their imposition or otherwise of sanctions for non-compliance with their CPD requirements. Here it can be seen that the size of the institution seems to have no bearing on the imposition of sanctions or not for non-compliance with CPD requirements.

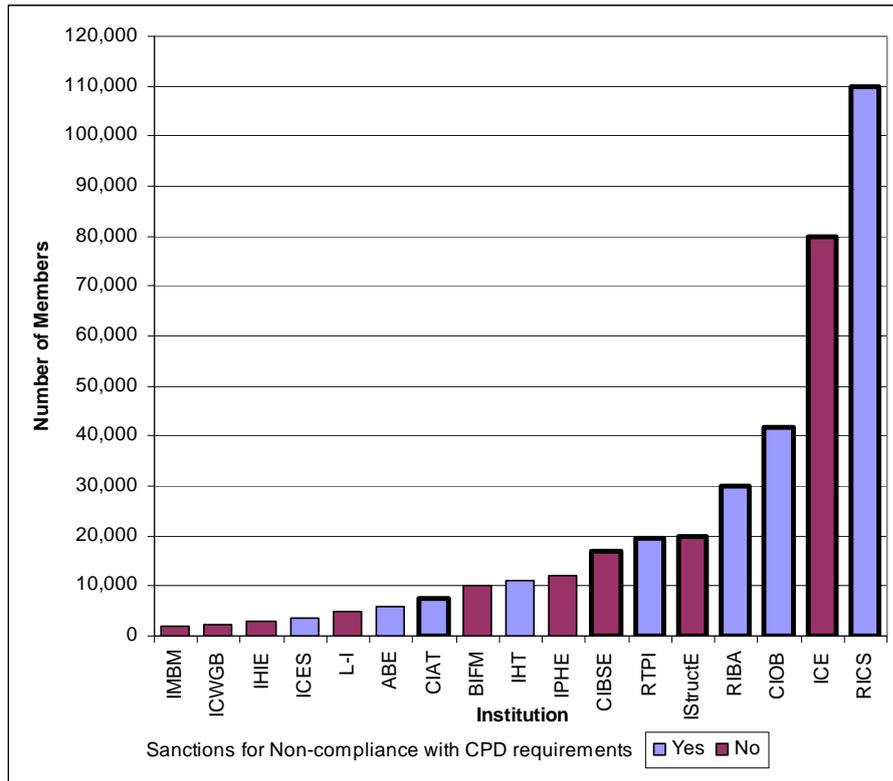


Figure 5.179: Institution Sanctions for CPD Non-compliance

Table 5.37 overleaf shows the extent to which sanctions are imposed on members for failing to comply with an institution’s CPD requirements where there is formal monitoring of CPD activities taking place. Clearly, where there is no monitoring of CPD activities taking place it would be very difficult for an institution to impose sanctions for non-compliance.

Of the eleven professional institutions that formally monitor their members’ CPD activities eight also impose sanctions on members who fail to comply with CPD requirements. These eight institutions comprise 229,300 members, 60.25% of the total membership. Of the three that do not formally monitor members’ CPD (CIBSE, IHIE and IMBM) only the IHIE does not mention that non-compliance with the IHIE’s CPD requirements for members might affect admission to membership or progression of membership. The other nine institutions comprising 151,250 members, 39.75% of the total membership, do not impose sanctions for non-compliance with CPD requirements.

Table 5.37: Institution Sanctions for CPD Non-compliance

| | Membership | Formal Monitoring | | Sanctions | | Pressure | Disciplinary proceedings | Suspension |
|-----------------------------------|------------|-------------------|--------|-----------|---------|----------|--------------------------|------------|
| | | Yes | No | Yes | No | | | |
| ABE | 6,000 | 6,000 | | 6,000 | | Yes | Yes | Yes |
| BIFM | 10,250 | | 10,250 | | 10,250 | | | |
| CIAT | 7,500 | 7,500 | | 7,500 | | Yes | Yes | Yes |
| CIBSE | 17,000 | | 17,000 | | 17,000 | | | |
| CIOB | 41,600 | 41,600 | | 41,600 | | Yes | Yes | Yes |
| ICE | 80,000 | 80,000 | | | 80,000 | | | |
| ICES | 3,500 | 3,500 | | 3,500 | | Yes | Yes | No |
| ICWGB | 2,200 | | 2,200 | | 2,200 | | | |
| IHIE | 3,000 | 3,000 | | | 3,000 | | | |
| IHT | 11,000 | 11,000 | | 11,000 | | Yes | Yes | Yes |
| IMBM | 1,800 | 1,800 | | | 1,800 | | | |
| IPHE | 12,000 | | 12,000 | | 12,000 | | | |
| IStructE | 20,000 | | 20,000 | | 20,000 | | | |
| L-I | 5,000 | | 5,000 | | 5,000 | | | |
| RIBA | 30,000 | 30,000 | | 30,000 | | Yes | Yes | Yes |
| RICS | 110,000 | 110,000 | | 110,000 | | Yes | Yes | Yes |
| RTPI | 19,700 | 19,700 | | 19,700 | | Yes | Yes | Yes |
| Members | 380,550 | 314,100 | 66,450 | 229,300 | 151,250 | 229,300 | 229,300 | 221,800 |
| Percentage | | 82.54% | 17.46% | 60.25% | 39.75% | 60.25% | 60.25% | 58.28% |
| Institutions | | 11 | 6 | 8 | 9 | 8 | 8 | 7 |
| Chartered Institutions | | | | | | | | |
| Members | 325,800 | 288,800 | 37,000 | 208,800 | 117,000 | 208,800 | 208,000 | 208,000 |
| Percentage | | 75.89% | 9.72% | 54.87% | 30.74% | 54.87% | 54.87% | 54.87% |
| Institutions | | 6 | 2 | 5 | 3 | 5 | 5 | 5 |
| Non-chartered Institutions | | | | | | | | |
| Members | 54,750 | 25,300 | 29,450 | 20,500 | 34,250 | 20,500 | 20,500 | 17,000 |
| Percentage | | 6.65% | 7.74% | 5.39% | 9.00% | 5.39% | 5.39% | 4.47% |
| Institutions | | 5 | 4 | 3 | 6 | 3 | 3 | 2 |

The nature of the sanctions that are imposed by the eight professional institutions that do impose sanctions for non-compliance with CPD requirements vary only in the extent to which sanctions are taken. All the institutions claim to apply 'pressure' on

non-compliant members in the first instance to comply with the institutions' requirements. The institutions report that this is normally sufficient to obtain compliance of members, but for those who continue to resist or refuse it is reported that the threat of disciplinary proceedings that could ultimately lead to suspension of membership is generally more than sufficient to obtain compliance. Only the CIBSE claimed that it did not have a sanction of suspension of membership. No institution went as far as expelling members for non compliance with CPD requirements, reserving this ultimate sanction for more serious cases of professional misconduct. The CIOB was the only institution to admit that it had actually invoked disciplinary proceedings against member for continued refusal to comply. The member is reported to have resigned before being suspended from membership. Several institutions reported that once an errant member had received a letter advising them that formal disciplinary proceedings were being instigated then compliance was always forthcoming. It is important to remember that membership of a professional institution is often a pre-requisite for employment in some professions and that loss or suspension of membership could ultimately result in loss of employment, hence some of the professional institutions can wield considerable power over their members in this respect.

In terms of the consideration of chartered and non-chartered institutions six of the eight chartered professional institutions (CIAT, CIOB, ICE, RIBA, RICS, RTPI) with 288,000 (75.89%) members formally monitor their members' CPD records compared to five of the nine non-chartered institutions (ABE, BIFM, ICES, IHIE, IHT, IMBM) with 25,300 (6.65%) members. Only two chartered professional institutions, the CIBSE and the IStructE with 37,000 (9.72%) members, did not monitor their members' CPD records compared to four non-chartered professional institutions (BIFM, ICWGB, IPHE and L-I) with 29,450 (7.74%) members. Of the chartered professional institutions that formally monitor their members' CPD only the ICE with 80,000 members was found not to impose sanctions on non-compliant members, thus four out of the five chartered professional institutions that monitored their members' CPD records imposed sanctions for non-compliance with their CPD policies compared to three out of five non-chartered institutions.

5.7.7 Acceptable CPD activities.

It has already been established that almost all professional institutions only accept those institutions that will maintain or enhance their members' professional position or status. The range of activities that the professional institutions deem acceptable varies widely from being loosely defined to being very a highly prescribed list (RIBA) and have an equally wide variation in their intellectual/academic content. From the information provided by the professional institutions' websites and guidance documents the activities they deem acceptable as CPD can be broadly categorised under the following headings:

- Academic study leading to a recognised formal qualification;
- Academic study not leading to a recognised formal qualification;
- Other academic activities;
- Technical/professional activities;
- Work-based activities;
- Institutional activities; and
- Community based activities.

5.7.7.1 Academic study leading to a recognised formal qualification

All institutions were found to accept academic study that leads to a recognised formal academic award as being an acceptable CPD activity. Many of the institutions did not specify explicitly a minimum qualification but various inferences suggest that any qualification must be covered by the NQF and FHEQ framework (see Appendix 5A.8 for the frameworks) or other recognised awarding body. The qualifications can be undertaken using any mode of study, full-time, part-time, or distance learning. The one stipulation applied by the institutions is that the qualification must be work-related, i.e. an NVQ in car mechanics would not be acceptable, but a ECDL (European Computer Driving Licence) would be acceptable. The chartered institutions normally require a minimum of NQF level 6, or FHEQ level H for corporate membership.

5.7.7.2 Academic study not leading to a recognised formal qualification

Again all the institutions claimed to accept academic study that does not lead to a recognised formal academic qualification as acceptable. The types of study deemed acceptable by the institutions in this category are typically:

- Short courses;
- Study tours;
- Open and distance learning/study;
- Language courses; and
- Private self-directed learning/study.

Again, institutions were invariably found to stipulate that academic study not leading to a formally recognised academic qualification had to be work-related.

5.7.7.3 Other academic activities

Academic categories that do not fall into either of the above categories were also recognised by the professional institutions as acceptable CPD activities. Examples given by the institutions include:

- Research;
- Preparing and presenting conference papers;
- Preparing refereed journal articles;
- Preparing technical papers;
- Leading seminars and workshops;
- Giving talks;
- Giving lectures (for non-teaching members);
- Teaching (for non-teaching members);
- Tutoring; and
- Examining (for non-teaching members) and for an institution's own examinations.

Here again it was found to be stipulated by the professional institutions that these activities must be work-related to qualify as CPD activities.

5.7.7.4 Technical/professional activities

These were found to be activities that members attended and/or participated in that were outside the member's normal work environment such as:

- Attending conferences;
- Attending exhibitions; and
- Attending workshops and seminars.

Once again, it was found that the professional institutions stipulated that these activities must be work-related to qualify as CPD activities.

5.7.7.5 Work-based activities

These were identified by the professional institutions as acceptable CPD activities if they did not form a part of the member's normal day-to-day work activities.

Examples cited include:

- Job secondment;
- Work shadowing;
- Mentoring and coaching;
- Running staff training and development events;
- Attending in-house staff training and development courses/events; and
- Attending in-house workshops and seminars.

5.7.7.6 Institutional activities

All institutions were found to be very keen to encourage their members to participate in the institutions' activities and events and hence promote these as CPD qualifying events to their members. These activities typically include:

- Membership of institution committees;
- Membership of institution panels;
- Attending institution events and meetings;
- Site visits;
- Promoting the institution/profession to schools, colleges and universities;
and
- Attending other professional institutions' events and meetings.

5.7.7.7 Community based activities

Two professional institutions, the BIFM and the IStructE, cite community-based activities as being acceptable CPD activities. The rationale for the inclusion of these seemingly non-work related activities is that community-based activity is seen as the indirect promotion of the profession and the institution to the broader community, and also to enhance the member's standing within that community. Community based activities include:

- School and college governorships;
- Community-based committees;
- Youth leadership (e.g. scouts/guides, Duke of Edinburgh award scheme) and
- Leadership/committee membership of sports and social organisations.

Almost all of the above activities fall within 'personal development' rather than 'professional development' categories, hence their inclusion by only two professional institutions.

When considering the policies of chartered and non-chartered professional institutions no discernable difference was observed in terms of acceptable CPD activities, other than those discussed above.

5.7.8 Adoption of the EUSCCCIP CPD Model

All the professional institutions surveyed were full members of the CIC, which as identified in the literature review, has adopted the EUSCCCIP model for CPD. This section seeks to identify which of those professional institutions have taken the CIC's lead and adopted either the EUSCCCIP or the CIC CPD model. Due to the variable quality of the information available the professional institutions are categorised as either having 'fully adopted', 'partly adopted' or 'not adopted' the models based on the analysis of the information, both explicit and implicit, obtained from their websites, documentation and or other information supplied. However, the categorisation is based solely on the subjective opinion of the author, and is shown in Table 5.38 overleaf.

Table 5.38: Adoption of the EUSCCCIP/CIC CPD Model by Professional Institutions

| | Adoption of EUSCCCIP / CIC CPD Model | | | | | |
|-----------------------------------|--------------------------------------|---------------|--------------------|---------------|-----------------|---------------|
| | Fully Implemented | | Partly Implemented | | Not Implemented | |
| | Membership | % | Membership | % | Membership | % |
| ABE | | | | | 6,000 | 21.05% |
| BIFM | 10,250 | 5.08% | | | | |
| CIAT | | | | | 7,500 | 26.32% |
| CIBSE | 17,000 | 8.42% | | | | |
| CIOB | 41,600 | 20.61% | | | | |
| ICE | 80,000 | 39.63% | | | | |
| ICES | | | 3,500 | 2.43% | | |
| ICWGB | | | | | 2,200 | 7.72% |
| IPHE | | | | | 12,000 | 42.11% |
| IHIE | 3,000 | 1.49% | | | | |
| IHT | | | 11,000 | 7.63% | | |
| IMBM | | | | | 1,800 | 6.32% |
| IStructE | 20,000 | 9.91% | | | | |
| L-I | | | | | 5,000 | 17.54% |
| RIBA | 30,000 | 14.86% | | | | |
| RICS | | | 110,000 | 76.28% | | |
| RTPI | | | 19,700 | 13.66% | | |
| 380,550 | 201,850 | 53.04% | 144,200 | 37.89% | 34,500 | 9.07% |
| Institutions | 7 | | 4 | | 6 | |
| Chartered Institutions | | | | | | |
| 325,800 | 188,600 | 49.56% | 129,700 | 34.08% | 7,500 | 1.97% |
| Institutions | 5 | | 2 | | 1 | |
| Non-chartered Institutions | | | | | | |
| 54,750 | 13,250 | 3.48% | 14,500 | 3.81% | 27,000 | 7.09% |
| Institutions | 3 | | 2 | | 5 | |

Of the seventeen professional institutions surveyed seven, accounting for 201,850 members (53.04% of the membership), were found to have adopted the EUSCCCIP/CIC CPD model in full or were in the process of fully implementing it. Four professional institutions with 144,200 members (37.89% of the membership) were found to have only partly adopted or partly implemented the EUSCCCIP/CIC CPD model, or were in the process of transition from another CPD model rather than implementing a CPD model for the first time. The remaining six professional institutions with 28,500 members (7.49% of the membership) had no evidence of having adopted the EUSCCCIP/CIC CPD model or any other model, as shown in Figure 5.180 overleaf.

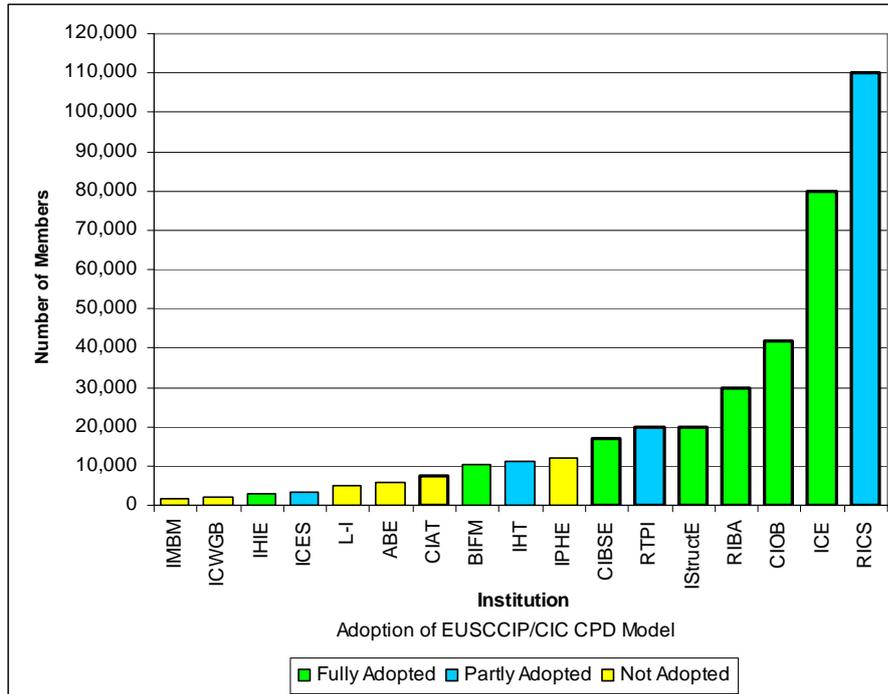


Figure 5.180: Adoption of the EUSCCCIP/CIC CPD Model by Professional Institutions

It was also found that all but one (the CIAT) of the chartered institutions had already adopted the EUSCCCIP/CIC model or were in the process of implementing it.

5.7.9 Conclusions

This thread of the research has sought to answer the third research sub-question ‘How do the professional institutions serving the construction industry influence the continuing education, training and development of construction managers?’ - by using the third element of the critical research model ‘conditions’ as the basis for identifying and examining the requirements of the principal professional institutions of the construction industry upon their members. This has been achieved through a desk-top study of the institutions’ requirements.

Although this desktop survey was intended to provide an overview rather than an in-depth analysis of the professional institutions’ policies for CPD requirements for their members, it has, never-the-less, provided a useful assessment of the current state of

CPD policy implementation by the professional institutions. In so doing it has identified some of the key agential factors and emergent properties of those institutions and their CPD policies, being a part of the external environment in which construction companies and their construction managers operate.

The chartered professional institutions are bound by a condition-precedent to the Privy Council to ensure that their members maintain their knowledge and skills base to enable them to practice their chosen profession to the standards required of them. In pursuance of this requirement all the chartered professional institutions were found to have well developed CPD policies stipulating the requirements for compliance with those policies and (with the exception of the CIBSE) to formally monitor their members through sampling of their members' CPD records. In addition, they are required to impose disciplinary proceedings on non-compliant members that could ultimately lead to expulsion of the member, although no institution seemed willing to go beyond suspension at this time. In the case of non-chartered institutions it was found that CPD policies were less well developed and implemented.

Latham's Recommendation No.22 (1994: 75, para. 7.30) for professional education states that the CIC is best placed to coordinate the various efforts and initiatives in developing professional education, having previously noted that the professional institutions were best placed 'to consider, develop and approve the educational courses they deemed necessary for entry' (para. 7.28). This has seen the CIC adopt the EUSCCIP model for CPD for construction professionals, which is in turn being adopted and implemented by the various professional institutions. As might be expected, some professional institutions are far more advanced than others in their adoption and implementation of the CPD models (Hurst, Hodgkinson and Mutch, 2007a).

Time requirements for CPD were not found to be consistent amongst the professional institutions. However, there was found to be a movement away from a prescribed minimum yearly hourly requirement towards a more flexible approach of allowing

members to aggregate their hours over periods of two or three years to enable members to adapt to the varying demands of their work. Most noticeable is the trend towards having no specified hourly requirement, following the EUSCCCIP recommendation that the time spent on CPD activities should be relevant to the individual's needs and position. This seems to undermine the very essence of what is trying to be achieved by introducing CPD, as many of those who are in most need of development may be the last to recognise or accept their deficiencies (Hurst, Hodgkinson and Mutch, 2007d).

Monitoring by professional institutions of their members' CPD activities through records their members submit is required to assist in meeting the chartered institutions obligations to ensure that their members maintain currency of their knowledge and skills required to practice their professions. This obligation was widely evident in most of the chartered institutions although the degree of monitoring (sampling) was found to vary considerably amongst these institutions. This variation could be because not only were some in a process of evolving their policies to meet new requirements and guidelines; but also because of the large variations in size of the institutions means that some of the smaller institutions, perhaps with very few staff may lack the resources to implement widespread monitoring.

Other institutions perhaps lack a real willingness and commitment to impose these requirements on members due to their cultural backgrounds and that the members who ultimately 'own' the institutions as 'professionals' believe that they should not have to be subjected to this form of regulation (Hurst, Hodgkinson and Mutch, 2007c). However, other professional institutions see the implementation and the monitoring of their members' CPD as a way of increasing professional standards and, in one instance, as a marketing vehicle for its own services and promotion of the institution. As perhaps was to be expected the professional institutions accepted a wide range of activities as acceptable for CPD. These varied from very highly prescribed lists and syllabi of the RIBA to the short all-embracing recommendations of the ICWGB.

The professional institutions themselves, whilst generally keen advocates of both CPD for their members and the maintenance of professional standards and competencies, are not generally in a position to implement anything other than relatively small-scale sampling of the members' CPD activities due to the inherent cost (time and man-power) which must ultimately be funded via their members' subscriptions. Never-the-less the professional institutions are showing commitment to the embodiment of CPD within the cultures of their professions, a commitment that will be increasingly important as the various initiatives to raise the standards of education, training and development in the construction industry become accepted and embedded practice.

5.8 Conclusions and Recommendations

This thesis has built upon earlier investigations carried out in Documents 1 to 4 of this research project examining various aspects of the construction industry, and various factors related to the continuing education, training and development of construction managers. The research project itself has been borne out of many various criticisms of the construction industry for its seeming poor performance, e.g. Latham (1994) and Egan (1998), and from the author's own experiences in the construction industry and latterly in construction industry related higher education. This thesis, its antecedent documents and the papers both published and in preparation arising from the research have also sought to contribute to the wider debate on the education, training and development of construction managers.

Only in the last decade or so have Government sponsored enquiries into the construction industry begun to recognise that a root cause of many of the industry's problems lie not solely in its technical and contractual arrangements as was previously believed, but in the people that comprise the industry (Egan, 1998, 2002). This has been further reinforced by the recent review of the industry's progress since the Egan reports by Constructing Excellence (2009).

A key factor of the industry's perceived poor performance is the poor standards of management within the industry to which low levels and standards of education, training and development makes an important contribution. It is, however, noted that this problem is not confined to the UK alone, but one that is characteristic of the construction industry in many countries around the world (OECD, 2006). Notwithstanding this fact this thesis focuses upon the UK construction industry.

On the 14th October 2009 Construction Excellence published a report entitled 'Never Waste a Good Crisis: A Review of Progress since *Rethinking Construction* and Thoughts of Our Future', reviewing the construction industry's progress towards the targets for the industry set by the 1998 *Rethinking Construction* report (Egan, 1998)

some eleven years earlier. Although report has a much wider scope than this thesis many of its findings and recommendations align with the findings of this thesis.

With perhaps the exception of health and safety, the industry review notes that there has been little real improvement in the performance of the industry in the eleven year post-Egan period. The review identifies four 'key blockers' to industry performance:

1. Business and economic models: 'Business and economic models in the sector determine the pace of change';
2. Capability: 'We need to attract, retain and develop more of the right people to improve industry capability';
3. Delivery model: 'A lack of integration in the delivery process impedes continuous improvement';
4. Industry structure: 'The diverse and fragmented structure of the industry creates competing agendas'.

(Construction Excellence, 2009)

In the report the issues are raised under each of the 'key blockers' that 'together create a downward spiral that prevents progress (Construction Excellence,2009:15):

Key Blocker 1: Business and economic models.

Here six factors are identified (Construction Excellence, 2009:15):

- Lack of a coherent industry vision;
- Few business drivers to improve;
- Construction 'does not matter';
- No incentives for change;
- Construction is seen as a commodity purchase; and
- Industry culture is driven by economic forces.

Key Blocker 2: Capability.

Here five factors are identified (Construction Excellence, 2009: 18):

- Lack of visible leadership;
- Failure to attract new talent to the industry;
- Narrow degree courses prevent holistic thinking;
- Failure to develop talent within the industry; and
- Lack of purpose.

Key Blocker 3: Delivery model.

Here three factors are identified (Construction Excellence, 2009:22)

- Few clients demand best value solutions;
- Lack of integrated process results in sub-optimal solutions;
- Contractors would rather ‘push’ risk down the supply chain than ‘pull’ the opportunities back up.

Key Blocker 4: Industry Structure.

Here three factors are identified (Construction Excellence, 2009:24):

- Lack of a single coherent voice for the industry;
- Lack of joined-up thinking by Government and other key stake-holders; and
- Too many industry bodies.

Whilst recognising that the problem is a complex one, Constructing Excellence identify what they describe as the key challenges for the future to tackle the problems, these are (Construction Excellence, 2009:25-26):

1. Understand the built environment;
2. Focus much more on the environment;
3. Find a cohesive voice for our industry;
4. Adopt new business models that promote change;
5. Develop a new generation of leaders;
6. Integrate education and training;
7. Procure for value; and
8. Suppliers to take the lead.

In support of these they offer describe as ‘some quick wins’ under the headings of ‘Industry’, ‘Government’ and ‘Client’ (Constructing Excellence, 2009:26). Twenty-two items for action are noted of which the following eight, under the headings of ‘Industry’ and ‘Government’, relate directly to issues raised in this thesis and some of the earlier documents:

Industry:

6. Up your game by attracting, training and retaining your future leaders. A lot of them are choosing to bypass our industry altogether;
7. Graduates leave university with a technical qualification. Institutions will guide them to professional status. You have to convert them into people who you would trust to lead and grow your business. Steal some ideas from other sectors who understand what graduate and professional training really means;
8. People management should not be a transactional process – employees are not ‘spanners on an inventories’. Develop talent management as a core skill along with organisational design;
9. Continue to support efforts to improve the image of the industry by promoting the vital role of the built environment from an early age in schools.

Government.

10. Understand the strategic value of infrastructure and develop a long-term vision for a sustainable UK built environment;
11. Develop policies to incentivise innovation and change in our industry to help speed up the modernisation process and focus the industry on the next steps;
13. Plan for the nation’s future infrastructure. It would help everybody if the plan was integrated and funded. If you are about to make cuts in infrastructure spending then you need to be honest with us. We will need to plan for the downturn or lose the momentum and skills that we are building;
16. Supporting the education and professional development of the industry by working with universities to create ‘systems thinkers’ who challenge silo approaches to problem solving.

All of these ‘quick-wins’ need further research to determine the best way to implement them in order to effectively contribute to change and hence improved performance in the UK construction industry.

The earlier investigations conducted have led to the development of the research question that this thesis has considered:

How might continuing education, training and development of construction managers be effectively implemented in construction companies to improve productivity and performance of the industry?

As the critical realist research philosophy has been used throughout this research project it has again been adopted for this thesis. Using Sayer's (2002) critical realist research model (see Figure 5.5) the research question posed seeks to address some of the issues that contribute to the 'effect' of the perceived poor performance of the UK construction industry. Thus from a critical realist perspective the 'effect' is established and in order to determine the various agential factors, causal mechanisms and emergent properties that lead to the 'effect' it is necessary to identify the three contributing components, 'structure', 'mechanism' and 'conditions'. Therefore, in order to undertake this investigation, three sub-questions have had to be considered from a critical realist perspective:

- 1) ***Structure:* How does the structure of the construction industry affect continuing education training and development of construction management?**
- 2) ***Mechanism:* What continuing education, training and development of construction managers is currently undertaken by construction companies? and**
- 3) ***Conditions:* How do the professional institutions serving the construction industry influence the continuing education, training and development of managers?**

The critical realist approach has proven to be an ideal research philosophy for the type of research undertaken in this project. Whilst the writings of Bhaskar (e.g. 1975, 1989, 1998, 2008,) now regarded as the 'father' of critical realist philosophy, and proponents of critical realisms such as Archer (e.g. 1975, 1976, 2000, 2003) are renowned for the complex philosophical language in the arguments and debate they present, however, others such as Collier (1994) and Sayer (1997, 2000), have made critical realism more accessible. Hence, through the writings of those such as Danermark *et al* (2002), Ackroyd and Fleetwood (2000) and Fleetwood and Ackroyd (2004) there has been an increased adoption of critical realism for underpinning business research. Thus, the debate has moved from one of pure theoretical philosophical debate to one of praxis.

This chapter will therefore seek to address the sub-questions above from a critical realist perspective so that their findings can be brought together in order that the main question can be addressed from a critical realist perspective. The first of these sub-questions is addressed in the next section and investigates the first of the critical realist research model components ‘structure’.

5.8.1 Research Sub-question 1 - *Structure*

How does the structure of the construction industry affect continuing education training and development of construction management?

This question was posed in order that the first component of the critical realist research model could be addressed, that of ‘structure’, that in this project entailed a study of the construction industry in which the education, training and development of construction managers takes place. It considers how the construction industry is composed, i.e. the strata within it and how and of what they are composed, and how the strata responds to changes in their external environment, what the causal mechanisms might be, i.e. the agential factors that lead to changes and the emergent properties arising from those changes. These issues have been addressed in Chapter 5.5: Structure – The structure of the construction industry.

Chapter 5.5 revealed that the construction industry is becoming increasingly fragmented, i.e. composed of small units, predominantly self-employed sole traders and small partnerships or companies. Currently some 70% of construction companies comprise three or less people, and some 85% employ seven or less people. This is, however, currently less than in the 1990s, when almost 95% of construction companies employed seven or less people.

Two of the main drivers for the change appear to be those of changes in taxation regulations for self-employed workers and the state of the economy in terms of construction workload and employment. Both have fuelled, not only an increase in self-employment, but also the numbers of specialist trades contractors together with a

significant increase in the numbers they employ and a corresponding decrease in the numbers employed in main trades contractors.

The nett result of these changes is that the UK construction industry is becoming increasingly fragmented resulting in a greater number of smaller companies. Whilst this may give the industry a much greater degree of flexibility in being able to adapt to changing circumstances, the opportunities for education, training and development in these companies becomes increasingly difficult as many of these small businesses lack the resources, often in terms of finance and/or in time, to incorporate it into their businesses (Jones, Comfort and Hillier, 2006). Many larger firms also find themselves in similar positions. Whilst they may be better resourced and can perhaps afford the costs of some education, training and development, they may be unable to accommodate the time commitment as it often means key workers, especially site-based workers, being absent from the workplace. Many medium and even some larger companies have traditionally relied on the very large companies to educate, train and develop managers whom they then recruit (Morbey, 2008). These companies are now finding this increasingly difficult due to the growth in subcontracting and self-employment diminishing this supply as work is increasingly packaged out to smaller construction and trades specialists.

Whilst the growth of specialist trades contractors has undoubtedly helped the construction industry become more flexible and adaptable, offering better specialist skills and services, it has effectively left many construction companies acting as little more than management organisations. Although they often appear to be large organisations due to their financial turnover, much of that turnover originates from work-packages undertaken by specialist trades contractors, and the modern-day construction manager is more likely to spend most of his/her time managing work-package contractors, rather than the more traditional role of managing trades and crafts supervisors. Thus, construction managers today need very different skills and knowledge sets than those of a generation ago. This includes a much greater need and reliance on 'soft-skills' such as negotiation skills, contractual knowledge, financial and human resource management skills, and less 'hard-skills' in the form of

extensive technical skills and knowledge as these are now delegated to, and dispersed amongst, the specialist trades contractors. However, this does present potential new opportunities for alternative forms of education, training and development delivery.

The subcontracting culture is so deeply embedded culturally and structurally in the construction industry that it not realistic to recommend that the construction industry abandon its practice and culture of subcontracting as it derives great benefit from the specialisms that *bona-fide* specialist trades contractors bring. However, it is recommended that construction companies minimise their use of agency and self-employed workers, particularly for managerial grade staff. This could lead to larger cores in companies in which education, training and development of staff might be more effectively and efficiently implemented. The Government's recently published proposals (HMT, 2009) might well be a catalyst to this change becoming a reality as the intention of HMT and HMRC is to ultimately eliminate entirely, or if not then severely curtail, the misuse of the self-employed status amongst construction workers (bogus or false self-employment) by imposing stringent statutory tests for self-employment.

One of the key agents for change that affects both the structure and culture of the industry is the Government and its economic policies for regulating the national economy through increasing or decreasing expenditure in attempts to try and either inflate or deflate the economy as circumstances require. Despite the pleadings of the Phelps Brown report (1968) Governments have continued to use the construction industry as an economic regulator, and will probably continue to do so due to the industry spanning across almost all aspects of business, commerce and society. As these policy changes, particularly those appertaining to deflationary measures, can sometimes occur with little prior warning, this can make strategic planning difficult for construction companies. This in turn impacts directly on education, training and development of staff as long-term employment for employees and continuity of employment for self-employed and agency staff can never be assured.

Again, it would be unrealistic to expect or recommend that governments stop using the construction industry as an economic regulator as governments will always require some form of mechanism for regulating the economy. Due to its pan-industry and pan-societal embrace the construction industry remains one of the most effective economic regulators available. Perhaps only if, or when, the industry stops being used as an economic regulator will it enjoy a more stable trading environment and the culture of the industry will change, as more stability and certainty will enable a longer-term strategic approach to be adopted by construction companies towards education, training and development of staff. Construction Excellence (2009) have also recognised and identified this in their call to Government to be honest with the industry about its intentions towards cutting construction expenditure. This is in order that the construction industry can make and implement proper strategic plans for downturns, i.e. adopt a proactive response rather than that of a reactive response. Constructing Excellence (2009) claim that at present the Government appears not to have any long-term visions for either the UK's built environment or the construction industry itself, and that these problems are exacerbated by a lack of joined-up Government thinking.

The next section considers the second of the research questions that investigates the 'mechanism' component of the critical realist research model, and the research sections within it to establish the nature and extent of continuing education, training and development of construction managers undertaken by construction companies

5.8.2 Research Sub-question 2 – Mechanism:

What continuing education, training and development of construction managers is currently undertaken by construction companies?

This question was posed in order that the second component of the critical realist research model could be addressed, that of ‘mechanism’, that in this project entailed a study of some of the internal mechanisms of construction companies in which construction managers operate, pertinent to the education, training and development of those construction managers. These internal mechanisms have themselves developed in response to the structural dynamics of the construction industry and the agential factors, causal mechanisms that stratify the industry itself. In addition, the mechanisms also develop and are adapted in response to the strategic requirements of the construction companies themselves.

Recommendation: construction companies need to fully develop and fully implement corporate policies and strategies for education training and development of construction managers in order that new talent can be attracted and retained through opportunities for personal and career development and progression.

These issues have been addressed in Chapter 5.6: Mechanisms: Education, Training and Development of Construction Managers in three sections. The first section examines construction companies’ policies and strategies towards management development; the second examines those companies’ attitudes towards education, training and development and engagement with higher education for education, training and development of construction managers; and the third examines the provision and accessibility of ICT in construction companies for supporting education, training and development of construction managers.

5.8.2.1 Corporate Policies and Strategies Towards Management Development.

The construction industry, as revealed by the survey in Chapter 5.6, appears to show little real commitment to continuing education, training and development of its managers. The existence and implementation of both staff development policies and staff appraisal policies amongst respondents did not reflect any significant levels of consistency. This reflects the variability of approach, with some companies clearly being more committed than others to education, training and development.

It was disappointing to find that, even amongst the UK's largest companies, there is still an entrenched attitude that educating, training and developing staff will increase their value to other employers who might be prepared to pay them more than their current employer does. This, however, suggests that companies with such attitudes neither value education, training and development nor staff, as it is not prepared to invest in education, training and development, nor pay staff higher salaries in recognition of their worth. This has also been recognised by Constructing Excellence as they too found that the industry was still failing 'to attract new talent the industry', and is failing 'to develop talent within the industry' due to a 'lack of purpose' (Constructing Excellence, 2009: 18).

Inevitably this is reflected in the level of management development (Mumford and Gold, 2004). This may also be a reflection of the industry's strong task oriented culture, where concern for production (and profits) takes precedence over people; the industry is after-all renowned for its 'hire and fire' attitude towards its workers, including managers. Much of this approach can be attributed to the competitive project-based nature of the industry and the inherent uncertainty of winning work, coupled with the often Government induced cycles of economic growth and recession producing periods of 'boom and bust' in the industry. If a more stable trading environment can be created for the construction industry then, and perhaps only then, will construction companies will be able to focus more on education, training and development of staff. Until then the focus is likely to remain firmly on short-term business survival, which as the industry becomes fragmented into more and more smaller units means more companies competing either for the same work,

or for more smaller packages of work, with less chance of winning it and, ultimately, of remaining in business. Here too Constructing Excellence (2009: 15) noted that ‘industry culture is driven by economic forces’ and that there are ‘few business drivers to improve’ and ‘no incentives to change’.

5.8.2.2 Educational engagement

This short-term approach is reflected in the companies’ approach to relationships with higher education. It has already been shown that construction companies’ main objective in dealing with higher education appears to be by involvement with only those activities that give them access to students, i.e. potential recruits. Yet, when it comes to construction companies making a contribution to higher education by way of providing some form of input, be it prizes, sponsorships, etc., then there appears to be substantially less interest. It must be remembered that the survey was conducted during a period of ‘boom’ for the construction industry when the demand for staff, and especially students and graduates is high and outstrips supply.

Recommendation: In these circumstances higher education should seek to take greater advantage of the demand to forge closer links with construction companies.

This could include obtaining greater support for resource provision, all of which would ultimately benefit students. However, in times of ‘bust’ when the demand for students and graduates can be greatly diminished, the links forged could still remain beneficial to both the construction companies and the higher education institutes in helping companies prepare for future economic growth periods by having fully trained and developed staff available. However, this is unlikely to occur due to the industry’s lack of drivers and incentives to change as the industry is driven by economic forces over which it has no control (Constructing Excellence, 2009).

With the exception of sub-degree level courses construction companies show a clear preference for higher education part-time and distance-learning courses as being most effective in meeting their needs. Many of these courses are, or could be, made

available to industry not only as academically accredited courses, but also as both accredited and unaccredited CPD courses, thus meeting the MSC recommendation (Boutall and Freeman, 2007a, 2007b) that CPD be linked to educational frameworks.

Recommendation: higher education develop both existing and new part-time and distance-learning courses at all levels that can be studied as CPD units specifically tailored to meet industry's needs and develop its talent. This must be in addition to, not instead of, existing traditional full-time arrangements.

Professional qualifications are normally highly valued by construction managers, if not their employers, and those entering higher education construction industry related courses invariably seek out those institutions and courses that will provide with professionally accredited courses so that they may, with due passage of time, obtain full professional (chartered) status. Professional institution accreditation is therefore vital to the success of higher education construction industry related courses.

Recommendation: Higher education providers of construction industry related courses need to ensure that all their courses, be they full-time, part-time, distance learning or CPD units, are accredited by relevant professional institutions to ensure students have the opportunity to work towards gaining professional chartered status.

The next section considers the final section of this research question, that of provision and access to ICT facilities that can be used to support education, training and development of construction managers in the workplace.

5.8.2.3 Provision and Access to ICT to support education, training and development.

The construction industry has never been renowned for its uptake of the latest technological developments, either in its production techniques or its business systems, including the provision of ICT facilities. This is particularly the case on construction sites where there is perhaps most to be gained. This is confirmed by the

findings that construction managers had far less access to facilities such as the internet than managers generally in industry, yet those that did have access were found to have far fewer restrictions on its usage. This tends to suggest that in addition to ICT provision ICT usage policies are also far less well developed in construction companies than in industry generally – a situation that appears to mirror that of HR provision. Notwithstanding this construction managers do not seem to make extensive use of such facilities when they are available, a reflection of the strong task culture within the construction industry, with little focus on the potential for either improving business performance or for CPD and/or other educational opportunities. This despite claims from companies that employees are encouraged to use ICT facilities for CPD and staff development purposes.

Recommendation: Construction managers should avail themselves of the opportunities for ICT based CPD and staff development.

However, in many instances, particularly where construction sites are involved, there are many construction managers based on sites that do not have access to any site-based ICT provision, be it modem or broadband based. Whilst it is understandable that at present broadband is not available in some of the remoter parts of the country alternatives using telephone land-lines or cell-phone networks are usually available. Most construction work is inevitably focussed around centres of population and business, i.e. towns and cities or major industrial centres, thus few construction sites are actually in areas where there is little or no ICT connectivity. Hence, where ICT provision is not available this tends to be as a result of company policy not to provide it rather than lack of availability.

Recommendation: Construction companies should take all possible steps to provide ICT facilities to construction sites wherever and whenever such services are available.

The least ICT provision was found in the housing sector where the lowest standards of management are also to be found. Increased provision of ICT in this sector would

bring considerable additional benefits in terms of not only improving business performance, but also the potential to assist in raising management standards as well.

The next section considers the third and final research sub-question that investigated ‘conditions’ – that of the influence of the professional institutions in continuing education, training and development.

5.8.3 Research Sub-question 3 - *Conditions*:

How do the professional institutions serving the construction industry influence the continuing education, training and development of managers?

This question was posed in order that the third component of the critical realist research model could be addressed, that of ‘conditions’, that in this project entailed a study of some of the critical external mechanisms in the construction companies external environment that can influence education, training, development and development of construction managers. The ‘conditions’ examined are manifest in the form of the professional bodies that exist externally to the construction companies as a part of their external environment. They also form an integral and influential part of the construction industry as they determine the requisite academic and experiential standards for various grades of membership as well as codes of conduct for professional behaviour of their members, not only for construction managers but for other construction professionals as well.

These issues have been addressed in Chapter 5.7: Conditions: Professional Institution CPD requirements, that examines the requirements and obligations placed on construction managers in terms of maintaining currency of their knowledge and skills base through the undertaking of CPD. It must be remembered that construction managers can and do come from a wide range of professional backgrounds and/or may be members of more than one professional body.

The survey conducted focussed on the CPD requirements of the professional institutions, rather than their educational requirements for membership of the institution and accreditation of academic courses. CPD requirements of the various institutions were found to be inconsistent in terms of the requirements for both quality and quantity to be undertaken. As the CIC adopted the EUSCCCIP model in 2006 as the basis for CPD in the construction industry this is also slowly being adopted and implemented by the professional institutions.

In terms of attempting to raise management standards it is worrying to note that EUSCCCIP recommended dropping any form of ‘time-serving’ requirement for CPD, opting instead for an undefined requirement of ‘sufficient to meet a person’s needs and position’. The CIC and a number of professional institutions have now adopted this undefined requirement. This allows for a potential ‘opt-out’ of undertaking any CPD if an individual deems that, because of their position, they have no need of CPD. There is no requirement for an individual to justify or substantiate their claim. This is contrary to the MSC (2007) recommendations of clearly defined CPD requirements both in terms of time and of standard or level of study linked to the NVQ levels.

Recommendation: the MSC approach be adopted and that professional institutions specify minimum requirements both in terms of quantity (e.g. time) and quality (i.e. NVQ level) if management standards are to be improved.

There is an opportunity here for higher education establishments to develop accredited CPD courses for the upper levels of the National Qualifications Framework and Higher Education Qualifications Framework, that could also lead to gaining recognised academic qualifications, particularly in the post-graduate arena.

At present the CSCS PQP card is not available to all corporate members of the principal professional institutions serving the construction industry as only nine institutions¹ have currently mapped their membership grades to the CSCS.

¹ CIAT, CIOB, ICE, ICES, ICWGB, IHIE, IMBM, IStructE, RICS.

Recommendation: all the principal professional institutions map their membership grades to the CSCS.

This will then impose a minimum CPD obligation on all construction professionals, irrespective of their institution's CPD requirements for corporate grade members. It is further recommended that CPD requirements that currently only exists for the PQP card is extended to all supervisory and managerial grades cards, and the CSCS becomes more widely accepted, then so too might CPD.

Drawing the above three components of the critical realist research model together enables the main research question to be considered in terms of the final critical realist research model component 'effect' to be considered in the next section..

5.8.4 The Research Question - *Effect*.

How might continuing education, training and development of construction managers be effectively implemented in construction companies to improve productivity and performance of the industry?

The previous three sections have addressed the three components of the critical realist research model, those being 'structure', 'mechanism' and 'conditions'. This final section now addresses the final component of the model, that of 'effect'. Not in this case what that effect is, as this is already widely known and documented – that of poor performance in the construction industry – but how education, training and development of construction managers might be improved, and whether or not such improvement would actually have any discernable effect in improving the construction industry's performance. Thus the research question for this thesis that has been considered in terms of the three sub-questions that have already been addressed.

The UK construction industry operates within a political economic environment that is subject to regular periods of booms and busts. In modern times the government has used the construction industry as an important economic regulator to help inflate or deflate the economy as circumstances require. These periods of booms and busts inevitably have a severe impact upon the construction industry as it tries to adapt to these cycles of expanding and contracting workloads that impact directly upon employment levels in the industry. This together with the uncertainty of procuring work through a highly competitive system within the industry, has led to construction companies adopting various coping strategies, such as subcontracting out work packages and the move to the use of self-employed labour as they strive to maintain the flexibility and competitiveness essential for survival. This has inevitably led to a short-termist approach by contractors. Whilst the construction companies, and indeed the construction industry itself, cannot control the economic cycles despite pleadings to government to end the use of the industry as an economic regulator (indeed the government itself often seem powerless to control these cycles in response to global economic condition), the construction industry can nevertheless address the issues of both the way it sublets its work and employs its workforce as these are within the industry's control.

A direct effect of this turbulence has been a significant increase in the fragmentation of the construction industry with a dramatic growth in the numbers of small contracting enterprises and self-employed workers. Often these enterprises employ just a few people including a working proprietor, or are self-employed workers, i.e. single-person enterprises, not only at the trades/crafts level, but also increasingly at the professional level/grades as well.

The short-termist approach that construction contractors have inevitably adopted has often been in response to the exploitation of grey-areas and loopholes in various pieces of legislation, often fiscal, aimed at curbing undesirable working practices that have led to, for example, both avoidance and/or evasion of the payment of taxation, national insurance contributions, etc. These practices have helped contractors

minimise their costs, thus making them more competitive and likely to win work necessary to stay in business.

The subcontracting culture, and particularly the advent and expansion of self-employment whilst it has had, from a contractor's perspective, a beneficial effect of reducing costs, increasing flexibility and competitiveness, has also had the detrimental effect of placing responsibility for education, training and development with the subcontractors and self-employed workers themselves. Many of these small, subcontracting firms and self-employed workers can neither afford the time nor the expense of undertaking education, training and development as time away from the workplace equates to a loss of earnings.

Recommendation: *As many small subcontracting firms and self-employed workers cannot afford either the time or financial burden of education, training and development this should be facilitated by the main contractors (employers).*

The issue of cost clearly arises here. The contractors invariably argue that paying for the education, training and development of non direct-employees, is improving the workforce for the benefit of their competitors, and the cost burden of so doing makes them less competitive than those who do not provide education, training and development. Indeed many SMEs currently rely on the large contractors to provide them with a pool of qualified workers from which they can recruit without having the inconvenience of having to educate, train and develop themselves.

Recommendation: *The CITB/ConstructionSkills scheme should be extended to include the education, training and development of all workers in the industry. Whilst ConstructionSkills has a remit for this for the entire industry its origins in the CITB mean that its primary focus is still on the crafts/trades levels, and not yet on the professional levels as well, as it prefers to leave these to other providers at the current time.*

The introduction of the CSCS scheme for managers and construction professionals will, in due course, become the *de-facto* industry standard as it becomes more widely and fully accepted. Whilst the scheme is still a voluntary arrangement Government, major clients and major contractors are beginning to make it a compulsory requirement for all construction workers and subcontractors, at all levels, working on their projects. Whether the CSCS (or any successor scheme) will become an industry-wide contractual requirement remains to be seen, but until there is a statutory requirement for CSCS registration this is unlikely to occur. It is therefore recommended that the CSCS registration be made a statutory requirement for all construction workers.

The Management of Health and Safety Regulations (1999) now places a statutory duty on all employers to provide health and safety training for their workers, including subcontractors, agency workers and self-employed in their employ, although no actual standard of training is prescribed. The CSCS now provides a standard of competence for health and safety training in the construction industry. The problem here is that these are minimum standards of competence that inevitably become the *de-facto* standard, rather than the minimum, and that training is to meet the minimum standard of competence rather than to exceed it through the adoption of best practice. Nevertheless, the professional institutions play a critical role in raising standards by aligning themselves with the CSCS.

Ultimately it must be the managers themselves that take responsibility for their own personal development, not only to meet professional institution and CSCS requirements, but also to enhance their own employability by remaining professionally attractive to potential employers. It is for employers to raise the standards of management in the industry by divesting themselves of the short-termist approach and by investing in education, training and development of their managers. CPD has the potential to make a significant contribution to raising standards if it ceases to be an ad-hoc arrangement and instead becomes an accepted practice within the industry where education, training and development is not regarded by both companies as a cost and workers as inconvenience or chore to be avoided wherever

possible. Acceptance would mean CPD being regarded by employers as an investment increasing competitiveness by raising productivity and profitability; and by workers as something eagerly sought after, keen to enhance their own knowledge and capabilities, thus enhancing their earnings potential and employability, as is the case in many other industries.

Clearly the UK construction industry has a long way to go to raise its standards of education, training and development, not only for construction managers, but for the entire industry. The problem is a deep-rooted cultural one, exacerbated by the high level of fragmentation and overly competitive nature of the industry. There is no 'quick-fix' to these problems, and any improvement is likely to be one of very slow evolution, not revolution. Notwithstanding this, the industry is so large, diverse and complex that an improvement in education, training and development is but one small actor and any improvement might not be discernable for a very long time, if at all. Raising the standards of education, training and development will change the very nature of the industry itself and might bring to prominence other agential factors, causal mechanisms and emergent properties capable of negating any possible improvement in education, training, and development. The industry is unlikely or even unwilling to be able to make changes whilst it is subject to cycles of 'boom and bust', and the vicious circle of ruthless pressure of minimising costs to remain competitive in order to stand a realistic chance winning work to stay in business.

In terms of the question 'will construction managers ever learn?' posed in the title of this thesis unless there is a major change in the culture of the industry, as called for by Egan (1998), and the removal of the blockages to improvement (Constructing Excellence, 2009) then performance is unlikely to improve, and, along with most of the industry, construction managers are unlikely to ever learn.

The next and final chapter will highlight areas that were revealed in the research work undertaken for this thesis that the author believes will prove to be fruitful areas

for future research, either through continuation of research work undertaken, or areas that were identified as worthy of further research, but which were not developed within this thesis.

5.9 Future Research

5.9.1 Introduction

The research undertaken for this thesis has identified a number of areas of opportunity for further research as it was found that either there was comparatively little research has been published in these areas, or that they were emerging issues that will warrant new research. Possible future research areas are identified and discussed below under the headings of the research undertaken in this thesis and which will now need to be considered in the light of the recent Constructing Excellence report (2009).

5.9.2 The Evolving Structure of Construction Industry

The research included in this thesis has identified various changes in the structure of the construction industry through longitudinal study of its constituent employment and companies, i.e. the strata within the industry. More detailed study of these strata, particularly those relating to ‘trades’ (subcontractors) and employment patterns within those trades has been undertaken by the author in parallel to the research for this thesis. Research undertaken to date has been primarily to inform teaching, but will, when combined with the research for this thesis, be the subject of future publications by the author.

Whilst the longitudinal study of the industry strata will continue as each edition of the ‘Construction Statistics Annual’ and the ‘Annual Abstract of Statistics’ is published each year by the Government there is also the opportunity to undertake further research into the agents and effects of these changes. Typical areas for research might include industry responses to agents not only in terms of economics and industry cycles but also in terms of the effects of legislation, particularly the various taxation regimes introduced by the Government to try to regulate the industry.

The practice of using self-employment and agency labour within the industry has been both contentious and controversial for many years (e.g. Harvey, 2001). At the

time of writing¹ it has just been announced by the Government that they intend to introduce new legislation this year to give agency and other temporary workers the same employment rights as ordinary employees (Tyler, 2008). The proposed legislation intends to curb the use of agency workers and temporary, and its likely effect of the construction industry has yet to be determined. One of the likely effects is that it could make agency and temporary workers more expensive to employ than direct employees, thus less attractive to employers. This will also need to be considered in conjunction with the latest proposals from HMT and HMRC in July 2009 to introduce stringent statutory tests for self-employed status of workers. Thus, a new research area will arise to determine how this legislation will affect both the structure and culture of the industry. Such a study would be both cross-sectional in terms of how construction companies respond to the legislation in terms of their employment policies, and longitudinal in how the industry strata change over time in terms of employment distribution within the industry.

A further area of research opportunity is that of the effects of the introduction of the Construction Skills Certification Scheme (CSCS) in the industry. As this is a recent introduction to the industry that is only now gaining acceptance, new opportunities arise here for research into the impact and effect that the CSCS is having. This is in terms of not only health and safety, but also on the culture of the industry and upon management attitudes as the CSCS becomes more widely accepted and embedded in the industry. Again, there are opportunities for both cross-sectional and longitudinal studies in this area.

5.9.3 Education, Training and Development

The survey undertaken in Chapter 5.6 focussed on the top 150 UK construction companies in terms of their financial turnover as these could be identified from a number of published league-tables. No league-tables were found to exist in terms of the numbers of employees each company has, but the assumption has to be made that it is not unreasonable to assume that those companies with the largest turnovers are

¹ February 2008

the most likely to have the largest numbers of employees. However, the caveat has to be made that often a construction company's turnover comprises a large percentage from work-packages that the company does not undertake any work for; or in the case of conglomerates turnover may be generated from subsidiary activities such as minerals, property portfolios and plant-hire companies. As these companies can be assumed to have the largest employee bases an assumption must be made that they also have the largest budgets available for education, training and development of their workforces. Thus, there is considerable scope for further research in this field in the following areas:

5.9.3.1 Extension of the Survey

As it was difficult to obtain sufficient data from the level of responses to the survey (forty-five companies) to undertake statistically significant analysis further research can be undertaken by expanding the number of companies surveyed. This would need to be at least five hundred companies to yield sufficient responses at the responses rate achieved to undertake a valid Chi-squared test. Expanding the number of firms surveyed to at least one thousand companies would provide a more accurate profile of the industry and would enable data to be stratified into both different sizes of companies and possibly into various markets segments within the industry such as house-building, civil engineering, general construction, etc. However, analysis by market segmentation prove difficult as many firms operate in more than one market segment and is likely that the companies that do would not be able to apportion their responses to market segments, although estimates of this might be achieved via business turnover in each segment, although accuracy might be compromised. Nevertheless, expanding the survey would allow a more accurate picture of the industry to be established, and to enable identification of similarities.

Within the existing survey data there is considerable scope for further analysis and cross-tabulations to be undertaken, although there is a risk of over-analysis and the production of spurious cross-tabulations.

As the survey comprised three strands of enquiry with construction companies; the state of education, training and development; links to higher education; and ICT provision for construction managers; there are many opportunities for further research in each of these strands discussed below.

5.9.3.2 The State of Education, Training and Development in Construction Companies

Very little focussed research was found to have been carried out in the UK in this field with respect to construction managers, despite the various Government reports that have highlighted poor standards of management as a contributing factor to poor productivity, and their recommendations for standards to be raised significantly.

Research here could take one or more directions: to resurvey the original respondents in two or three years time; and/or to expand the existing survey to a much greater number of companies and then resurvey these companies again in a few years time to see what, if any, improvements or changes of attitude have occurred. A longitudinal study will help determine the extent to which Latham's (1994) and Egan's (1998, 2002) recommendations have become embodied within the industry.

It would be useful to be able to indentify trends in education, training and development in the various market segments of the construction industry, as well as the construction companies themselves. Of particular interest will be the adoption and implementation of various policies for staff-development, staff appraisal and their encouragement as a measure of the development of management standards within construction companies. Linking the adoption and implementation of CPD policies both in industry segments and in construction companies will provide a critical insight into the raising of management standards within the industry.

5.9.3.3 Links to Higher Education

As with the previous research areas extending the survey would reveal a far more accurate picture of the industry's links with higher education which again allow for analysis by size of company and/or market segment. There are many opportunities for research into the needs of construction companies with regard to the educational sector meeting their needs. There been a number of reports of this nature, but they have tended to focus either on the needs of business/industry at large or on the trades/crafts levels, but few have focused on the managerial level needs of the construction industry.

As the construction companies have stated that part-time courses that best meet their needs, rather than full-time courses, then research is needed to determine how best higher education can meet those needs as the focus on higher education is very much on full-time courses. It is, however, noted that the short-term focus of the construction industry results in rapid changes of requirements from construction companies invariably aimed at meeting their current crisis, rather than longer term strategic matters upon which higher education tends to focus.

5.9.3.4 ICT Provision for Construction Managers

The construction industry is not renowned for its progressive attitude towards technology. Whilst there have been a number of studies into ICT usage in the construction industry the rate of technological advance in these areas has rendered most of these studies obsolete. Further research could be undertaken to obtain a more comprehensive view of the provision and use of ICT, particularly for site based managers using a large sample size to compare differences and similarities between sizes of companies and market segments.

Additional research could also be undertaken to ascertain the extent to which construction companies are adopting newer technologies, such as broadband connectivity and wireless networks on sites that give a potentially greater degree of access to the internet, and thus to education, training and development opportunities.

Whilst the survey undertaken here solicited the corporate perspective from education and training managers, no attempt was made to solicit the views and opinions of construction managers themselves in the use, or potential use, of ICT for education, training and development. There is an opportunity here for an in-depth study in this area, which could also be linked to the professional institutions' developments in the areas of on-line recording and submission of CPD activity (see next section).

5.9.4 Professional Institution CPD Requirements

The survey here sought to obtain a 'snap-shot' of the current level of CPD requirements of the professional institutions in the construction industry that are full members of the CIC.

The research opportunity here is for an in-depth study of the impact of the development of CPD requirements by the professional institutions; and how the institutions' requirements are changing in response to the various pressures to which they and the industry are subject. Further research is also needed to establish the impact the professional institutions' CPD requirements have on acceptance and provision of education, training and development in construction companies.

A recent development within a number of the professional institutions is the online submission and recording of CPD activity by their members. Another area of research therefore is the utilisation of these facilities by members as an indication of the acceptability of such facilities and the access to them by their members in undertaking CPD, as well as a measure of ICT provision.

5.9.5 Conclusions

This thesis does not, and indeed did not intend to, provide a definitive study of the education, training and development of construction managers within the construction industry. It has attempted to investigate specific aspects of education,

training and development, particularly those of CPD, and has opened new lines of enquiry and research in these areas.

It is anticipated that some of these research areas will continue to be pursued by the author, and that others might carry out research in other areas. Should this not be the case, then it is hoped that the research carried out will at least stimulate debate in these areas.

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Doctor of Business Administration Programme

***Management Education, Training and
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Thesis

Document 5

Appendices

**A.G. Hurst
N0013040
October 2009**

**NOTTINGHAM
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5A Appendices

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Appendix 5A.2: Construction Industry Based Family Names

- Beaton.** (obs). Dealer in gravel, cement, bitumen.
- Carpenter.** q.v.
- Chafer.** Lime kiln worker.
- Chalker.** Maker and applier of lime-wash.
- Clachar.** (Gaelic). Mason or builder in stone.
- Cleaver.** Plank maker.
- Cundy.** (Cornish). Conduit or water pipe maker.
- Cutter.** Wood or stone cutter.
- Dauber, Dawber, Doorbar.** Renderer or plasterer; e.g. wattle and daub.
- Dyer.** (Cornish/Celtic) Thatcher.
- Fearon.** Ironsmith.
- Fencer.** Maker or repairer of fencing.
- Filer.** Maker of files.
- Fitter.** Joiner, (11th C.)
- Genner, Gendwer, Ginner.** Master mason of design (architect or engineer).
- Glaisher, Glaysher, Galzyer, Glazier.** Glass maker.
- Glasswright.** Worker of glass.
- Goldbeater.** Worker of gold leaf.
- Graver.** Carver or sculptor.
- Grinder.** Sharpener of tools.
- Grieve, Greave, Greeve.** Estates or buildings manager.
- Hackwood.** Wood-cutter.
- Hafter.** Maker of tool handles.
- Hager, Hagger, Hagerty, Haggert.** Maker of door latches.
- Hamer, Hammer.** Maker or user of hammers.
- Handas.** Maker or user of small hammers.
- Hansom.** Bricklayer.
- Helliar, Hellier, Hellyer, Helyer, Hilliar, Hillyer, Hilyer, Hillier, Hillyar.** Roof slater or tiler.
- Hewar, Hewer.** Wood or stone cutter.
- Honer.** Tool sharpener.
- Hottar.** Basket or pannier maker for carrying sand for building.

Image. Sculptor of wood or stone.

Jenner, Jennour. Master mason of design (architect or engineer).

Jowers, Juer, Jewers. Joiner.

Kear, Keer, Kare. Keysmith.

Killer, Kilner, Kelner. Lime burner or lime kiln worker.

Lampett, Lampitt, Lamput. Clay-pit worker

Latter. Lathe maker, for wood and stone.

Layer, Leir. Stone layer.

Ledbetter, Leadbeater, Leadbeatter, Ledbitter, Ledbetter, Ledbetter. Lead worker or leadsmith.

Locksmith. q.v.

Lockyer, Lockyers, Lockyear, lockier, Lokier. Locksmith.

Lodge: Wardens of the Mason's lodge.

Lymburner. Lime burner or kiln maker.

Machent, Machon, Machion. Mason

Marber, Marbarrow, Marbler. Layer of marble floors, or carver of marble.

Marler, Marlor. Quarrier of marl.

McIntyre. (Celtic) Son of a carpenter.

Nailer, Naylor, Nailsmith. Maker of nails.

Painter, Payntor. q.v.

Pannell. (obs) Panel Maker.

Pargeter, Pargetter, Pargiter. Plasterer.

Paver, Pavier, Pavior. q.v.

Picker. (obs) Maker or seller of pick-axe handles.

Picache, Picasse. Pick-axe user – workman.

Pipe, Pipes. Maker of conduits and pipes (also musical pipe player).

Plummer, Plimmer. Plumber (also a feather-merchant).

Plumber. q.v.

Pointer, Poynter. q.v. (also a cord maker).

Quarrie, Quarry, Quarrier. Quarry owner or worker.

Reader, Reder, Reeder. (Norfolk) Thatcher (reed thatch).

Rover, Ruffer. Roof repairer.

Sawer, Sawyer, Sayer, Sayers, Sayre, Saer, Sare, Seyer, Sear, Seers. q.v. or saw-pit worker.

- Sedgman.** Wall thatcher (sedge thatch).
- Sedger.** Thatcher (sedge thatch).
- Shingler, Shingle.** Shingle roofer.
- Shovellor, Shovel, Showel, Shouler.** Maker or user of shovels.
- Slater, Slator, Slatter, Sclater.** Roofer (slates).
- Spooner.** Maker of spoons, but also timber shingles.
- Standall.** Stone quarry worker.
- Stonebreaker.** Stone quarry worker.
- Stonehewer, Stonier, Stainer, Stanyer.** Stone cutter or quarry worker.
- Stoneman.** Stone-worker, hewer or mason.
- Taylor.** (Norman) Cutter of wood and stone [also later of cloth].
- Tallboy, Talboy, Tabois.** Wood-cutter.
- Tellwright.** Tile maker, brick maker, tiler.
- Thaker (m), Thaxton (f), Thakore.** Thatcher.
- Thatcher.** q.v.
- Tiler, Tyler, Tylor.** q.v., of roofs.
- Tingle, Tingler.** Maker of small nails.
- Tracer.** Drawing maker or tracer for stone masons.
- Tupper, Tupp, Tuppe.** Maker or beater of mud and straw mixture (for cobb work).
- Turner.** Q.v. of wood or stone.
- Wademan, Wade, Wodeman, Waller, Wallers, Walls.** Builder of walls.
- Warrick, Warrack.** Scaffolder or maker of warracks – wedges for scaffold lashings.
- Watler, Whattler, Watler.** Maker of wattles (wattle and daub).
- Whetter.** Sharpener of tools.
- Woodman.** q.v.

Note:

The above list was compiled by the author in the early 1990s from a variety of sources such as encyclopaedias of surnames and the like of a period of time. The list of original sources has been lost over time, hence no citations. The author acknowledges that the above list was sourced from original publications and is not the author's own work.

Appendix 5A.3. UK Working Populations

Appendix 5A.3.1: Working Populations of the UK

Table 5A.1: Working Population of the UK 1954~2006

| Year | Workforce | Unemployed | | In Employment | | HM Forces | |
|------|-----------|------------|------------|---------------|------------|-----------|------------|
| | x1,000 | x1,000 | Percentage | x1,000 | Percentage | x1,000 | Percentage |
| 1954 | 24,239 | 246 | 1.01% | 23,148 | 95.50% | 845 | 3.49% |
| 1955 | 24,486 | 200 | 0.82% | 23,477 | 95.88% | 809 | 3.30% |
| 1956 | 24,738 | 217 | 0.88% | 23,754 | 96.02% | 767 | 3.10% |
| 1957 | 24,817 | 282 | 1.14% | 23,845 | 96.08% | 708 | 2.85% |
| 1958 | 24,961 | 476 | 1.91% | 23,663 | 94.80% | 620 | 2.48% |
| 1959 | 24,765 | 420 | 1.70% | 23,776 | 96.01% | 569 | 2.30% |
| 1960 | 25,100 | 326 | 1.30% | 24,256 | 96.64% | 518 | 2.06% |
| 1961 | 25,344 | 287 | 1.13% | 24,583 | 97.00% | 474 | 1.87% |
| 1962 | 25,620 | 406 | 1.58% | 24,772 | 96.69% | 442 | 1.73% |
| 1963 | 25,719 | 497 | 1.93% | 24,795 | 96.41% | 427 | 1.66% |
| 1964 | 25,849 | 349 | 1.35% | 25,076 | 97.01% | 424 | 1.64% |
| 1965 | 26,049 | 299 | 1.15% | 25,327 | 97.23% | 423 | 1.62% |
| 1966 | 25,632 | 281 | 1.10% | 25,351 | 98.90% | 417 | 1.63% |
| 1967 | 24,919 | 466 | 1.87% | 24,453 | 98.13% | 417 | 1.67% |
| 1968 | 25,378 | 542 | 2.14% | 24,836 | 97.86% | 400 | 1.58% |
| 1969 | 25,375 | 518 | 2.04% | 24,857 | 97.96% | 380 | 1.50% |
| 1970 | 24,721 | 524 | 2.12% | 24,197 | 97.88% | 372 | 1.50% |
| 1971 | 25,123 | 724 | 2.88% | 24,399 | 97.12% | 368 | 1.46% |
| 1972 | 25,267 | 778 | 3.08% | 24,489 | 96.92% | 371 | 1.47% |
| 1973 | 25,613 | 557 | 2.17% | 25,057 | 97.83% | 361 | 1.41% |
| 1974 | 25,658 | 528 | 2.06% | 25,130 | 97.94% | 345 | 1.34% |
| 1975 | 25,877 | 838 | 3.24% | 25,039 | 96.76% | 336 | 1.30% |
| 1976 | 26,110 | 1,265 | 4.84% | 24,844 | 95.15% | 336 | 1.29% |
| 1977 | 26,224 | 1,359 | 5.18% | 24,865 | 94.82% | 327 | 1.25% |
| 1978 | 26,311 | 1,151 | 4.37% | 24,987 | 94.97% | 318 | 1.21% |
| 1979 | 26,580 | 1,068 | 4.02% | 25,365 | 95.43% | 314 | 1.18% |
| 1980 | 26,759 | 1,274 | 4.76% | 25,301 | 94.55% | 323 | 1.21% |
| 1981 | 26,697 | 2,176 | 8.15% | 24,323 | 91.11% | 334 | 1.25% |
| 1982 | 26,610 | 2,521 | 9.47% | 23,889 | 89.77% | 324 | 1.22% |
| 1983 | 26,633 | 2,905 | 10.91% | 23,611 | 88.65% | 322 | 1.21% |
| 1984 | 27,296 | 2,896 | 10.61% | 24,399 | 89.39% | 326 | 1.19% |
| 1985 | 27,711 | 3,019 | 10.89% | 24,692 | 89.11% | 326 | 1.18% |
| 1986 | 27,838 | 3,120 | 11.21% | 24,719 | 88.80% | 322 | 1.16% |
| 1987 | 28,083 | 2,836 | 10.10% | 25,248 | 89.90% | 319 | 1.14% |
| 1988 | 28,345 | 2,485 | 8.77% | 25,860 | 91.23% | | |
| 1989 | 28,764 | 2,075 | 7.21% | 26,689 | 92.79% | | |
| 1990 | 28,764 | 2,075 | 7.21% | 26,689 | 92.79% | | |

...Continued...

Appendix 5A.3.1: Working Populations of the UK

...Continued

| Year | Workforce | Unemployed | | In Employment | | HM Forces | |
|------|-----------|------------|------------|---------------|------------|-----------|------------|
| | x1,000 | x1,000 | Percentage | x1,000 | Percentage | x1,000 | Percentage |
| 1991 | 28,813 | 2,414 | 8.38% | 26,400 | 91.63% | | |
| 1992 | 28,397 | 2,791 | 9.83% | 25,606 | 90.17% | | |
| 1993 | 28,258 | 2,954 | 10.45% | 25,304 | 89.55% | | |
| 1994 | 28,021 | 2,750 | 9.81% | 25,451 | 90.83% | | |
| 1995 | 28,202 | 2,470 | 8.76% | 25,731 | 91.24% | | |
| 1996 | 28,345 | 2,336 | 8.24% | 26,009 | 91.76% | | |
| 1997 | 28,561 | 2,048 | 7.17% | 26,513 | 92.83% | | |
| 1998 | 28,509 | 1,788 | 6.27% | 26,721 | 93.73% | | |
| 1999 | 28,833 | 1,743 | 6.05% | 27,090 | 93.95% | | |
| 2000 | 29,061 | 1,599 | 5.50% | 27,461 | 94.49% | | |
| 2001 | 29,167 | 1,472 | 5.05% | 27,694 | 94.95% | | |
| 2002 | 29,420 | 1,515 | 5.15% | 27,905 | 94.85% | | |
| 2003 | 29,655 | 1,464 | 4.94% | 28,192 | 95.07% | | |
| 2004 | 29,844 | 1,433 | 4.80% | 28,412 | 95.20% | | |
| 2005 | 31,126 | 1,433 | 4.60% | 28,693 | 92.18% | | |
| 2006 | 30,613 | 1,683 | 5.50% | 28,930 | 94.50% | | |

Source: Annual Abstracts of Statistics

Table 5A.2: UK ILO Working Population 1959~2006

| | Workforce age 16+ | Economically Active | | In employment | | ILO Unemployed | | Economically Inactive | |
|------|----------------------|------------------------|------------|---------------|------------|----------------|------------|--------------------------|------------|
| | x1,000 | x1,000 | Percentage | x1,000 | Percentage | x1,000 | Percentage | x1,000 | Percentage |
| 1988 | 44,697 | 28,345 | 63.42% | 25,860 | 57.86% | 2,485 | 5.56% | 16,453 | 36.81% |
| 1989 | 44,978 | 28,764 | 63.95% | 26,689 | 59.34% | 2,075 | 4.61% | 16,214 | 36.05% |
| 1990 | 44,978 | 28,764 | 63.95% | 26,689 | 59.34% | 2,075 | 4.61% | 16,214 | 36.05% |
| 1991 | 45,226 | 28,813 | 63.71% | 26,400 | 58.37% | 2,414 | 5.34% | 16,413 | 36.29% |
| 1992 | 44,990 | 28,397 | 63.12% | 25,606 | 56.91% | 2,791 | 6.20% | 16,593 | 36.88% |
| 1993 | 45,041 | 28,258 | 62.74% | 25,304 | 56.18% | 2,954 | 6.56% | 16,783 | 37.26% |
| 1994 | 45,072 | 28,021 | 62.17% | 25,451 | 56.47% | 2,750 | 6.10% | 16,871 | 37.43% |
| 1995 | 45,189 | 28,202 | 62.41% | 25,731 | 56.94% | 2,470 | 5.47% | 16,988 | 37.59% |
| 1996 | 45355 | 28345 | 62.50% | 26009 | 57.35% | 2,336 | 5.15% | 17010 | 37.50% |
| 1997 | 45509 | 28561 | 62.76% | 26513 | 58.26% | 2,048 | 4.50% | 16949 | 37.24% |
| 1998 | 45675 | 28509 | 62.42% | 26721 | 58.50% | 1,788 | 3.91% | 17166 | 37.58% |
| 1999 | 45880 | 28833 | 62.84% | 27090 | 59.05% | 1,743 | 3.80% | 17047 | 37.16% |
| 2000 | 46128 | 29061 | 63.00% | 27461 | 59.53% | 1,599 | 3.47% | 17067 | 37.00% |
| 2001 | 46440 | 29167 | 62.81% | 27694 | 59.63% | 1,472 | 3.17% | 17274 | 37.20% |
| 2002 | 46727 | 29420 | 62.96% | 27905 | 59.72% | 1,515 | 3.24% | 17306 | 37.04% |
| 2003 | 47020 | 29655 | 63.07% | 28192 | 59.96% | 1,464 | 3.11% | 17365 | 36.93% |
| 2004 | 47,352 | 29,844 | 63.03% | 28,412 | 60.00% | 1,433 | 3.03% | 17,508 | 36.97% |
| 2005 | 47,753 | 31,126 | 65.18% | 28,693 | 60.09% | 1,433 | 3.00% | 17,628 | 36.91% |
| 2006 | 48,131 | 30,613 | 63.60% | 28,930 | 60.11% | 1,683 | 3.50% | 17,518 | 36.40% |

Source: Annual Abstract of Statistics

Appendix 5A.3.2: Employee and Self-employed Working Population

Table 5A.3: Employee and Self-employed Working UK Population 1959~2006

| Year | Workforce | Self Employed | | Employee | |
|------|-----------|---------------|------------|----------|------------|
| | x1,000 | x1,000 | Percentage | x1,000 | Percentage |
| 1959 | 23,776 | 1,770 | 7.44% | 22,006 | 92.56% |
| 1960 | 24,256 | 1,767 | 7.28% | 22,489 | 92.72% |
| 1961 | 24,583 | 1,760 | 7.16% | 22,824 | 92.84% |
| 1962 | 24,772 | 1,748 | 7.06% | 23,024 | 92.94% |
| 1963 | 24,795 | 1,735 | 7.00% | 23,060 | 93.00% |
| 1964 | 25,076 | 1,720 | 6.86% | 23,356 | 93.14% |
| 1965 | 25,327 | 1,706 | 6.74% | 23,621 | 93.26% |
| 1966 | 25,351 | 1,681 | 6.63% | 23,253 | 91.72% |
| 1967 | 24,453 | 1,689 | 6.91% | 22,347 | 91.39% |
| 1968 | 24,836 | 1,786 | 7.19% | 22,650 | 91.20% |
| 1969 | 24,857 | 1,853 | 7.45% | 22,624 | 91.02% |
| 1970 | 24,197 | 1,832 | 7.57% | 21,993 | 90.89% |
| 1971 | 24,399 | 1,909 | 7.82% | 22,122 | 90.67% |
| 1972 | 24,489 | 1,997 | 8.15% | 22,121 | 90.33% |
| 1973 | 25,057 | 2,032 | 8.11% | 22,664 | 90.45% |
| 1974 | 25,130 | 1,996 | 7.94% | 22,789 | 90.68% |
| 1975 | 25,039 | 1,993 | 7.96% | 22,710 | 90.70% |
| 1976 | 24,844 | 1,952 | 7.86% | 22,557 | 90.79% |
| 1977 | 24,865 | 1,907 | 7.67% | 22,631 | 91.02% |
| 1978 | 24,987 | 1,907 | 7.63% | 22,762 | 91.10% |
| 1979 | 25,365 | 1,906 | 7.51% | 23,145 | 91.25% |
| 1980 | 25,301 | 2,013 | 7.96% | 22,965 | 90.77% |
| 1981 | 24,323 | 2,119 | 8.71% | 21,870 | 89.91% |
| 1982 | 23,889 | 2,169 | 9.08% | 21,395 | 89.56% |
| 1983 | 23,611 | 2,219 | 9.40% | 21,054 | 89.17% |
| 1984 | 24,399 | 2,669 | 10.94% | 21,229 | 87.01% |
| 1985 | 24,692 | 2,777 | 11.25% | 21,413 | 86.72% |
| 1986 | 24,719 | 2,792 | 11.29% | 21,377 | 86.48% |
| 1987 | 25,248 | 3,069 | 12.16% | 21,576 | 85.46% |
| 1988 | 25,860 | 3,230 | 12.49% | 22,083 | 85.39% |
| 1989 | 26,689 | 3,528 | 13.22% | 22,656 | 84.89% |
| 1990 | 26,689 | 3,572 | 13.38% | 22,887 | 85.75% |
| 1991 | 26,400 | 3,416 | 12.94% | 22,531 | 85.34% |
| 1992 | 25,606 | 3,227 | 12.60% | 22,018 | 85.99% |
| 1993 | 25,304 | 3,142 | 12.42% | 21,662 | 85.61% |
| 1994 | 25,451 | 3,494 | 13.73% | 21,483 | 84.41% |
| 1995 | 25,731 | 3,562 | 13.84% | 21,752 | 84.54% |

Continues...

Appendix 5A.3.2: Employee and Self-employed Working Population continued

...Continued

| Year | Workforce | Self Employed | | Employee | |
|------|-----------|---------------|------------|----------|------------|
| | x1,000 | x1,000 | Percentage | x1,000 | Percentage |
| 1996 | 26,009 | 3,501 | 13.46% | 22,145 | 85.14% |
| 1997 | 26,513 | 3,470 | 13.09% | 22,709 | 85.65% |
| 1998 | 26,721 | 3,368 | 12.60% | 23,088 | 86.40% |
| 1999 | 27,090 | 3,324 | 12.27% | 23,509 | 86.78% |
| 2000 | 27,461 | 3,255 | 11.85% | 23,948 | 87.21% |
| 2001 | 27,694 | 3,276 | 11.83% | 24,177 | 87.30% |
| 2002 | 27,905 | 3,336 | 11.95% | 24,365 | 87.31% |
| 2003 | 28,192 | 3,559 | 12.62% | 24,453 | 86.74% |
| 2004 | 28,412 | 3,676 | 12.94% | 24,514 | 86.28% |
| 2005 | 28,693 | 3,630 | 12.65% | 24,848 | 86.60% |
| 2006 | 28,930 | 3,719 | 12.86% | 25,023 | 86.49% |

Appendix 5A.3.3: Gender Composition of the UK Workforce 1959~2006

Table 5A.4: Gender Composition of the UK Workforce 1959~2006

| Year | UK Workforce jobs: Total x1,000 | UK Workforce jobs: Males x1,000 | Males as percentage of total workforce | UK Workforce jobs: Females x1,000 | Females as percentage of total workforce x1,000 |
|------|---------------------------------|---------------------------------|--|-----------------------------------|---|
| 1959 | 25,441 | 17,054 | 67.03% | 8,387 | 32.97% |
| 1960 | 25,899 | 17,224 | 66.50% | 8,674 | 33.49% |
| 1961 | 26,194 | 17,338 | 66.19% | 8,855 | 33.81% |
| 1962 | 26,387 | 17,395 | 65.92% | 8,992 | 34.08% |
| 1963 | 26,422 | 17,382 | 65.79% | 9,040 | 34.21% |
| 1964 | 26,740 | 17,502 | 65.45% | 9,238 | 34.55% |
| 1965 | 27,023 | 17,601 | 65.13% | 9,422 | 34.87% |
| 1966 | 27,200 | 17,570 | 64.60% | 9,629 | 35.40% |
| 1967 | 26,837 | 17,324 | 64.55% | 9,513 | 35.45% |
| 1968 | 26,687 | 17,134 | 64.20% | 9,553 | 35.80% |
| 1969 | 26,648 | 17,076 | 64.08% | 9,646 | 36.20% |
| 1970 | 26,550 | 16,940 | 63.80% | 9,687 | 36.49% |
| 1971 | 26,290 | 16,648 | 63.32% | 9,643 | 36.68% |
| 1972 | 26,278 | 16,530 | 62.90% | 9,748 | 37.10% |
| 1973 | 26,902 | 16,748 | 62.26% | 10,153 | 37.74% |
| 1974 | 26,991 | 16,589 | 61.46% | 10,403 | 38.54% |
| 1975 | 26,902 | 16,433 | 61.08% | 10,469 | 38.92% |
| 1976 | 26,664 | 16,226 | 60.85% | 10,438 | 39.15% |
| 1977 | 26,702 | 16,152 | 60.49% | 10,550 | 39.51% |
| 1978 | 26,867 | 16,088 | 59.88% | 10,779 | 40.12% |
| 1979 | 27,289 | 16,200 | 59.36% | 11,089 | 40.64% |
| 1980 | 27,245 | 16,130 | 59.20% | 11,115 | 40.80% |
| 1981 | 26,229 | 15,442 | 58.87% | 10,787 | 41.13% |
| 1982 | 25,781 | 15,061 | 58.42% | 10,720 | 41.58% |
| 1983 | 25,476 | 14,789 | 58.05% | 10,687 | 41.95% |
| 1984 | 26,179 | 15,066 | 57.55% | 11,112 | 42.45% |
| 1985 | 26,485 | 15,125 | 57.11% | 11,360 | 42.89% |
| 1986 | 26,528 | 15,002 | 56.55% | 11,526 | 43.45% |
| 1987 | 27,059 | 15,169 | 56.06% | 11,890 | 43.94% |
| 1988 | 28,029 | 15,643 | 55.81% | 12,386 | 44.19% |
| 1989 | 28,918 | 16,029 | 55.43% | 12,889 | 44.57% |
| 1990 | 29,232 | 16,108 | 55.10% | 13,123 | 44.89% |

Continues...

Appendix 5A.3.3: Gender Composition of the UK Workforce 1959~2006

... Continued

| Year | UK Workforce jobs: Total x1,000 | UK Workforce jobs: Males x,1000 | Males as percentage of total workforce | UK Workforce jobs: Females x1,000 | Females as percentage of total workforce |
|-------------|--|--|---|--|---|
| 1991 | 28,308 | 15,393 | 54.38% | 12,915 | 45.62% |
| 1992 | 27,835 | 14,913 | 53.58% | 12,922 | 46.42% |
| 1993 | 27,385 | 14,527 | 53.05% | 12,858 | 46.95% |
| 1994 | 27,531 | 14,583 | 52.97% | 12,949 | 47.03% |
| 1995 | 27,894 | 14,770 | 52.95% | 13,124 | 47.05% |
| 1996 | 28,222 | 14,787 | 52.40% | 13,436 | 47.61% |
| 1997 | 28,698 | 15,142 | 52.76% | 13,556 | 47.24% |
| 1998 | 28,831 | 15,335 | 53.19% | 13,497 | 46.81% |
| 1999 | 29,159 | 15,675 | 53.76% | 13,484 | 46.24% |
| 2000 | 29,603 | 15,793 | 53.35% | 13,810 | 46.65% |
| 2001 | 29,918 | 15,995 | 53.46% | 13,923 | 46.54% |
| 2002 | 30,071 | 15,996 | 53.19% | 14,075 | 46.81% |
| 2003 | 30,366 | 16,248 | 53.51% | 14,118 | 46.49% |
| 2004 | 30,690 | 16,373 | 53.35% | 14,317 | 46.65% |
| 2005 | 31,042 | 16,493 | 53.13% | 14,549 | 46.87% |
| 2006 | 31,409 | 16,738 | 53.29% | 14,671 | 46.71% |

Source: ONS Online StatBase

Available at: <http://www.statistics.gov.uk/StatBase> (Last accessed 18/08/2007)

Appendix 5A.3.4: UK National and Construction Workforce 1978~2006

Table 5A.5: UK National and Construction Workforce 1978~2006

| Year | UK Workforce jobs: Total x1,000 | UK Workforce jobs: Total – Construction x1,000 | Percentage of total workforce |
|------|---------------------------------------|---|----------------------------------|
| 1978 | 26,867 | 1,871 | 6.96% |
| 1979 | 27,289 | 1,917 | 7.02% |
| 1980 | 27,245 | 1,945 | 7.14% |
| 1981 | 26,229 | 1,846 | 7.04% |
| 1982 | 25,781 | 1,778 | 6.90% |
| 1983 | 25,476 | 1,760 | 6.91% |
| 1984 | 26,179 | 1,889 | 7.22% |
| 1985 | 26,485 | 1,897 | 7.16% |
| 1986 | 26,528 | 1,907 | 7.19% |
| 1987 | 27,059 | 2,007 | 7.42% |
| 1988 | 28,029 | 2,137 | 7.62% |
| 1989 | 28,918 | 2,385 | 8.25% |
| 1990 | 29,232 | 2,385 | 8.16% |
| 1991 | 28,308 | 2,166 | 7.65% |
| 1992 | 27,835 | 1,985 | 7.13% |
| 1993 | 27,385 | 1,894 | 6.92% |
| 1994 | 27,531 | 1,861 | 6.76% |
| 1995 | 27,894 | 1,839 | 6.59% |
| 1996 | 28,222 | 1,824 | 6.46% |
| 1997 | 28,698 | 1,774 | 6.18% |
| 1998 | 28,831 | 1,833 | 6.36% |
| 1999 | 29,159 | 1,850 | 6.34% |
| 2000 | 29,603 | 1,896 | 6.40% |
| 2001 | 29,918 | 1,914 | 6.40% |
| 2002 | 30,071 | 1,942 | 6.46% |
| 2003 | 30,366 | 1,991 | 6.56% |
| 2004 | 30,690 | 2,069 | 6.74% |
| 2005 | 31,042 | 2,120 | 6.83% |
| 2006 | 31,409 | 2,177 | 6.93% |

Source: ONS Online StatBase

Available at: <http://www.statistics.gov.uk/StatBase> (Last accessed 18/08/2007)

Appendix 5A.3.5: Gender Composition of the UK Construction Workforce 1978~2006

Table 5A.6: Gender Composition of the UK Construction Workforce 1978~2006

| Year | UK Workforce jobs: Total – Construction x1,000 | percentage of total workforce | UK Workforce jobs: Males – Construction x1,000 | Males as percentage of total workforce | Males as percentage of male workforce | UK Workforce jobs: Females – Construction x1,000 | Percentage of total workforce | Percentage of female workforce |
|------|--|----------------------------------|--|---|--|--|----------------------------------|-----------------------------------|
| 1978 | 1,871 | 6.96% | 1,718 | 6.39% | 10.68% | 153 | 0.57% | 1.42% |
| 1979 | 1,917 | 7.02% | 1,760 | 6.45% | 10.86% | 158 | 0.58% | 1.42% |
| 1980 | 1,945 | 7.14% | 1,782 | 6.54% | 11.05% | 163 | 0.60% | 1.47% |
| 1981 | 1,846 | 7.04% | 1,680 | 6.41% | 10.88% | 165 | 0.63% | 1.53% |
| 1982 | 1,778 | 6.90% | 1,610 | 6.24% | 10.69% | 168 | 0.65% | 1.57% |
| 1983 | 1,760 | 6.91% | 1,587 | 6.23% | 10.73% | 173 | 0.68% | 1.62% |
| 1984 | 1,889 | 7.22% | 1,699 | 6.49% | 11.28% | 190 | 0.73% | 1.71% |
| 1985 | 1,897 | 7.16% | 1,702 | 6.43% | 11.25% | 196 | 0.74% | 1.73% |
| 1986 | 1,907 | 7.19% | 1,702 | 6.42% | 11.35% | 204 | 0.77% | 1.77% |
| 1987 | 2,007 | 7.42% | 1,792 | 6.62% | 11.81% | 215 | 0.79% | 1.81% |
| 1988 | 2,137 | 7.62% | 1,910 | 6.81% | 12.21% | 227 | 0.81% | 1.83% |
| 1989 | 2,385 | 8.25% | 2,131 | 7.37% | 13.29% | 254 | 0.88% | 1.97% |
| 1990 | 2,385 | 8.16% | 2,129 | 7.28% | 13.22% | 256 | 0.88% | 1.95% |
| 1991 | 2,166 | 7.65% | 1,928 | 6.81% | 12.53% | 237 | 0.84% | 1.84% |
| 1992 | 1,985 | 7.13% | 1,762 | 6.33% | 11.82% | 224 | 0.80% | 1.73% |
| 1993 | 1,894 | 6.92% | 1,674 | 6.11% | 11.52% | 219 | 0.80% | 1.70% |
| 1994 | 1,861 | 6.76% | 1,643 | 5.97% | 11.27% | 218 | 0.79% | 1.68% |
| 1995 | 1,839 | 6.59% | 1,638 | 5.87% | 11.09% | 201 | 0.72% | 1.53% |
| 1996 | 1,824 | 6.46% | 1,610 | 5.70% | 10.89% | 213 | 0.75% | 1.59% |
| 1997 | 1,774 | 6.18% | 1,596 | 5.56% | 10.54% | 179 | 0.62% | 1.32% |
| 1998 | 1,833 | 6.36% | 1,622 | 5.63% | 10.58% | 210 | 0.73% | 1.56% |
| 1999 | 1,850 | 6.34% | 1,641 | 5.63% | 10.47% | 209 | 0.72% | 1.55% |
| 2000 | 1,896 | 6.40% | 1,685 | 5.69% | 10.67% | 211 | 0.71% | 1.53% |
| 2001 | 1,914 | 6.40% | 1,706 | 5.70% | 10.67% | 208 | 0.70% | 1.49% |
| 2002 | 1,942 | 6.46% | 1,738 | 5.78% | 10.87% | 205 | 0.68% | 1.46% |
| 2003 | 1,991 | 6.56% | 1,785 | 5.88% | 10.99% | 206 | 0.68% | 1.46% |
| 2004 | 2,069 | 6.74% | 1,858 | 6.05% | 11.35% | 211 | 0.69% | 1.47% |
| 2005 | 2,120 | 6.83% | 1,898 | 6.11% | 11.51% | 222 | 0.72% | 1.53% |
| 2006 | 2,177 | 6.93% | 1,938 | 6.17% | 11.58% | 239 | 0.76% | 1.63% |

Source: ONS Online StatBase

Available at: <http://www.statistics.gov.uk/StatBase> (Last accessed 18/08/2007)

Appendix 5A.4: Construction Industry Employment

Appendix 5A.4: GDP/GVA of the UK Construction Industry 1948~2004

Table 5A.7: GDP/GVA of the UK Construction Industry 1948~2004

| Year | GDP% | GVA% |
|-------------|-------------|-------------|
| 1948 | 4.8316% | |
| 1949 | 4.8678% | |
| 1950 | 4.7912% | |
| 1951 | 4.7464% | |
| 1952 | 4.7493% | |
| 1953 | 4.8821% | |
| 1954 | 4.9567% | |
| 1955 | 5.0682% | |
| 1956 | 5.2652% | |
| 1957 | 5.1014% | |
| 1958 | 5.1164% | |
| 1959 | 5.0963% | |
| 1960 | 5.2994% | |
| 1961 | 5.5065% | |
| 1962 | 5.7679% | |
| 1963 | 5.7509% | |
| 1964 | 5.9862% | |
| 1965 | 6.0462% | |
| 1966 | 5.9586% | |
| 1967 | 5.9146% | |
| 1968 | 5.8442% | |
| 1969 | 5.8059% | |
| 1970 | 5.9679% | |
| 1971 | 5.9837% | |
| 1972 | 7.2155% | |
| 1973 | 6.7503% | |
| 1974 | 6.2748% | |
| 1975 | 5.9339% | |
| 1976 | 5.6690% | |
| 1977 | 5.3827% | |
| 1978 | 5.4023% | |
| 1979 | 5.3327% | |
| 1980 | 5.2977% | |
| 1981 | 5.0866% | |
| 1982 | 5.0781% | |
| 1983 | 5.1838% | |
| 1984 | 5.2354% | |
| 1985 | 5.1229% | |
| 1986 | 4.9287% | |
| 1987 | 5.4195% | |
| 1988 | 5.9078% | |

...Continues

Appendix 5A.4: GDP/GVA of the UK Construction Industry 1948~2004

Continued

...Continued

| Year | GDP% | GVA% |
|-------------|-------------|-------------|
| 1981 | 5.0866% | |
| 1982 | 5.0781% | |
| 1983 | 5.1838% | |
| 1984 | 5.2354% | |
| 1985 | 5.1229% | |
| 1986 | 4.9287% | |
| 1987 | 5.4195% | |
| 1988 | 5.9078% | |
| 1989 | 6.4293% | 6.4696% |
| 1990 | 6.2342% | 6.2319% |
| 1991 | 5.3899% | 5.4736% |
| 1992 | 4.8779% | 4.9144% |
| 1993 | 4.5195% | 4.5407% |
| 1994 | 4.5356% | 4.5816% |
| 1995 | 4.4880% | 4.5942% |
| 1996 | 4.4251% | 4.5428% |
| 1997 | | 4.5587% |
| 1998 | | 4.6434% |
| 1999 | | 4.6892% |
| 2000 | | 4.8231% |
| 2001 | | 5.1057% |
| 2002 | | 5.2462% |
| 2003 | | 5.3909% |
| 2004 | | 5.5032% |

Source: Annual Abstracts of Statistics

Appendix 5A.5: Construction Industry Employment

Appendix 5A.5.2: Quarterly Employment in the Construction Industry 1983~2006

Table 5A.8: Quarterly Employment in the Construction Industry 1983~2006

| Year | Employment x1000 | | | | Source |
|------|------------------|-------|-------|-------|---|
| | Q1 | Q2 | Q3 | Q4 | |
| 1983 | 1,530 | 1,512 | 1,518 | 1,548 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1984 | 1,553 | 1,549 | 1,560 | 1,576 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1985 | 1,568 | 1,556 | 1,548 | 1,554 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1986 | 1,542 | 1,530 | 1,534 | 1,546 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1987 | 1,564 | 1,574 | 1,601 | 1,631 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1988 | 1,644 | 1,668 | 1,683 | 1,714 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1989 | 1,745 | 1,787 | 1,843 | 1,850 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1990 | 1,835 | 1,837 | 1,838 | 1,816 | HACS December Quarter 1993; No.56 part 2; table 2.9 |
| 1991 | 1,774 | 1,719 | 1,671 | 1,626 | CSA; 2002; table 12.2 |
| 1992 | 1,577 | 1,529 | 1,497 | 1,478 | CSA; 2003; table 12.2 |
| 1993 | 1,429 | 1,407 | 1,401 | 1,405 | CSA; 2004; table 12.2 |
| 1994 | 1,394 | 1,379 | 1,390 | 1,375 | CSA; 2005; table 12.2 |
| 1995 | 1,394 | 1,362 | 1,362 | 1,382 | CSA; 2006; table 12.2 |
| 1996 | 1,392 | 1,354 | 1,355 | 1,378 | CSA; 2007; table 12.2 |
| 1997 | 1,399 | 1,361 | 1,384 | 1,392 | CSA; 2007; table 12.2 |
| 1998 | 1,447 | 1,426 | 1,409 | 1,417 | CSA; 2007; table 12.2 |
| 1999 | 1,429 | 1,429 | 1,418 | 1,443 | CSA; 2007; table 12.2 |
| 2000 | 1,435 | 1,455 | 1,439 | 1,476 | CSA; 2007; table 12.2 |
| 2001 | 1,507 | 1,524 | 1,548 | 1,557 | CSA; 2007; table 12.2 |
| 2002 | 1,594 | 1,629 | 1,631 | 1,599 | CSA; 2007; table 12.2 |
| 2003 | 1,618 | 1,559 | 1,590 | 1,613 | CSA; 2007; table 12.2 |
| 2004 | 1,659 | 1,682 | 1,762 | 1,754 | CSA; 2007; table 12.2 |
| 2005 | 1,760 | 1,811 | 1,830 | 1,799 | CSA; 2007; table 12.2 |
| 2006 | 1,826 | 1,814 | 1,834 | 1,852 | CSA; 2007; table 12.2 |

Appendix 5A.5.3: UK Construction Industry Employment 1923~ 2006

Table 5A.9: Construction Industry Employment 1923~ 2006

| Year | Employed x1000 | Source |
|-------------|---------------------------|------------------------------|
| 1923 | 844 | AAS; 1938; No.82; Table 126. |
| 1924 | 860 | AAS; 1940; No. 83; Table 126 |
| 1925 | 909 | AAS; 1940; No. 83; Table 126 |
| 1926 | 971 | AAS; 1940; No. 83; Table 126 |
| 1927 | 1,017 | AAS; 1940; No. 83; Table 126 |
| 1928 | 977 | AAS; 1940; No. 83; Table 126 |
| 1929 | 990 | AAS; 1940; No. 83; Table 126 |
| 1930 | 1,019 | AAS; 1940; No. 83; Table 126 |
| 1931 | 1,129 | AAS; 1940; No. 83; Table 126 |
| 1932 | 1,147 | AAS; 1940; No. 83; Table 126 |
| 1933 | 1,161 | AAS; 1940; No. 83; Table 126 |
| 1934 | 1,200 | AAS; 1940; No. 83; Table 126 |
| 1935 | 1,287 | AAS; 1948; No. 84; Table 131 |
| 1936 | 1,343 | AAS; 1948; No. 84; Table 131 |
| 1937 | 1,361 | AAS; 1948; No. 84; Table 131 |
| 1938 | 1,408 | AAS; 1953; No. 89; Table 123 |
| 1939 | 1,440 | AAS; 1953; No. 89; Table 123 |
| 1940 | 1,092 | AAS; 1953; No. 89; Table 123 |
| 1941 | 1,003 | AAS; 1953; No. 89; Table 123 |
| 1942 | 868 | AAS; 1953; No. 89; Table 123 |
| 1943 | 678 | AAS; 1953; No. 89; Table 123 |
| 1944 | 572 | AAS; 1953; No. 89; Table 123 |
| 1945 | 662 | AAS; 1953; No. 89; Table 123 |
| 1946 | 1,062 | AAS; 1953; No. 89; Table 123 |
| 1947 | 1,196 | AAS; 1953; No. 89; Table 123 |
| 1948 | 1,375 | AAS No. 93; 1957; Table 132 |
| 1949 | 1,359 | AAS No. 94; 1958; Table 134 |
| 1950 | 1,363 | AAS No. 94; 1958; Table 134 |
| 1951 | 1,354 | AAS No. 94; 1958; Table 134 |
| 1952 | 1,359 | AAS No. 97; 1961; Table 134 |
| 1953 | 1,378 | AAS No. 97; 1961; Table 134 |
| 1954 | 1,391 | AAS No. 97; 1961; Table 134 |
| 1955 | 1,409 | AAS No. 97; 1961; Table 134 |
| 1956 | 1,457 | AAS No. 97; 1961; Table 134 |
| 1957 | 1,452 | AAS No. 97; 1961; Table 134 |
| 1958 | 1,428 | AAS No. 97; 1961; Table 134 |
| 1959 | 1,480 | AAS No. 99; 1963; Table 134 |
| 1960 | 1,505 | AAS No. 100; 1964; Table 132 |
| 1961 | 1,556 | AAS No. 101; 1965; Table 130 |
| 1962 | 1,614 | AAS No. 101; 1965; Table 130 |
| 1963 | 16,58 | AAS No. 103; 1967; Table 134 |

Continues.....

Appendix 5A.5.2: Construction Industry Employment 1923~ 2006 Continued

| Year | Employed x1000 | Source |
|-------------|---------------------------|------------------------------|
| 1964 | 1,711 | AAS No. 104; 1968; Table 132 |
| 1965 | 1,746 | AAS No. 105; 1969; Table 136 |
| 1966 | 1,725 | AAS No. 106; 1970; Table 134 |
| 1967 | 1,684 | AAS No. 106; 1970; Table 134 |
| 1968 | 1,658 | AAS No. 106; 1970; Table 134 |
| 1969 | 1,590 | AAS No. 108; 1972; Table 148 |
| 1970 | 1,367 | AAS No. 109; 1973; Table 141 |
| 1971 | 1,261 | AAS No. 110; 1974; Table 144 |
| 1972 | 1,299 | AAS No. 110; 1974; Table 144 |
| 1973 | 1,380 | AAS No. 113; 1977; Table 6.2 |
| 1974 | 1,328 | AAS No. 115; 1979; Table 6.2 |
| 1975 | 1,313 | AAS No. 116; 1980; Table 6.2 |
| 1976 | 1,308 | AAS No. 117; 1981; Table 6.2 |
| 1977 | 1,270 | AAS No. 120; 1984; Table 6.2 |
| 1978 | 1,264 | AAS No. 120; 1984; Table 6.2 |
| 1979 | 1,253 | AAS No. 121; 1985; Table 6.2 |
| 1980 | 1,252 | AAS No. 122; 1986; Table 6.2 |
| 1981 | 1,139 | AAS No. 123; 1987; Table 6.2 |
| 1982 | 1,067 | AAS No. 125; 1989; Table 6.2 |
| 1983 | 1,044 | AAS No. 126; 1990; Table 6.2 |
| 1984 | 1,037 | AAS No. 127; 1991; Table 6.2 |
| 1985 | 1,021 | AAS No. 129; 1993; Table 6.2 |
| 1986 | 989 | AAS No. 129; 1993; Table 6.2 |
| 1987 | 1,009 | AAS No. 130; 1994; Table 6.2 |
| 1988 | 1,047 | AAS No. 131; 1995; Table 6.2 |
| 1989 | 1,082 | AAS No. 131; 1995; Table 6.2 |
| 1990 | 1,143 | AAS No. 132; 1996; Table 6.2 |
| 1991 | 1,053 | AAS No. 133; 1997; Table 6.2 |
| 1992 | 952 | AAS No. 134; 1998; Table 6.2 |
| 1993 | 865 | AAS No. 135; 1999; Table 7.5 |
| 1994 | 864 | AAS No. 136; 2000; Table 7.5 |
| 1995 | 917 | AAS No. 137; 2001; Table 7.5 |
| 1996 | 921 | AAS No. 138; 2002; Table 7.5 |
| 1997 | 976 | AAS No. 139; 2003; Table 7.5 |
| 1998 | 1,098 | AAS No. 140; 2004; Table 7.5 |
| 1999 | 1,110 | AAS No. 141; 2005; Table 7.5 |
| 2000 | 1,183 | AAS No. 142; 2006; Table 7.5 |
| 2001 | 1,140 | AAS No. 143; 2007; Table 7.5 |
| 2002 | 1,110 | AAS No. 143; 2007; Table 7.5 |
| 2003 | 1,119 | AAS No. 143; 2007; Table 7.5 |
| 2004 | 1,133 | AAS No. 143; 2007; Table 7.5 |
| 2005 | 1,168 | AAS No. 143; 2007; Table 7.5 |
| 2006 | 1,249 | AAS No. 143; 2007; Table 7.5 |

Appendix 5A.3: Comparison of AAS and CSA Employment Figures 1969~2006

Table 5A.10: Comparison of AAS and CSA Employment Figures 1969~2006

| Year | Construction Employment x1,000 | | Percentage Difference |
|------|-----------------------------------|-------|--------------------------|
| | AAS | CSA | |
| 1969 | 1,590 | 1,892 | 15.96 |
| 1970 | 1,367 | 1,802 | 24.14 |
| 1971 | 1,261 | 1,764 | 28.51 |
| 1972 | 1,299 | 1,794 | 27.59 |
| 1973 | 1,380 | 1,911 | 27.79 |
| 1974 | 1,328 | 1,855 | 28.41 |
| 1975 | 1,313 | 1,746 | 24.80 |
| 1976 | 1,308 | 1,713 | 23.64 |
| 1977 | 1,270 | 1,592 | 20.23 |
| 1978 | 1,264 | 1,680 | 24.76 |
| 1979 | 1,253 | 1,666 | 24.79 |
| 1980 | 1,252 | 1,696 | 26.18 |
| 1981 | 1,139 | 1,606 | 29.08 |
| 1982 | 1,067 | 1,533 | 30.40 |
| 1983 | 1,044 | 1,527 | 31.63 |
| 1984 | 1,037 | 1,559 | 33.48 |
| 1985 | 1,021 | 1,556 | 34.38 |
| 1986 | 989 | 1,538 | 35.70 |
| 1987 | 1,009 | 1,592 | 36.62 |
| 1988 | 1,047 | 1,677 | 37.57 |
| 1989 | 1,082 | 1,733 | 37.56 |
| 1990 | 1,143 | 1,832 | 37.61 |
| 1991 | 1,053 | 1,698 | 37.99 |
| 1992 | 952 | 1,520 | 37.37 |
| 1993 | 865 | 1,410 | 38.65 |
| 1994 | 864 | 1,388 | 37.75 |
| 1995 | 917 | 1,375 | 33.31 |
| 1996 | 921 | 1,370 | 32.77 |
| 1997 | 976 | 1,384 | 29.48 |
| 1998 | 1,098 | 1,425 | 22.95 |
| 1999 | 1,110 | 1,430 | 22.38 |
| 2000 | 1,148 | 1,452 | 20.94 |
| 2001 | 1,140 | 1,534 | 25.68 |
| 2002 | 1,110 | 1,614 | 31.23 |
| 2003 | 1,119 | 1,596 | 29.89 |
| 2004 | 1,133 | 1,715 | 33.94 |
| 2005 | 1,168 | 1,810 | 35.47 |
| 2006 | 1,249 | 1,832 | 31.82 |

Appendix 5A.5.4: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005

Table 5A.11: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005

| Year | 1 | 2 - 3 | 4 - 7 | 8 - 13 | 14 - 24 | 25 - 34 | |
|------|---------|--------|--------|--------|---------|---------|-------|
| 1971 | 19,258 | 18,021 | 14,387 | 32,408 | 7,750 | 5,364 | 2,006 |
| 1972 | 18,197 | 17,227 | 15,053 | 32,280 | 8,232 | 5,626 | 2,176 |
| 1973 | 17,785 | 16,683 | 15,891 | 32,574 | 8,342 | 5,853 | 2,224 |
| 1974 | 29,057 | 25,320 | 16,516 | 41,836 | 9,136 | 5,965 | 2,255 |
| 1975 | 28,131 | 24,597 | 14,482 | 39,079 | 8,516 | 5,667 | 2,058 |
| 1976 | 26,953 | 24,156 | 13,119 | 37,275 | 7,831 | 5,285 | 1,996 |
| 1977 | 24,915 | 21,441 | 12,707 | 34,148 | 7,584 | 5,070 | 1,811 |
| 1978 | 28,551 | 25,760 | 16,247 | 42,007 | 9,092 | 5,712 | 1,945 |
| 1979 | 30,197 | 29,858 | 18,753 | 48,611 | 9,716 | 6,037 | 2,147 |
| 1980 | 36,549 | 34,522 | 20,586 | 55,108 | 10,052 | 5,849 | 2,002 |
| 1981 | 40,580 | 34,541 | 20,187 | 54,728 | 9,161 | 5,380 | 1,791 |
| 1982 | 55,498 | 44,872 | 25,249 | 70,121 | 8,630 | 4,994 | 1,733 |
| 1983 | 64,585 | 51,370 | 27,489 | 78,859 | 7,129 | 4,949 | 1,684 |
| 1984 | 71,386 | 54,533 | 27,081 | 81,614 | 7,241 | 4,922 | 1,604 |
| 1985 | 72,896 | 54,405 | 24,171 | 78,576 | 7,164 | 4,582 | 1,519 |
| 1986 | 76,946 | 54,223 | 24,455 | 78,678 | 7,067 | 4,520 | 1,394 |
| 1987 | 79,354 | 54,712 | 24,838 | 79,550 | 7,074 | 4,485 | 1,507 |
| 1988 | 83,484 | 57,878 | 25,639 | 83,517 | 6,156 | 4,306 | 1,467 |
| 1989 | 94,218 | 67,189 | 24,984 | 92,173 | 5,869 | 4,212 | 1,478 |
| 1990 | 101,223 | 71,498 | 23,403 | 94,901 | 5,362 | 3,935 | 1,420 |
| 1991 | 103,169 | 70,452 | 21,664 | 92,116 | 4,981 | 3,429 | 1,186 |
| 1992 | 94,452 | 68,486 | 30,395 | 98,881 | 5,240 | 3,574 | 1,146 |
| 1993 | 93,585 | 64,438 | 26,072 | 90,510 | 7,630 | 3,219 | 1,066 |
| 1994 | 97,141 | 65,188 | 22,145 | 87,333 | 4,221 | 2,881 | 956 |
| 1995 | 99,099 | 64,837 | 20,288 | 85,125 | 4,021 | 2,828 | 938 |
| 1996 | 81,363 | 56,106 | 15,317 | 71,423 | 4,366 | 2,952 | 1,103 |
| 1997 | 86,269 | 47,644 | 15,737 | 63,381 | 3,787 | 3,101 | 1,176 |
| 1998 | 87,837 | 47,918 | 16,391 | 64,309 | 3,988 | 3,274 | 1,201 |
| 1999 | 88,018 | 49,350 | 16,969 | 66,319 | 4,148 | 3,271 | 1,332 |
| 2000 | 87,712 | 48,773 | 16,584 | 65,357 | 3,790 | 3,104 | 1,201 |
| 2001 | 77,926 | 50,653 | 22,455 | 73,108 | 8,044 | 4,920 | 1,782 |
| 2002 | 71,431 | 50,306 | 23,963 | 74,269 | 9,819 | 5,427 | 1,809 |
| 2003 | 70,370 | 53,022 | 25,704 | 78,726 | 10,508 | 5,892 | 1,932 |
| 2004 | 71,620 | 55,027 | 26,865 | 81,892 | 10,982 | 6,161 | 1,985 |
| 2005 | 73,117 | 57,320 | 28,435 | 85,735 | 11,599 | 6,341 | 2,037 |

Continues.....

Appendix 5A.5.4: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005 Continued

| Year | 35 - 59 | 60 - 79 | 80 - 114 | 115 - 299 | 300 - 599 | 600 - 1,199 | 1,200 and Over | All Firms Total |
|------|---------|---------|----------|-----------|-----------|-------------|----------------|-----------------|
| 1971 | 1,955 | 695 | 589 | 811 | 211 | 117 | 76 | 71,240 |
| 1972 | 2,058 | 754 | 640 | 822 | 243 | 124 | 68 | 71,220 |
| 1973 | 2,203 | 707 | 675 | 856 | 239 | 125 | 80 | 71,663 |
| 1974 | 2,195 | 709 | 634 | 821 | 221 | 134 | 82 | 93,045 |
| 1975 | 2,050 | 674 | 609 | 801 | 234 | 127 | 71 | 88,017 |
| 1976 | 1,989 | 643 | 585 | 777 | 223 | 119 | 63 | 83,739 |
| 1977 | 1,836 | 596 | 563 | 730 | 217 | 116 | 56 | 77,642 |
| 1978 | 1,918 | 620 | 549 | 733 | 224 | 115 | 54 | 91,520 |
| 1979 | 2,097 | 611 | 545 | 730 | 231 | 98 | 60 | 101,080 |
| 1980 | 1,985 | 592 | 484 | 663 | 208 | 92 | 48 | 113,632 |
| 1981 | 1,721 | 528 | 416 | 598 | 162 | 82 | 39 | 115,186 |
| 1982 | 1,682 | 498 | 411 | 562 | 152 | 76 | 38 | 144,395 |
| 1983 | 1,603 | 541 | 418 | 563 | 154 | 72 | 39 | 160,596 |
| 1984 | 1,529 | 484 | 406 | 555 | 144 | 74 | 40 | 169,999 |
| 1985 | 1,480 | 441 | 409 | 512 | 141 | 66 | 39 | 167,825 |
| 1986 | 1,502 | 448 | 369 | 501 | 130 | 71 | 34 | 171,660 |
| 1987 | 1,520 | 456 | 393 | 507 | 143 | 71 | 35 | 175,095 |
| 1988 | 1,471 | 451 | 406 | 510 | 138 | 70 | 42 | 182,018 |
| 1989 | 1,458 | 450 | 421 | 530 | 153 | 66 | 48 | 201,076 |
| 1990 | 1,305 | 442 | 432 | 507 | 150 | 69 | 47 | 209,793 |
| 1991 | 1,100 | 382 | 372 | 431 | 137 | 58 | 39 | 207,400 |
| 1992 | 1,148 | 361 | 317 | 387 | 103 | 59 | 36 | 205,704 |
| 1993 | 1,098 | 294 | 283 | 330 | 96 | 53 | 33 | 195,107 |
| 1994 | 1,008 | 325 | 262 | 356 | 92 | 50 | 32 | 194,657 |
| 1995 | 968 | 307 | 258 | 337 | 105 | 51 | 33 | 194,070 |
| 1996 | 984 | 325 | 263 | 348 | 101 | 54 | 33 | 163,315 |
| 1997 | 1,156 | 396 | 296 | 381 | 107 | 60 | 38 | 160,148 |
| 1998 | 1,263 | 419 | 319 | 405 | 125 | 56 | 40 | 163,236 |
| 1999 | 1,188 | 397 | 304 | 379 | 105 | 58 | 42 | 165,561 |
| 2000 | 1,109 | 364 | 271 | 341 | 91 | 51 | 35 | 163,426 |
| 2001 | 999 | 354 | 304 | 433 | 129 | 68 | 56 | 168,123 |
| 2002 | 1,782 | 457 | 425 | 520 | 123 | 62 | 57 | 166,181 |
| 2003 | 1,821 | 583 | 451 | 535 | 135 | 75 | 64 | 171,092 |
| 2004 | 1,906 | 550 | 464 | 560 | 148 | 75 | 60 | 176,403 |
| 2005 | 1,928 | 573 | 469 | 556 | 148 | 65 | 56 | 182,644 |

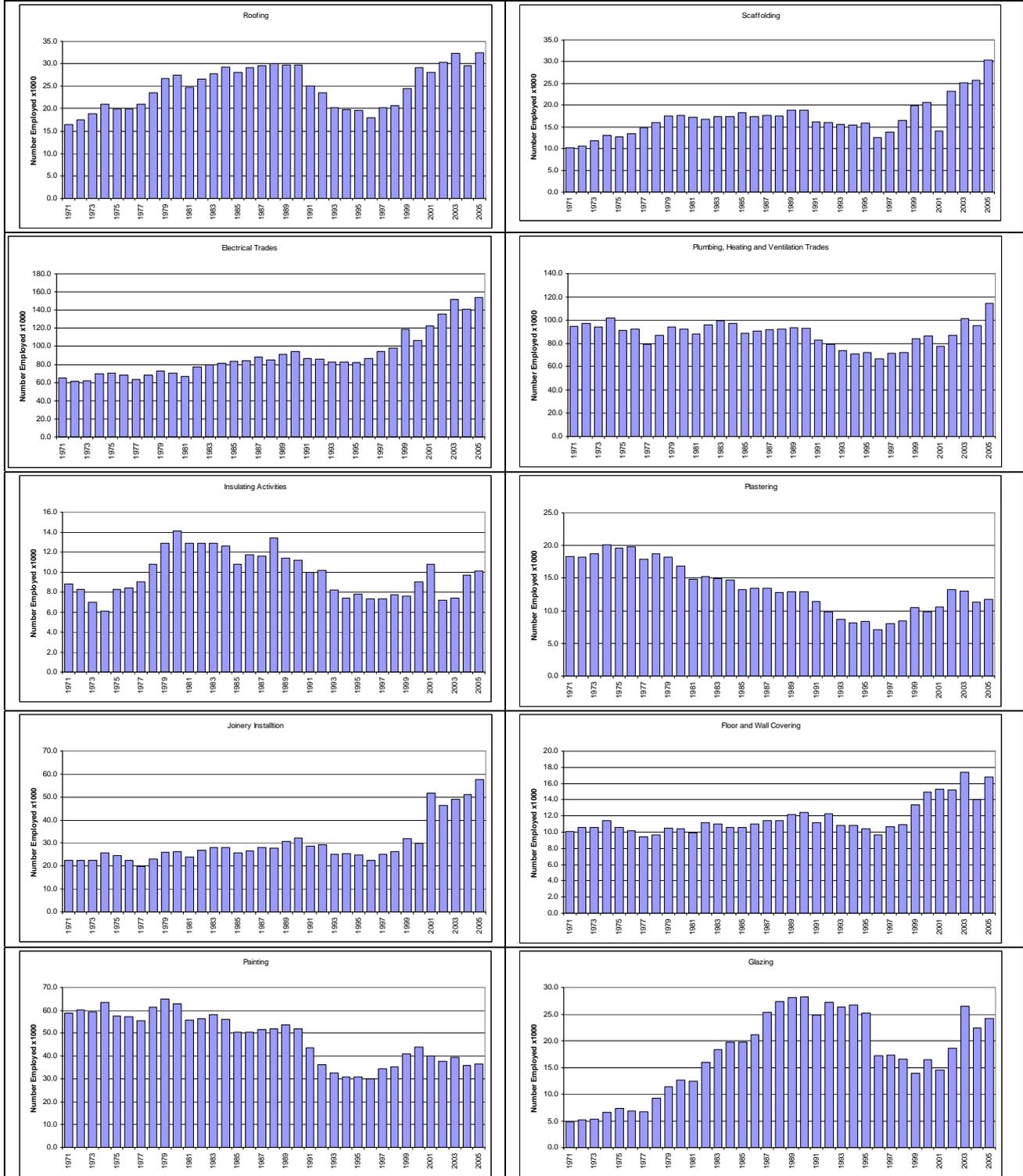
Continued.....

Appendix 5A.5.4: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005 Continued

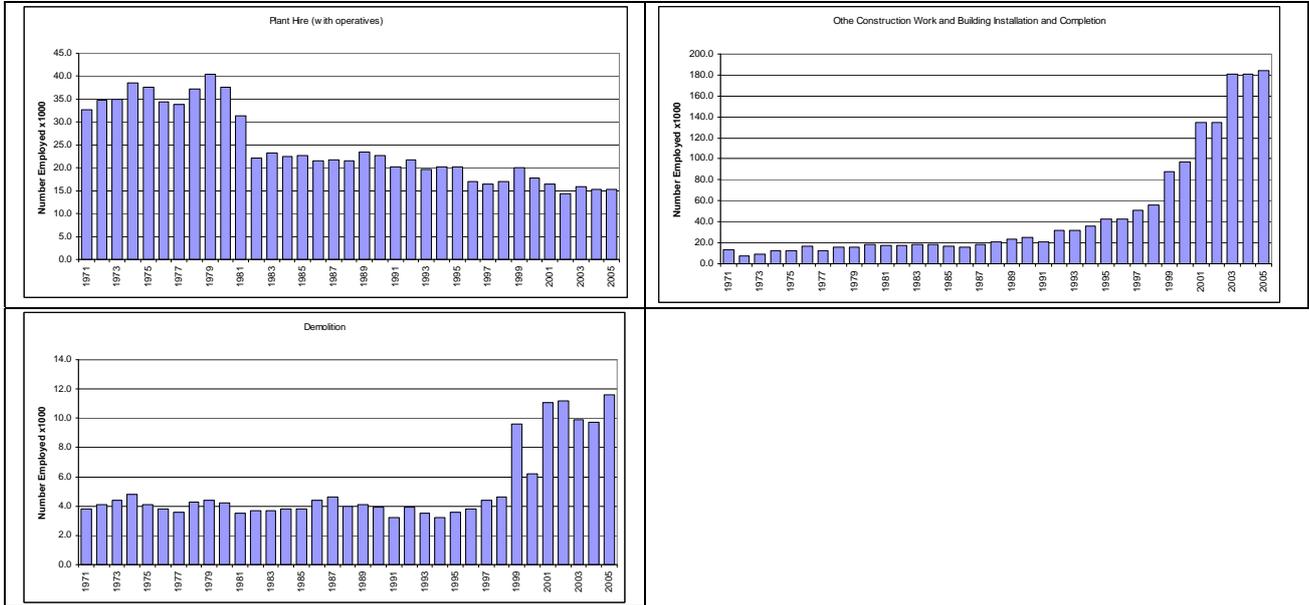
| Year | Source |
|------|---|
| 1971 | DOE (1980) Housing and Construction Statistics 1969 – 1979 (Table 26(a)) |
| 1972 | DOE (1981) Housing and Construction Statistics 1970 – 1980 (Table 28(a)) |
| 1973 | DOE (1982) Housing and Construction Statistics 1971 – 1981 (Table 27(a)) |
| 1974 | DOE (1984) Housing and Construction Statistics 1974 – 1984 (Table 3.1(a)) |
| 1975 | DOE (1984) Housing and Construction Statistics 1974 – 1984 (Table 3.1(a)) |
| 1976 | DOE (1987) Housing and Construction Statistics 1976-1986 (Table 3.1(a)) |
| 1977 | DOE (1987) Housing and Construction Statistics 1976-1986 (Table 3.1(a)) |
| 1978 | DOE (1989) Housing and Construction Statistics 1978-1988 (Table 3.1(a)) |
| 1979 | DOE (1990) Housing and Construction Statistics 1979-1989 (Table 3.1(a)) |
| 1980 | DOE (1991) Housing and Construction Statistics 1980-1990 (Table 3.1(a)) |
| 1981 | DOE (1992) Housing and Construction Statistics 1981-1991 (Table 3.1(a)) |
| 1982 | DOE (1993) Housing and Construction Statistics 1982-1992 (Table 3.1(a)) |
| 1983 | DOE (1993) Housing and Construction Statistics 1982-1992 (Table 3.1(a)) |
| 1984 | DOE (1996) Housing and Construction Statistics 1984-1994 (Table 3.1(a)) |
| 1985 | DOE (1997) Housing and Construction Statistics 1985-1995 (Table 3.1(a)) |
| 1986 | DETR (1998) Housing and Construction Statistics 1986-1996 (Table 3.1(a)) |
| 1987 | DETR (1998) Housing and Construction Statistics 1987-1997 (Table 3.1(a)) |
| 1988 | DETR (1999) Housing and Construction Statistics 1988-1998 (Table 3.1(a)) |
| 1989 | DTI (2000) Construction Statistics Annual 2000 (Table 3.1) |
| 1990 | DTI (2001) Construction Statistics Annual 2001 (Table 3.1) |
| 1991 | DTI (2002) Construction Statistics Annual 2002 (Table 3.1) |
| 1992 | DTI (2003) Construction Statistics Annual 2003 (Table 3.1) |
| 1993 | DTI (2004) Construction Statistics Annual 2004 (Table 3.1) |
| 1994 | DTI (2005) Construction Statistics Annual 2005 (Table 3.1) |
| 1995 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1996 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1997 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1998 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1999 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2000 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2001 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2002 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2003 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2004 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2005 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |

Appendix 5A.5.4: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005 Continued

Figure 5A.1: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005



Appendix 5A.5.4: Private Contractors: Numbers Employed by Size of Firms in the Construction Industry 1971~2005 Continued



Source: Housing and Construction Statistics, and Construction Statistics Annuals

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

Table 5A.12: Private Contractors: Numbers and Trades of Firms in the Construction Industry

| Year | General Builders | Building and Civil Engineering Contractors | Non-residential building | House-building | Civil Engineering | Main Trades Total |
|------|------------------|--|--------------------------|----------------|-------------------|-------------------|
| 1971 | 30,681 | 2,094 | | | 1,618 | 34,393 |
| 1972 | 30,772 | 1,980 | | | 1,757 | 34,509 |
| 1973 | 31,571 | 2,155 | | | 1,776 | 35,502 |
| 1974 | 38,885 | 2,315 | | | 2,044 | 43,244 |
| 1975 | 36,590 | 2,257 | | | 1,856 | 40,703 |
| 1976 | 34,939 | 2,174 | | | 1,714 | 38,827 |
| 1977 | 31,899 | 2,054 | | | 1,633 | 35,586 |
| 1978 | 36,407 | 2,380 | | | 1,886 | 40,673 |
| 1979 | 40,081 | 2,661 | | | 2,011 | 44,753 |
| 1980 | 44,790 | 2,910 | | | 2,191 | 49,891 |
| 1981 | 45,889 | 2,880 | | | 2,121 | 50,890 |
| 1982 | 57,565 | 3,242 | | | 2,357 | 63,164 |
| 1983 | 64,276 | 3,561 | | | 2,510 | 70,347 |
| 1984 | 68,250 | 3,722 | | | 2,651 | 74,623 |
| 1985 | 67,475 | 3,623 | | | 2,662 | 73,760 |
| 1986 | 68,324 | 3,777 | | | 2,847 | 74,948 |
| 1987 | 68,947 | 3,917 | | | 2,946 | 75,810 |
| 1988 | 70,746 | 4,075 | | | 3,108 | 77,929 |
| 1989 | 77,222 | 4,522 | | | 3,468 | 85,212 |
| 1990 | 78,981 | 4,773 | | | 3,742 | 87,496 |
| 1991 | 76,991 | 4,772 | | | 3,760 | 85,523 |
| 1992 | 74,393 | 6,180 | | | 4,312 | 84,885 |
| 1993 | 70,765 | 6,264 | | | 4,070 | 81,099 |
| 1994 | 69,160 | 6,845 | | | 4,182 | 80,187 |
| 1995 | 68,502 | 7,043 | | | 4,298 | 79,843 |
| 1996 | | | | | | 66,380 |
| 1997 | | | | | | 63,579 |
| 1998 | | | | | | 63,550 |
| 1999 | | | | | | 60,858 |
| 2000 | | | | | | 59,704 |

Continues...

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | General Builders | Building and Civil Engineering Contractors | Non-residential building | House-building | Civil Engineering | Main Trades Total |
|------|------------------|--|--------------------------|----------------|-------------------|-------------------|
| 2001 | | | 33,197 | 9,332 | 14,851 | 57,381 |
| 2002 | | | 26,201 | 13,462 | 14,380 | 54,043 |
| 2003 | | | 19,857 | 19,015 | 9,948 | 48,821 |
| 2004 | | | 16,893 | 20,947 | 8,120 | 45,960 |
| 2005 | | | 15,729 | 22,206 | 7,771 | 45,706 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Constructional Engineers | Demolition | Reinforced Concrete Specialists | Test drilling and Boring | Roofing | Asphalt and Tar Sprayers | Construction of Highways | Construction of water projects | Scaffolding | Installation of Electrical Wiring and fitting |
|------|--------------------------|------------|---------------------------------|--------------------------|---------|--------------------------|--------------------------|--------------------------------|-------------|---|
| 1971 | 360 | 298 | 230 | | 1,347 | 298 | | | 109 | 4,107 |
| 1972 | 402 | 316 | 269 | | 1,429 | 325 | | | 142 | 4,071 |
| 1973 | 408 | 326 | 288 | | 1,486 | 354 | | | 170 | 4,016 |
| 1974 | 494 | 457 | 348 | | 1,975 | 465 | | | 223 | 6,332 |
| 1975 | 469 | 427 | 304 | | 1,891 | 459 | | | 232 | 6,140 |
| 1976 | 437 | 385 | 282 | | 1,861 | 421 | | | 217 | 5,856 |
| 1977 | 407 | 376 | 278 | | 1,837 | 422 | | | 228 | 5,618 |
| 1978 | 683 | 432 | 317 | | 2,441 | 529 | | | 346 | 6,958 |
| 1979 | 910 | 475 | 353 | | 2,905 | 584 | | | 387 | 7,757 |
| 1980 | 1,096 | 483 | 388 | | 3,374 | 632 | | | 478 | 8,938 |
| 1981 | 1,092 | 458 | 367 | | 3,483 | 630 | | | 512 | 9,187 |
| 1982 | 1,154 | 523 | 435 | | 4,469 | 760 | | | 623 | 13,176 |
| 1983 | 1,396 | 573 | 482 | | 5,103 | 822 | | | 779 | 14,616 |
| 1984 | 1,516 | 564 | 496 | | 5,678 | 850 | | | 920 | 15,567 |
| 1985 | 1,560 | 559 | 515 | | 5,818 | 856 | | | 966 | 15,449 |
| 1986 | 1,694 | 608 | 551 | | 6,000 | 887 | | | 1,028 | 15,993 |
| 1987 | 1,756 | 634 | 597 | | 6,145 | 913 | | | 1,081 | 16,402 |
| 1988 | 1,919 | 616 | 632 | | 6,487 | 945 | | | 1,179 | 17,139 |
| 1989 | 2,286 | 656 | 733 | | 7,294 | 1,036 | | | 1,401 | 19,215 |
| 1990 | 2,592 | 667 | 910 | | 7,767 | 1,080 | | | 1,524 | 20,752 |
| 1991 | 2,640 | 635 | 999 | | 7,722 | 1,081 | | | 1,597 | 21,020 |
| 1992 | 2,713 | 717 | 859 | | 7,524 | 1,163 | | | 1,779 | 21,780 |
| 1993 | 2,375 | 708 | 729 | | 6,891 | 1,071 | | | 1,645 | 20,589 |
| 1994 | 2,168 | 685 | 637 | | 6,470 | 1,077 | | | 1,733 | 21,004 |
| 1995 | 1,976 | 712 | 615 | | 6,461 | 1,086 | | | 1,791 | 21,033 |
| 1996 | 1,216 | 740 | 415 | | 5,457 | 866 | | | 1,270 | 19,463 |
| 1997 | 1,002 | 750 | 357 | | 5,374 | 772 | | | 1,112 | 19,077 |
| 1998 | 864 | 793 | 321 | | 5,599 | 711 | | | 1,009 | 19,385 |
| 1999 | 1,042 | 1,021 | 351 | | 5,636 | 584 | | | 1,262 | 19,036 |
| 2000 | 1,105 | 855 | 263 | | 6,310 | 845 | | | 1,555 | 18,426 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Constructional Engineers | Demolition | Reinforced Concrete Specialists | Test drilling and Boring | Roofing | Asphalt and Tar Sprayers | Construction of Highways | Construction of water projects | Scaffolding | Installation of Electrical Wiring and fitting |
|------|--------------------------|------------|---------------------------------|--------------------------|---------|--------------------------|--------------------------|--------------------------------|-------------|---|
| 2001 | | 1,076 | | 138 | 5,985 | | 1,568 | 308 | 1,037 | 20,132 |
| 2002 | | 1,137 | | 182 | 6,252 | | 1,640 | 341 | 1,194 | 20,424 |
| 2003 | | 1,113 | | 185 | 6,664 | | 1,812 | 246 | 1,512 | 21,953 |
| 2004 | | 1,090 | | 192 | 6,886 | | 2,147 | 244 | 1,614 | 23,251 |
| 2005 | | 1,093 | | 190 | 7,086 | | 2,349 | 252 | 1,741 | 24,288 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Insulating Activities | Plumbing | Heating and Ventilating Engineers | Plumbing (including H&V) | Plastering | Joinery Installation | Flooring contractors | Floor and wall Tiling specialists | Floor and Wall Covering | Floor and Wall Covering |
|------|-----------------------|----------|-----------------------------------|--------------------------|------------|----------------------|----------------------|-----------------------------------|-------------------------|-------------------------|
| 1971 | 114 | 6,066 | 2,409 | 8,475 | 2,404 | 4,445 | 423 | 312 | | 735 |
| 1972 | 126 | 5,912 | 2,516 | 8,428 | 2,381 | 4,300 | 545 | 314 | | 859 |
| 1973 | 141 | 5,681 | 2,499 | 8,180 | 2,373 | 4,157 | 498 | 341 | | 839 |
| 1974 | 200 | 7,944 | 3,140 | 11,084 | 3,242 | 6,096 | 689 | 493 | | 1,182 |
| 1975 | 223 | 7,494 | 3,081 | 10,575 | 3,038 | 5,593 | 685 | 460 | | 1,145 |
| 1976 | 232 | 7,113 | 2,983 | 10,096 | 2,810 | 5,270 | 643 | 436 | | 1,079 |
| 1977 | 261 | 6,565 | 2,906 | 9,471 | 2,547 | 4,749 | 636 | 413 | | 1,049 |
| 1978 | 411 | 7,463 | 3,952 | 11,415 | 2,775 | 5,855 | 753 | 545 | | 1,298 |
| 1979 | 570 | 8,310 | 4,640 | 12,950 | 2,864 | 6,323 | 838 | 598 | | 1,436 |
| 1980 | 770 | 9,595 | 5,510 | 15,105 | 3,010 | 6,994 | 923 | 712 | | 1,635 |
| 1981 | 847 | 9,866 | 5,634 | 15,500 | 2,975 | 6,997 | 924 | 709 | | 1,633 |
| 1982 | 1,076 | 13,286 | 7,469 | 20,755 | 3,590 | 9,341 | 1,272 | 963 | | 2,235 |
| 1983 | 1,348 | 14,671 | 8,335 | 23,006 | 3,836 | 10,359 | 1,391 | 1,079 | | 2,470 |
| 1984 | 1,401 | 15,292 | 8,802 | 24,094 | 4,016 | 11,004 | 1,431 | 1,158 | | 2,589 |
| 1985 | 1,308 | 14,934 | 8,461 | 23,395 | 4,019 | 10,949 | 1,400 | 1,167 | | 2,567 |
| 1986 | 1,341 | 15,030 | 8,614 | 23,644 | 4,128 | 11,337 | 1,451 | 1,222 | | 2,673 |
| 1987 | 1,379 | 15,207 | 8,751 | 23,958 | 4,137 | 11,741 | 1,495 | 1,259 | | 2,754 |
| 1988 | 1,375 | 15,570 | 8,951 | 24,521 | 4,201 | 12,408 | 1,611 | 1,325 | | 2,936 |
| 1989 | 1,399 | 16,774 | 9,485 | 26,259 | 4,567 | 14,033 | 1,841 | 1,516 | | 3,357 |
| 1990 | 1,376 | 17,046 | 9,624 | 26,670 | 4,834 | 15,244 | 1,999 | 1,657 | | 3,656 |
| 1991 | 1,281 | 16,752 | 9,375 | 26,127 | 4,761 | 15,499 | 2,033 | 1,675 | | 3,708 |
| 1992 | 1,265 | 14,647 | 9,774 | 24,421 | 3,893 | 14,199 | 2,387 | 1,607 | | 3,994 |
| 1993 | 1,147 | 13,880 | 9,355 | 23,235 | 3,549 | 13,302 | 2,248 | 1,492 | | 3,740 |
| 1994 | 1,131 | 13,181 | 9,136 | 22,317 | 3,160 | 12,614 | 2,320 | 1,430 | | 3,750 |
| 1995 | 1,133 | 13,111 | 8,892 | 22,003 | 3,129 | 12,385 | 2,288 | 1,394 | | 3,682 |
| 1996 | 977 | 11,698 | 6,697 | 18,395 | 2,475 | 10,202 | 2,249 | 1,011 | | 3,260 |
| 1997 | 926 | 12,045 | 5,981 | 18,026 | 2,443 | 9,974 | 2,412 | 872 | | 3,284 |
| 1998 | 934 | 12,519 | 5,500 | 18,019 | 2,538 | 10,016 | 2,684 | 770 | | 3,454 |
| 1999 | 832 | 13,600 | 6,161 | 19,761 | 2,741 | 9,725 | 2,805 | 803 | | 3,608 |
| 2000 | 879 | 13,973 | 5,870 | 19,843 | 2,389 | 9,699 | 2,820 | 791 | | 3,611 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Insulating Activities | Plumbing | Heating and Ventilating Engineers | Plumbing (including H&V) | Plastering | Joinery Installation | Flooring contractors | Floor and wall Tiling specialists | Floor and Wall Covering | Floor and Wall Covering |
|------|-----------------------|----------|-----------------------------------|--------------------------|------------|----------------------|----------------------|-----------------------------------|-------------------------|-------------------------|
| 2001 | 939 | 18,271 | | 18,271 | 2,712 | 17,069 | | | 3,947 | 3,947 |
| 2002 | 993 | 18,853 | | 18,853 | 2,777 | 15,295 | | | 4,058 | 4,058 |
| 2003 | 933 | 20,540 | | 20,540 | 2,839 | 15,616 | | | 4,456 | 4,456 |
| 2004 | 913 | 22,179 | | 22,179 | 2,963 | 16,702 | | | 4,871 | 4,871 |
| 2005 | 936 | 23,552 | | 23,552 | 3,191 | 17,560 | | | 5,182 | 5,182 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Suspended Ceiling Contractors | Painting | Glazing | Plant hire (with operators) | Other construction work and building installation and completion. | Other construction work and building installation and completion inc suspended ceiling contractors | Specialist trades Total | All Trades Total |
|------|-------------------------------|----------|---------|-----------------------------|---|--|-------------------------|------------------|
| 1971 | 102 | 11,370 | 300 | 1,702 | 451 | 553 | 36,847 | 71,240 |
| 1972 | 115 | 11,152 | 318 | 1,701 | 468 | 583 | 36,802 | 71,220 |
| 1973 | 131 | 10,714 | 324 | 1,743 | 511 | 642 | 36,161 | 71,663 |
| 1974 | 205 | 14,292 | 496 | 2,006 | 694 | 899 | 49,791 | 93,035 |
| 1975 | 221 | 13,305 | 477 | 2,043 | 772 | 993 | 47,314 | 88,017 |
| 1976 | 231 | 12,421 | 463 | 2,089 | 762 | 993 | 44,912 | 83,739 |
| 1977 | 231 | 11,356 | 460 | 2,059 | 707 | 938 | 42,056 | 77,642 |
| 1978 | 325 | 12,350 | 933 | 2,556 | 1,223 | 1,548 | 50,847 | 91,520 |
| 1979 | 367 | 12,832 | 1,374 | 3,059 | 1,181 | 1,548 | 56,327 | 101,080 |
| 1980 | 455 | 13,341 | 1,926 | 3,545 | 1,571 | 2,026 | 63,741 | 113,632 |
| 1981 | 502 | 12,703 | 2,164 | 3,508 | 1,738 | 2,240 | 64,296 | 115,186 |
| 1982 | 665 | 14,267 | 3,036 | 3,260 | 1,866 | 2,531 | 81,231 | 144,395 |
| 1983 | 772 | 15,107 | 3,758 | 3,619 | 2,203 | 2,975 | 90,249 | 160,596 |
| 1984 | 832 | 15,232 | 4,342 | 3,740 | 2,535 | 3,367 | 95,376 | 169,999 |
| 1985 | 842 | 14,662 | 4,387 | 3,664 | 2,549 | 3,391 | 94,065 | 167,825 |
| 1986 | 922 | 14,719 | 4,640 | 3,723 | 2,819 | 3,741 | 96,707 | 171,660 |
| 1987 | 1,011 | 14,898 | 4,871 | 3,819 | 3,189 | 4,200 | 99,285 | 175,095 |
| 1988 | 1,137 | 15,053 | 4,201 | 4,009 | 4,136 | 5,273 | 102,894 | 182,018 |
| 1989 | 1,381 | 16,118 | 6,231 | 4,473 | 5,425 | 6,806 | 115,864 | 201,076 |
| 1990 | 1,554 | 16,511 | 6,531 | 4,626 | 6,003 | 7,557 | 122,297 | 209,793 |
| 1991 | 1,659 | 16,142 | 6,435 | 4,579 | 5,992 | 7,651 | 121,877 | 207,400 |
| 1992 | 1,757 | 10,788 | 7,001 | 5,621 | 11,345 | 13,102 | 120,819 | 205,704 |
| 1993 | 1,597 | 9,774 | 6,599 | 5,567 | 11,490 | 13,087 | 114,008 | 195,107 |
| 1994 | 1,509 | 8,974 | 6,918 | 5,940 | 14,383 | 15,892 | 114,470 | 194,657 |
| 1995 | 1,522 | 8,939 | 7,015 | 5,886 | 14,859 | 16,381 | 114,227 | 194,070 |
| 1996 | 2,118 | 8,284 | 4,174 | 4,607 | 13,016 | 15,134 | 96,935 | 163,315 |
| 1997 | 3,288 | 8,634 | 3,484 | 4,182 | 13,934 | 17,222 | 96,619 | 160,148 |
| 1998 | 4,529 | 8,969 | 3,128 | 3,882 | 15,535 | 20,064 | 99,686 | 163,236 |
| 1999 | 5,234 | 8,921 | 3,841 | 3,549 | 17,560 | 22,794 | 104,704 | 165,561 |
| 2000 | 3,452 | 8,507 | 3,581 | 3,245 | 19,154 | 22,606 | 103,719 | 163,426 |

Continues....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Suspended Ceiling Contractors | Painting | Glazing | Plant hire (with operators) | Other construction work and building installation and completion. | Other construction work and building installation and completion inc suspended ceiling contractors | Specialist trades Total | All Trades Total |
|------|-------------------------------|----------|---------|-----------------------------|---|--|-------------------------|------------------|
| 2001 | | 8,232 | 2,967 | 2,983 | 23,379 | 23,379 | 110,743 | 168,123 |
| 2002 | | 7,895 | 3,574 | 2,964 | 24,566 | 24,566 | 112,145 | 166,181 |
| 2003 | | 7,823 | 4,066 | 2,757 | 29,756 | 29,756 | 122,271 | 171,092 |
| 2004 | | 7,598 | 4,311 | 2,811 | 32,672 | 32,672 | 130,444 | 176,403 |
| 2005 | | 7,621 | 4,439 | 2,789 | 34,669 | 34,669 | 136,938 | 182,644 |

Continues.....

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

| Year | Source |
|------|--|
| 1971 | DOE (1980) Housing and Construction Statistics 1969 - 1979 (Table 26(b)) |
| 1972 | DOE (1981) Housing and Construction Statistics 1970 - 1980 (Table 28(b)) |
| 1973 | DOE (1982) Housing and Construction Statistics 1971 - 1981 (Table 27(b)) |
| 1974 | DOE (1984) Housing and Construction Statistics 1974 - 1984 (Table 3.1(b)) |
| 1975 | DOE (1984) Housing and Construction Statistics 1974 - 1984 (Table 3.1(b)) |
| 1976 | DOE (1987) Housing and Construction Statistics 1976 - 1986 (Table 3.1(b)) |
| 1977 | DOE (1987) Housing and Construction Statistics 1976 - 1986 (Table 3.1(b)) |
| 1978 | DOE (1989) Housing and Construction Statistics 1978 - 1988 (Table 3.1(b)) |
| 1979 | DOE (1990) Housing and Construction Statistics 1979 - 1989 (Table 3.1(b)) |
| 1980 | DOE (1991) Housing and Construction Statistics 1980 - 1990 (Table 3.1(b)) |
| 1981 | DOE (1992) Housing and Construction Statistics 1981 - 1991 (Table 3.1(b)) |
| 1982 | DOE (1993) Housing and Construction Statistics 1982 - 1992 (Table 3.1(b)) |
| 1983 | DOE (1993) Housing and Construction Statistics 1983 - 1993 (Table 3.1(b)) |
| 1984 | DOE (1996) Housing and Construction Statistics 1984 - 1994 (Table 3.1(b)) |
| 1985 | DOE (1997) Housing and Construction Statistics 1985 - 1995 (Table 3.1(b)) |
| 1986 | DETR (1998) Housing and Construction Statistics 1986 - 1996 (Table 3.1(b)) |
| 1987 | DETR (1998) Housing and Construction Statistics 1987 - 1997 (Table 3.1(b)) |
| 1988 | DETR (1999) Housing and Construction Statistics 1988 - 1998 (Table 3.1(b)) |
| 1989 | DTI (2000) Construction Statistics Annual 2000 (Table 3.1) |
| 1990 | DTI (2001) Construction Statistics Annual 2001 (Table 3.1) |
| 1991 | DTI (2002) Construction Statistics Annual 2002 (Table 3.1) |
| 1992 | DTI (2003) Construction Statistics Annual 2003 (Table 3.1) |
| 1993 | DTI (2004) Construction Statistics Annual 2004 (Table 3.1) |
| 1994 | DTI (2005) Construction Statistics Annual 2005 (Table 3.1) |
| 1995 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1996 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1997 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1998 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 1999 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2000 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |

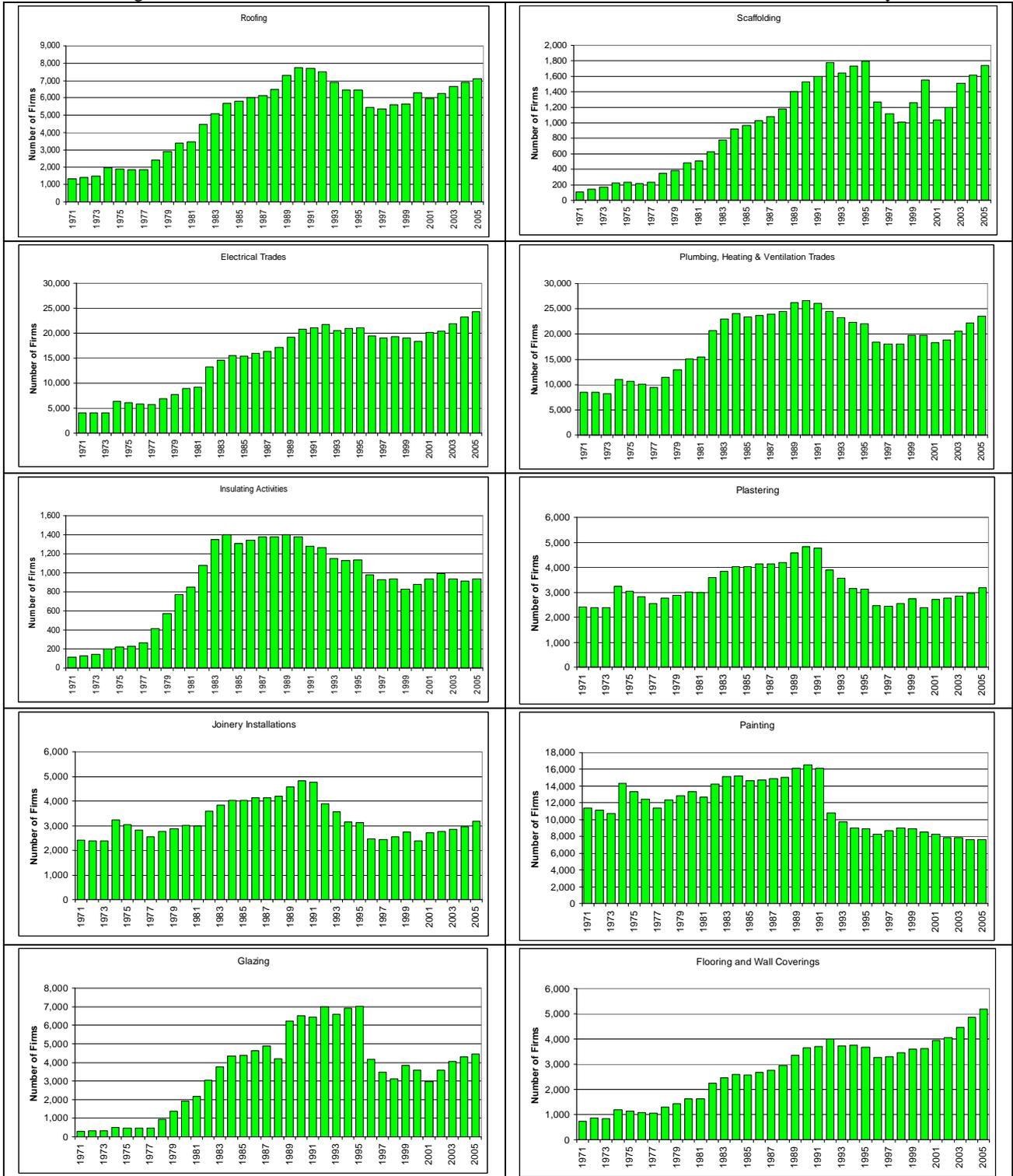
Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

... Continued

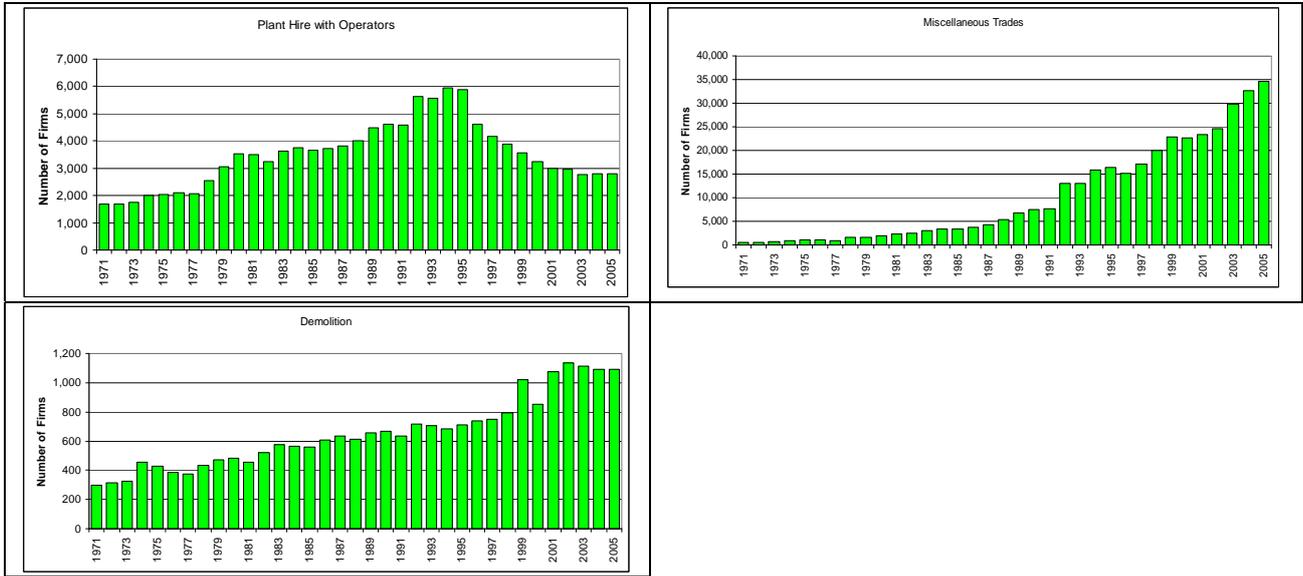
| Year | Source |
|------|--|
| 2001 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2002 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2003 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2004 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |
| 2005 | DTI (2006) Construction Statistics Annual 2006 (Table 3.1) |

Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry

Figure 5A.2: Private Contractors: Numbers and Trades of Firms in the Construction Industry



Appendix 5A.5.5: Private Contractors: Numbers and Trades of Firms in the Construction Industry



Source: Housing and Construction Statistics, and Construction Statistics Annuals

Appendix 5A.6: Insolvencies and Bankruptcies

Appendix 5A.6.1: Bankruptcies Amongst Self-employed Construction Workers 1969~2006

Table 5A.13: Bankruptcies Amongst Self-employed Construction Workers 1969~2006

| Year | Number of Bankruptcies | Percentage of all Bankruptcies | |
|-------------|-------------------------------|---------------------------------------|-------------------------|
| 1969 | 996 | 21.70 | HCS 1969-1979 Table 38 |
| 1970 | 1,057 | 21.90 | HCS 1970-1980 Table 53 |
| 1971 | 417 | 27.40 | HCS 1971-1981 Table 48 |
| 1972 | 1,091 | 27.40 | HCS 1972-1982 Table 3.2 |
| 1973 | 741 | 21.30 | HCS 1973-1983 Table 3.2 |
| 1974 | 1,056 | 19.90 | HCS 1974-1984 Table 3.2 |
| 1975 | 1,543 | 22.60 | HCS 1974-1984 Table 3.2 |
| 1976 | 1,564 | 23.00 | HCS 1976-1986 Table 3.2 |
| 1977 | 986 | 23.60 | HCS 1976-1986 Table 3.2 |
| 1978 | 894 | 24.80 | HCS 1978-1988 Table 3.2 |
| 1979 | 832 | 25.90 | HCS 1979-1989 Table 3.2 |
| 1980 | 783 | 21.10 | HCS 1980-1990 Table 3.2 |
| 1981 | 922 | 19.10 | HCS 1981-1991 Table 3.2 |
| 1982 | 988 | 18.40 | HCS 1982-1992 Table 3.2 |
| 1983 | 1,180 | 17.80 | HCS 1983-1993 Table 3.2 |
| 1984 | 901 | 11.60 | HCS 1984-1994 Table 3.2 |
| 1985 | 788 | 12.30 | HCS 1985-1995 Table 3.2 |
| 1986 | 801 | 11.80 | HCS 1986-1996 Table 3.2 |
| 1987 | 1,123 | 16.00 | HCS 1987-1997 Table 3.2 |
| 1988 | 1,590 | 20.60 | HCS 1988-1998 Table 3.2 |
| 1989 | 1,652 | 20.30 | CSA 2000 Table 3.2 |
| 1990 | 2,348 | 19.50 | CSA 2001 Table 3.2 |
| 1991 | 3,812 | 16.80 | CSA 2002 Table 3.2 |
| 1992 | 4,692 | 14.60 | CSA 2003 Table 3.2 |
| 1993 | 4,361 | 14.10 | CSA 2004 Table 3.2 |
| 1994 | 3,362 | 13.10 | CSA 2005 Table 3.2 |
| 1995 | 2,783 | 12.70 | CSA 2006 Table 3.2 |
| 1996 | 2,713 | 12.40 | CSA 2007 Table 3.2 |
| 1997 | 2,182 | 11.00 | CSA 2007 Table 3.2 |
| 1998 | 1,919 | 9.80 | CSA 2007 Table 3.2 |
| 1999 | 1,911 | 8.80 | CSA 2007 Table 3.2 |
| 2000 | 1,741 | 8.10 | CSA 2007 Table 3.2 |
| 2001 | 1,783 | 7.60 | CSA 2007 Table 3.2 |
| 2002 | 1,637 | 6.70 | CSA 2007 Table 3.2 |
| 2003 | 1,781 | 6.40 | CSA 2007 Table 3.2 |
| 2004 | 1,658 | 4.60 | CSA 2007 Table 3.2 |
| 2005 | 1,976 | 4.20 | CSA 2007 Table 3.2 |
| 2006 | 1,633 | 3.50 | CSA 2007 Table 3.2 |

Appendix 5A.6.2: Insolvencies Amongst Construction Firms 1969~2006

Table 5A.14: Insolvencies Amongst Construction Firms 1969~2006

| Year | Number of Insolvencies | Percentage of all Insolvencies | Percentage of Construction Firms | |
|-------------|-------------------------------|---------------------------------------|---|-------------------------|
| 1969 | 650 | 18.50 | | HCS 1969-1979 Table 38 |
| 1970 | 821 | 22.30 | 0.91 | HCS 1970-1980 Table 53 |
| 1971 | 651 | 18.60 | 0.73 | HCS 1971-1981 Table 48 |
| 1972 | 518 | 16.90 | 0.70 | HCS 1972-1982 Table 3.2 |
| 1973 | 500 | 19.40 | 0.83 | HCS 1973-1983 Table 3.2 |
| 1974 | 776 | 20.90 | 1.09 | HCS 1974-1984 Table 3.2 |
| 1975 | 956 | 17.70 | 1.17 | HCS 1974-1984 Table 3.2 |
| 1976 | 977 | 16.50 | 1.29 | HCS 1976-1986 Table 3.2 |
| 1977 | 1,004 | 17.20 | 1.02 | HCS 1976-1986 Table 3.2 |
| 1978 | 929 | 18.30 | 0.78 | HCS 1978-1988 Table 3.2 |
| 1979 | 789 | 17.40 | 0.84 | HCS 1979-1989 Table 3.2 |
| 1980 | 949 | 13.80 | 0.86 | HCS 1980-1990 Table 3.2 |
| 1981 | 990 | 11.50 | 0.98 | HCS 1981-1991 Table 3.2 |
| 1982 | 1,422 | 11.80 | 1.11 | HCS 1982-1992 Table 3.2 |
| 1983 | 1,776 | 13.20 | 1.08 | HCS 1983-1993 Table 3.2 |
| 1984 | 1,831 | 13.30 | 1.18 | HCS 1984-1994 Table 3.2 |
| 1985 | 1,975 | 13.30 | 1.11 | HCS 1985-1995 Table 3.2 |
| 1986 | 1,914 | 13.30 | 0.85 | HCS 1986-1996 Table 3.2 |
| 1987 | 1,490 | 13.00 | 0.81 | HCS 1987-1997 Table 3.2 |
| 1988 | 1,471 | 15.60 | 0.81 | HCS 1988-1998 Table 3.2 |
| 1989 | 1,638 | 15.70 | 1.17 | CSA 2000 Table 3.2 |
| 1990 | 2,445 | 16.20 | 1.63 | CSA 2001 Table 3.2 |
| 1991 | 3,373 | 15.50 | 1.86 | CSA 2002 Table 3.2 |
| 1992 | 3,830 | 15.70 | 1.63 | CSA 2003 Table 3.2 |
| 1993 | 3,189 | 15.40 | 1.23 | CSA 2004 Table 3.2 |
| 1994 | 2,401 | 14.40 | 0.95 | CSA 2005 Table 3.2 |
| 1995 | 1,844 | 12.70 | 0.99 | CSA 2006 Table 3.2 |
| 1996 | 1,610 | 12.00 | 0.89 | CSA 2007 Table 3.2 |
| 1997 | 1,419 | 11.30 | 0.81 | CSA 2007 Table 3.2 |
| 1998 | 1,325 | 10.00 | 0.92 | CSA 2007 Table 3.2 |
| 1999 | 1,529 | 10.70 | 0.90 | CSA 2007 Table 3.2 |
| 2000 | 1,474 | 10.30 | 0.90 | CSA 2007 Table 3.2 |
| 2001 | 1,509 | 10.70 | 1.11 | CSA 2007 Table 3.2 |
| 2002 | 1,840 | 11.30 | 1.01 | CSA 2007 Table 3.2 |
| 2003 | 1,728 | 12.20 | 0.94 | CSA 2007 Table 3.2 |
| 2004 | 1,653 | 13.60 | 0.97 | CSA 2007 Table 3.2 |
| 2005 | 1,775 | 13.80 | 0.91 | CSA 2007 Table 3.2 |
| 2006 | 1,409 | 14.10 | | CSA 2007 Table 3.2 |

Appendix 5A.7: Top Companies

Appendix 5A.7.1: Top 150 Building Contractors

Source: Top Companies (2003) Plimsoll Publishing Ltd. (online)

<http://www.majorcompanies.co.uk/companies.asp?code=cs15>

Accessed 14/07/2006

| | |
|--------------------------------------|--|
| A C Gallagher Holdings Ltd | Dawn Group Ltd |
| Alfred McAlpine Plc | Dean & Dyball Ltd |
| Allenbuild Ltd | Dew Pitchmastic Plc |
| Allied Carpets Group Plc | Durkan Holdings Ltd |
| Amec Plc | Enfield Energy Centre Ltd |
| Amey Plc | Esh Holdings Ltd |
| Anglo-Holt Group Ltd | Eugena Ltd |
| Anwyl Construction Co Ltd | Fairclough Homes Group Ltd |
| Apollo Group Holdings Ltd | Faithdean Plc |
| Ardmore Construction Ltd | Fifehead Plc |
| Ards Holdings Ltd | Fitzpatrick Ltd |
| Ashe Group Holdings Ltd | G F Tomlinson Group Ltd |
| AWG Plc | GGG Holdings Ltd |
| Balfour Beatty Plc | Geoffrey Osborne Ltd |
| Ballast Plc | GMI Construction Group Plc |
| Banner Holdings Ltd | HBG Construction Ltd |
| Barkbury Ltd | Hall & Tawse Ltd |
| Barr Holdings Ltd | Hallco 1022 Ltd |
| Barratt Developments Plc | HBG Construction Midlands Ltd |
| Bellwater Ltd | Headcrown Ltd |
| Benson Group Ltd | Henmead Ltd |
| Bethell Group Plc | Henry Boot Plc |
| Birse Group Plc | Henry Group (NI) Ltd |
| Bloor Holdings Ltd | Higgins Group Plc |
| Bolgar Ltd | Holloway White Allom Ltd |
| Border Construction (Holdings) Ltd | Hutton Construction Ltd |
| Bouygues (UK) Ltd | Ian Williams (Holdings) Ltd |
| Bovis Lend Lease Ltd | Interserve Plc |
| Bowmer And Kirkland Ltd | JMCC Holdings Ltd |
| Briggs & Forrester Group Ltd | J N Bentley Ltd |
| Bullock Construction Ltd | J W Muir Group Plc |
| Byrne Group Plc | Jack Lunn (Holdings) Ltd |
| CCG (Holdings) Ltd | Jarvis Plc |
| C-Beck Group Ltd | Jelson Holdings Ltd |
| Caddick Construction Ltd | John Graham (Dromore) Ltd |
| Canary Wharf Contractors Ltd | John Laing Plc |
| Carey Group Plc | Keepmoat Plc |
| Carillion Plc | Keltbray Group (Holdings) Ltd |
| Chase Midland Plc | Kier Group Plc |
| City Refrigeration Holdings (UK) Ltd | Kingsman (Holdings) Ltd |
| Clugston Group Ltd | Laing O'Rourke Holdings Ltd |
| Compart Ltd | Lovell Partnerships Ltd |
| Corringway Conclusions Plc | M J Gleeson Group Plc |
| Costain Group Plc | Macob Holdings Ltd |
| Cowlin Construction Ltd | Mainunit Ltd |
| Crispin & Borst Ltd | Marshall Holdings Ltd |
| Cruden Investments Ltd | McGee Group Ltd |
| D E Clegg Ltd | McNicholas Construction (Holdings) Ltd |
| David Mclean (Holdings) Ltd | McNicholas Plc |
| Davis Service Group Plc (The) | Mears Group Plc |

| | |
|--------------------------------|---------------------------------|
| Midas Group Ltd | Shepherd Building Group Ltd |
| Midas Homes Ltd | Simons Group Ltd |
| Miletrian Plc | Simpson (York) Holdings Ltd |
| Montpellier Group Plc | Skanska Construction Group Ltd |
| Morgan Sindall Plc | Strata Group Ltd |
| Newarthill Ltd | Sunley Turriff Holdings Ltd |
| North Midland Construction Plc | Taylor Woodrow Plc |
| O'Rourke Investments Ltd | Thomas Armstrong (Holdings) Ltd |
| Oak Manor Holdings Ltd | Thomas Vale Holdings Ltd |
| P C Harrington Contractors Ltd | Tolent Plc |
| P J Carey (Contractors) Ltd | United House Group Ltd |
| Pearce Group Ltd | Vinci Plc |
| Persimmon Plc | Volker Wessels Uk Ltd |
| Pettifer Group Ltd | W & R Buxton Ltd |
| Pochins Plc | Walter Lilly & Co Ltd |
| R Durtnell and Sons Ltd | Warings Contractors Ltd |
| R G Carter Holdings Ltd | Wates Group Ltd |
| R J Mcleod (Contractors) Ltd | Watkin Jones & Son Ltd |
| Robertson Group Ltd | William Davis Ltd |
| Rok Property Solutions Plc | William Kendrick & Sons Ltd |
| Rowecord Holdings Ltd | William Verry Ltd |
| Rydon Group Ltd | Willmott Dixon Ltd |
| SDC (Holdings) Ltd | Wilson Bowden Plc |
| Seddon Group Ltd | YJL Construction Ltd |
| Severfield-Rowen Plc | Yuill Group Ltd |

Appendix 5A.7.2: Top 150 Civil Engineers

Source: Top Companies (2003) Plimsoll Publishing Ltd. (online)

<http://www.majorcompanies.co.uk/companies.asp?code=cs25>

Accessed 14/07/2006

| | |
|---------------------------------------|--|
| L H 86 Ltd | George Leslie Plant Ltd |
| Accord Plc | Gleeson MCL Ltd |
| Alfred McAlpine Plc | Globemile Ltd |
| Allenbuild Ltd | H B G Construction Ltd |
| AMCO Corporation Plc | Hall Construction Services Ltd |
| Amey Plc | Hargreaves Industrial Services Ltd |
| Anglo-Dutch Dredging Co Ltd | Harper Group Plc |
| Anglo-Holt Group Ltd | Henmead Ltd |
| Ardmore Construction Ltd | Henry Boot Plc |
| Atmos Ltd | Hewlett Group Ltd (The) |
| AWG Plc | Heyrod Construction Ltd |
| Balfour Beatty Plc | Hochtief (UK) Construction Ltd |
| Bancourt Plc | Holderness Investments Ltd |
| Barhale Construction Plc | Interserve Plc |
| Barnes Construction (UK) Plc | J Breheny Contractors Ltd |
| Bethell Group Plc | JMCC Holdings Ltd |
| Bideem Holdings Ltd | Jarvis Plc |
| Birse Group Plc | John Crowley (Maidstone) Ltd |
| Bolgar Ltd | John Doyle Group Plc |
| Border Construction (Holdings) Ltd | John Laing Plc |
| Bosworth & Wakeford Ltd | John Reilly (Civil Engineering) Ltd |
| Britannia Construction Ltd | Johnston Construction Ltd |
| Butterley C E Ltd | Jupiter Ii Ltd |
| C A Blackwell Group Ltd | Kajima Construction Europe (UK) Ltd |
| C Spencer Ltd | Karl Holdings Ltd |
| Caddick Group Plc | Keller Group Plc |
| Carey Group Plc | Kier Group Plc |
| Carillion Plc | Kilnbridge Group Ltd |
| Chap (Holdings) Ltd | Land Engineering Ltd |
| Churgold Construction Holdings Ltd | Laser Holdings (UK) Ltd |
| Clancy Group Plc (The) | Lionverge Holdings Ltd |
| Clegg Construction Ltd | Lowery Ltd |
| Clugston Group Ltd | Luddon Construction Ltd |
| Coffey Construction Ltd | M Anderson Construction Ltd |
| Cofton Group Ltd | Mabey Holdings Ltd |
| Costain Group Plc | Macob Holdings Ltd |
| Cumbrian Industrials Ltd | Mainland Contractors Ltd |
| D E Clegg Holdings Ltd | Mainunit Ltd |
| Daniel Contractors Ltd | Mann Construction Ltd |
| Dean & Dyball Ltd | Marshall Holdings Ltd |
| Devine Holdings Ltd | May Gurney Integrated Services Plc |
| Dew Pitchmastic Plc | McConnell Dowell (UK) Ltd |
| Drilton Ltd | MegGee Group Ltd |
| Dyer And Butler Ltd | McLaughlin & Harvey Ltd |
| Edmund Nuttall Ltd | McNicholas Construction (Holdings) Ltd |
| ESH Holdings Ltd | McPhillips (Wellington) Ltd |
| F M Conway Ltd | Midas Group Ltd |
| F T Construction Group (Holdings) Ltd | Mitchellson Formwork & Civil Engineering Ltd |
| Fitzpatrick Contractors Ltd | Montpellier Group Plc |
| G F Tomlinson Group Ltd | Morgan Sindall Plc |
| Gatestock UK Ltd | Mouchel Parkman Plc |
| Geoffrey Osborne Ltd | Mulholland Contracts Ltd |

| | |
|--|---|
| North Midland Construction Plc | Stepnell Ltd |
| O'Halloran & O'Brien Ltd | Story Construction Ltd |
| O'Keefe Construction (Greenwich) Ltd | Sunley Turriff Holdings Ltd |
| O'Rourke Investments Ltd | T E Beach(Contractors)Limited |
| Old House Group Ltd | T J Brent Ltd |
| P J Carey (Contractors) Ltd | Tal Ltd |
| Parkman Group Plc | Thomas Armstrong (Holdings) Ltd |
| Paul John Construction (Leicester) Ltd | Thomas Vale Holdings Ltd |
| R J Mcleod (Contractors) Ltd | Thompson's Of Prudhoe Ltd |
| Raymond Brown Ltd | Tolent Plc |
| Reilly Holdings Ltd | Trant Holdings Ltd |
| Ringway Group Ltd | Tulloch Construction Group Ltd |
| Roger Bullivant Ltd | UCS Civils Ltd |
| Rom Group Ltd | VHE Construction Plc |
| Rowecord Holdings Ltd | W A Developments Ltd |
| Rowlinson Holdings Ltd | W H Brown Construction (Dundee) Ltd |
| SEH (Holdings) Ltd | W J Harte Construction Ltd |
| Scanmoor Ltd | Walter Lawrence Civil & Mechanical Ltd |
| Shaw Group UK Holdings | Warings Construction Group Holdings Ltd |
| Siac Construction (UK) Ltd | Waterman Group Plc |
| Skanska Construction Group Ltd | White Young Green Plc |
| SMS Holdings Ltd | Wrekin Construction Co Ltd |
| SOL Construction Ltd | |
| SSE Utility Services Plc | |

Appendix 5A.7.3: Top 150 House Building Companies

Source: Top Companies (2003) Plimsoll Publishing Ltd. (online)

<http://www.majorcompanies.co.uk/companies.asp?code=cs50>

Accessed 14/07/2006

| | |
|----------------------------------|--|
| A & H Gadd Ltd | Connaught Plc |
| A & J Stephen (Holdings) Ltd | Connolly Holdings Plc |
| A B Hamilton Holdings Ltd | Consort Homes Ltd |
| A C Lloyd (Asset Management) Ltd | Construct Reason Ltd |
| A J Moran Ltd | Country & Metropolitan Plc |
| Abbey Manor Group Ltd | Crest Nicholson Plc |
| Abbotshall Homes Ltd | Croudace Group Ltd |
| Ackroyd & Abbott Ltd | Cypress Point Holdings Ltd |
| Agetur (UK) Ltd | D J Laing (Contracts) Ltd |
| Aitch Group Holdings Ltd | Dacerell Ltd |
| Alfred Mcalpine Plc | David Mclean (Holdings) Ltd |
| Apple Homes Ltd | David Payne Homes Ltd |
| Arncliffe Homes Ltd | Derek Ingram Homes Plc |
| Arrow Property Investments Ltd | Direct Build Services (Developments) Ltd |
| Artisan (UK) Plc | Dorbcrest Homes Ltd |
| Avonside Group Ltd | Doric Developments (Bath) Ltd |
| Awg Residential Ltd | Doverline Ltd |
| Banner Homes Group Plc | Dunaskin Street Ltd |
| Barnfield Contractors (UK) Ltd | Dunisane Seacrest Ltd |
| Barratt Developments Plc | Durkan Holdings Ltd |
| Bayfordbury Holdings Ltd | E G Carter & Co Ltd |
| Beal Holdings Ltd | Elite Homes (North) Ltd |
| Beechcroft Ltd | Emerson Developments (Holdings) Ltd |
| Bellcross Co Ltd | Ennstone Plc |
| Bellway Plc | ESH Holdings Ltd |
| Belmont Homes Ltd | F T Construction Group (Holdings) Ltd |
| Ben Bailey Plc | Fairbriar Plc |
| Berkeley Group Plc (The) | Fairclough Homes Group Ltd |
| Bewley Homes Plc | Fairview Holdings Ltd |
| Bovis Homes Group Plc | Flower & Hayes Ltd |
| Bowey Group Ltd | Francis Jackson Estates Ltd |
| Bowmer And Kirkland Ltd | Frank Galliers Holdings Ltd |
| Britannia Developments Ltd | Galliford Try Plc |
| Broadgate Homes Ltd | George Wimpey Plc |
| Cala Group Ltd | Gladedale Holdings Plc |
| Calmont Homes (Pollokshaws) Ltd | Glossbrook Builders Ltd |
| Cannock Investments Ltd | Goldcrest Homes Plc |
| Carvill Group Ltd | H G Construction (Holdings) Ltd |
| Cathedral Group Plc | Hagan Homes Ltd |
| Cavanna Group Ltd | Hallco 1022 Ltd |
| CDC2020 Plc | Hanson Plc |
| Cecil M Yuill Ltd | Harron Group Ltd |
| Centex Development Co UK Ltd | Havelan Ltd |
| Charlton Homes Ltd | Headcrown Ltd |
| Chartdale Ltd | Hearthstead Homes Ltd |
| Chase Midland Plc | Henry Boot Plc |
| Chelsea Harbour Ltd | Heriot Developments (Holyrood) Ltd |
| Chestnut Homes Ltd | Heron Land Developments Ltd |
| Churchill Retirement Living Ltd | Higgins Group Plc |
| Citigate Dewe Rogerson Ltd | Hillreed Homes Ltd |
| Classic Home Co Ltd (The) | Hodson Developments Ltd |
| Clayson Country Homes Ltd | Hollybrook Homes Ltd |

| | |
|--------------------------------------|---------------------------------------|
| Hope Homes (Scotland) Ltd | Morrison City Quay Dundee Ltd |
| HPC (Homes) Ltd | Mount Anvil Group Ltd |
| Hubert C Leach Ltd | Nationcrest Plc |
| Hugh Bourn Developments (Wragby) Ltd | Newfield Construction Ltd |
| Hunter Construction (Aberdeen) Ltd | Newland Homes Ltd |
| J A Pye (Oxford) Holdings Ltd | Nicholas King Homes Holdings Plc |
| J Armor Ltd | Northgate Plc |
| J B Bennett (Contracts) Ltd | O'Brien Properties Ltd |
| J B Leadbitter & Co Ltd | Oakbridge Homes Ltd |
| J Greenwood (Builders) Ltd | Oakdene Homes Plc |
| J J McGinley Ltd | Octagon Group Ltd |
| J P Whelan (Investments) Ltd | Ogilvie Group Ltd |
| J S Bramley (Holdings) Ltd | Old Carrwood Homes Ltd |
| J W Muir Group Plc | Orchard Homes & Developments Ltd |
| Jack Lunn (Holdings) Ltd | Orion Developments Ltd |
| Jelson Holdings Ltd | P & BSB 1 Ltd |
| Jennings Holdings Ltd | P Hughes Construction Ltd |
| John Laing Plc | Pacific Shelf 1117 Ltd |
| John Turner Group Ltd | Parkridge Holdings Ltd |
| JP Group Ltd | PCBL Ltd |
| K B Benfield Group Holdings Ltd | Pentland Homes Ltd |
| K Phillips Ltd | Persimmon Plc |
| K W Linfoot Plc | Planestation Group Plc |
| Keepmoat Plc | Poltair Homes Plc |
| Keigar Homes Ltd | Portford Homes Ltd |
| Kelvin Homes Ltd | Propensity Group Ltd |
| Kier Group Plc | R B Farquhar (Holdings) Ltd |
| Kingsway Homes Ltd | Rectory Homes Ltd |
| Kirkwood Homes Ltd | Redrow Plc |
| Knight Developments Ltd | Richmond Homes (Scotland) Ltd |
| Ladyhill Holdings Ltd | Ro Trading Ltd |
| Lancing Homes Ltd | Robert Hitchins Group Ltd (The) |
| Land Charter Homes Plc | Robert Leonard Group Plc |
| Langley Holdings Plc | Robertson Group Ltd |
| Laurence Homes (Eastern) Ltd | Rok Property Solutions Plc |
| Linden Ltd | Rosemead Homes Ltd |
| Llanmoor Development Co Ltd | Rowe & Co Cornwall (Holdings) Limited |
| Lowry Homes Plc | Roxan Construction Ltd |
| Lupus Capital Plc | Runnymede Homes Ltd |
| M J Gleeson Group Plc | Rydon Group Ltd |
| MacFarlane Homes (Bonnybridge) Ltd | S Harrison Group Ltd |
| MacTaggart & Mickel Ltd | Scion Group Ltd |
| Manor Kingdom Holdings Ltd | Scotia Developments Ltd |
| Mansard Country Homes Ltd | Seddon Group Ltd |
| Mareand Construction Ltd | Senator Homes Ltd |
| Martin Grant (Holdings) Ltd | Shepherd Building Group Ltd |
| McCann Homes Ltd | Squires Bridge Ltd |
| McCarthy & Stone Plc | St James Group Ltd |
| McDermott Developments Ltd | Stewart Milne Group Ltd |
| McInerney Group Ltd | Story Construction Ltd |
| Merryland Properties Ltd | Strata Group Ltd |
| Mersea Homes Ltd | Strathclyde Homes Ltd |
| Meryl Construction Ltd | Sunley Family Ltd |
| Michael Goodall Quality Homes Ltd | Swan Hill Group Plc |
| Milford Group Ltd | T A Fisher (Holdings) Ltd |
| Millwood Designer Homes Ltd | T Wright & Son (Holdings) Ltd |
| Moody Homes Ltd | Taggart Holdings Ltd |
| Morris Group Ltd | Taylor Woodrow Plc |

| | |
|-------------------------------------|-----------------------------|
| Telford Homes Plc | Westbuild Homes Ltd |
| Testcourse Ltd | Westbury Plc |
| Thames Vale Homes Ltd | Westleigh Developments Ltd |
| Thomas Armstrong (Holdings) Ltd | Weston Group Plc |
| Thomas Mitchell Homes Ltd | Westpoint Homes Ltd |
| TLA Holdings Ltd | Westwall Group Ltd |
| TPT Holdings Ltd | Wheeldon Brothers Ltd |
| Tulloch Homes Group Ltd | Wild Bennett Homes Ltd |
| Turnberry Homes Ltd | William Hargreaves Ltd |
| Unicoin New Homes Plc | William Kendrick & Sons Ltd |
| W & R Buxton Ltd | Wilson Bowden Plc |
| W J Watkins & Son Ltd | Windsor Homes Plc |
| Wainhomes (South West) Holdings Ltd | Wolsey Group Ltd |
| Walker Holdings (Scotland) Ltd | Wrekin Group Plc |
| Wates Group Ltd | Wulfrun Homes Ltd |

Appendix 5A.8: Qualification Schemes

Appendix 5A.8.1: The National Qualifications Framework and the Framework for Higher Education Qualifications

Table 5A.15: The National Qualifications Framework and the Framework for Higher Education Qualifications

| National Qualifications Framework (NQF) | | Framework for Higher Education Qualifications (FHEQ) |
|--|--|--|
| Previous levels (Examples) | Current levels (Examples) | Levels (Examples) |
| Level 5 Level 5 NVQ in Construction management, Level 5 Diploma in Translation | Level 8 Specialist awards | D (doctoral) Doctorates |
| | Level 7 Level 7 Diploma in Translation | M (masters) Masters degrees, postgraduate certificates and diplomas |
| LEVEL 4 Level 4 NVQ in Advice and Guidance* Level 4 National Diploma in Professional Production Skills Level 4 BTEC Higher National Diploma in 3D Design Level 4 Certificate in Early Years | Level 6 Level 6 National Diploma in Professional Production Skills | H (honours) Bachelor degrees, graduate certificates and diplomas |
| | Level 5 Level 5 BTEC Higher National Diploma in 3D Design | I (intermediate) Diplomas of higher education and further education, foundation degrees and higher national diplomas |
| | Level 4 Level 4 Certificate in Early Years | C (certificate) Certificates of higher education |
| Level 3 Level 3 Certificate in Small Animal Care Level 3 NVQ in Aeronautical Engineering A levels | | |
| Level 2 Level 2 Diploma for Beauty Specialists Level 2 NVQ in Agricultural Crop Production GCSEs Grades A*-C | | |
| Level 1 Level 1 Certificate in Motor Vehicle Studies Level 1 NVQ in Bakery GCSEs Grades D-G | | |
| Entry level Entry Level Certificate in Adult Literacy | | |

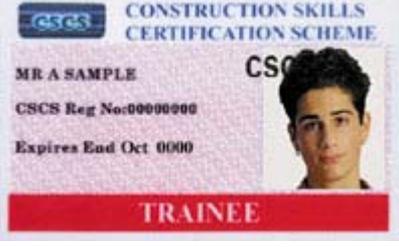
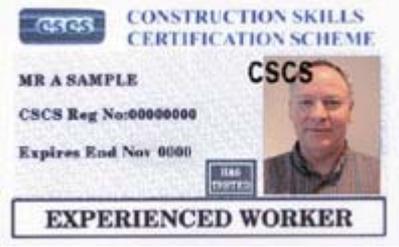
* Revised levels are not currently being implemented for NVQs at levels 4 and 5

Source: adapted from: QCA (2006) *The National Qualifications Framework*, London, QCA.

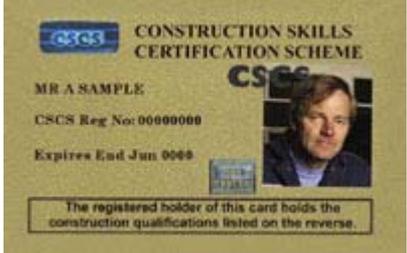
Appendix 5A.8: Qualification Schemes

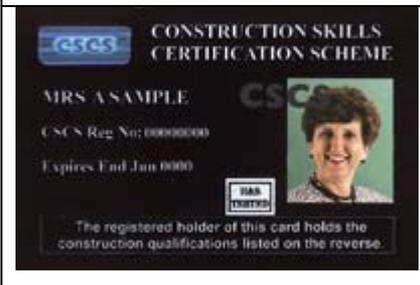
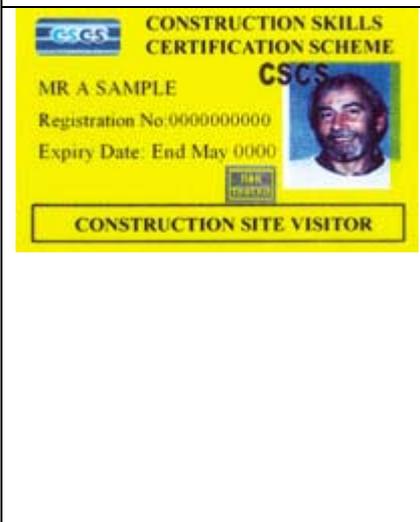
Appendix 5A.8.2: The Construction Skills Certification Scheme: Card Types

Figure 5A.3: The Construction Skills Certification Scheme: Card Types

| Card | Description |
|---|---|
|  | <p><u>Red Card: Trainee</u></p> <p>There are two types of red cards which are both for new entrants to occupations in the construction industry.</p> <p>Trainee Cards (Craft and Operative)</p> <p>You will qualify for this card if you are a trainee, and registered for an NVQ or SVQ (or Construction Award) but have not yet achieved level 2 or 3.</p> <p>Trainee Card (Technical, Supervisory and Management)</p> <p>You will qualify for this card if you can provide evidence of current registration with a further/higher education college for a nationally recognised construction related qualification. Or you can qualify if you can provide evidence of satisfactorily completing a nationally recognised construction related course in a further/higher education college.</p> <p>Trainees have the choice between the standard CSCS health and safety course or the health and safety test.</p> <p>The cards are valid for three years. However, the Trainee (Technical, Supervisory and Management) card can be renewed for a further three years on application.</p> |
|  | <p><u>Green Card: Construction Site Operative</u></p> <p>The green card is available to operatives who carry out basic site skills only and on the reverse shows the occupation the individual is involved in.</p> <p>There are two ways to apply for a green card: via NVQ level 1; or by employer's recommendation (industry accreditation), which is only open for a limited period of time. The employer must use the industry accreditation competencies, when assessing the applicant.</p> |
|  | <p><u>Blue Card: Experienced Worker/Craft</u></p> <p>This card is available to everyone with on the job experience (normally at least one year in the last three), but missed the industry accreditation opportunity.</p> <p>To qualify for a card you need to:</p> <ul style="list-style-type: none"> • Check to see if your trade is covered by CSCS. • Pass the health and safety test <p>The card is valid for one year and is non-renewable. The card is issued on a temporary basis, while a NVQ or SVQ is being achieved. It is expected to be replaced by a skilled five year card on achievement of NVQ or SVQ Level 2 or higher.</p> <p>An Experienced Worker Card can not be replaced by a Construction Site Operative or a Basic Skills Green Card.</p> |

Continues...

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|---|--|
| | <p>...continued</p> <p><u>Blue Card: Skilled Worker</u> You may qualify for a blue skilled card if you have achieved an NVQ or SVQ level 2 or if you have completed an employer sponsored apprenticeship and completed a City and Guilds of London Institute Craft Certificate. If you do not have these qualifications, you may apply for a skilled card if you are experienced in your job (see Experienced Worker Card for more information)</p> <p><u>Blue Card: Experienced Manager</u> This card is available to everyone with on the job experience (normally one year in the last three). If you have an NVQ or SVQ level 3, 4 or 5, or are a member of certain professional institutions. If you do not have these qualifications, you may apply for a skilled card if you are experienced in your job and your occupation is available through industry accreditation. Industry accreditation is open for a limited time only. To qualify for a card you need to:</p> <ul style="list-style-type: none"> • Check to see if your trade is covered by CSCS. • Pass the health and safety test. • Register for an NVQ or SVQ. • Complete an NVQ or SVQ profiling session. <p>This card is valid for three years and is non-renewable. The card is issued on a temporary basis, while a NVQ or SVQ is being achieved. It is expected to be replaced by a skilled five year card on achievement of NVQ or SVQ Level 3 or higher.</p> |
|  | <p><u>Gold Card: Skilled Worker</u> You may qualify for a gold skilled card if you have achieved an NVQ or SVQ level 3, or if you have completed an approved indentured apprenticeship (e.g. with NJCBI, BATJIC etc.) or an employer sponsored apprenticeship and completed a City and Guilds of London Institute Advanced Craft Certificate. If you do not have these qualifications, you may a skilled card if you are experienced in your job see Experienced Worker Card for more information.</p> <p><u>Gold Card: Supervisor</u> You may qualify for a gold supervisor card if you are involved in supervisor occupations. Cards can be applied for through industry accreditation, for three years from release date, or by achievement of an NVQ or SVQ level 3 in a supervisory occupation. Some of these occupations may be covered by the Professional Membership Mapped Route. For those who apply after industry accreditation has closed, entry will be by NVQ or SVQ level 3 or by applying for an experienced manager card.</p> |

| | |
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|  | <p><u>Platinum Card: Manager</u></p> <p>The platinum card is available for manager occupations.</p> <p>You may apply for a card through <u>industry accreditation</u>, for three years from release date, or by achievement of an NVQ or SVQ level 4 in one of the occupations above.</p> <p>Some of the occupations may be covered by the <u>Professional Membership Mapped Route</u>.</p> <p>For those who apply after industry accreditation has closed, entry will be by NVQ or SVQ level 4 or by applying for an <u>experienced manager card</u>.</p> <p>All applicants must pass the manager level construction health and safety test.</p> |
|  | <p><u>Black Card: Senior Manager</u></p> <p>The black card is available for senior manager occupations.</p> <p>Achievement of an NVQ or SVQ level 5 in a relevant occupation is required to apply for this CSCS card.</p> <p>For those who do not have and NVQ or SVQ level 5 application is by the <u>experienced manager card</u>.</p> <p>All applicants must pass the PQP <u>health and safety test</u>.</p> |
|  | <p><u>Yellow Card: Professionally Qualified Person</u></p> <p>The yellow PQP card is for non-site based professionals who have health and safety responsibilities such as Consultants, Client Architects, Surveyor and Engineers, but are not resident on site (CSCS defines residency as normally spending no more than 30 days on site in any six month period).</p> <p>In order to apply for a card the applicant must:</p> <ul style="list-style-type: none"> • Be a chartered member of an approved institution • Pass the PQP Health and Safety test • Have up to date continuing professional development records for the last two years relevant to the area of work in which they are in. <p>Cards are valid for five years and are renewal on re-verification of the PQP criteria.</p> |
|  | <p><u>Yellow Card: Regular Visitor (No Construction skills)</u></p> <p>The yellow Regular Visitor Card is for people who frequently visit a construction site, but have no construction specific skill.</p> <p>The card is issued on a personal basis via application form, the applicant will need to take and pass the CSCS Operative health and safety test.</p> <p>The card has been designed to allow access to a Construction Site to be made easier, as the health and safety test status can reduce the amount of site induction that is required.</p> <p><u>Important Notes:</u></p> <p>Although the health and safety tested status can reduce the amount of site health and safety induction required, some site-specific health and safety induction may also</p> |

| | |
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| | <p>be required. The issue of this card does not relieve the site managers from their legal obligation to ensure the health, safety and welfare of people entering their sites.</p> |
|  | <p><u>White Card: Construction Related Occupation</u> This card covers construction related occupations not covered by the other categories of card and shows the holder's occupation. A CRO card is valid for five years and to renew it applicants must retake and pass the health and safety test.</p> |

Source: CSCS (2007a)

Appendix 5A.9: The Questionnaire

Figure 5A.4: The Questionnaire

|  225451 – CP – IE – 2005 – Minerva | |
|--|---|
| Optional information | |
| Name: _____ | Phone: _____ |
| Job title: _____ | e-mail: _____ |
| Company: _____ | |
| Address: _____ | |
| Question 1 | To what extent does your organisation have a formal staff development policy? <input type="checkbox"/> Not at all <input type="checkbox"/> For some staff only <input type="checkbox"/> For most staff <input type="checkbox"/> For all staff Optional comments/explanations _____ If you answered 'Not at all' to this question please go to question 4 |
| Question 2 | Does the policy formally require staff to undertake development activities? <input type="checkbox"/> Not at all <input type="checkbox"/> Partly <input type="checkbox"/> Mostly <input type="checkbox"/> Fully Optional comments/explanations _____ |
| Question 3 | To what extent is the staff development policy implemented? <input type="checkbox"/> Not at all <input type="checkbox"/> Partly <input type="checkbox"/> Mostly <input type="checkbox"/> Fully Optional comments/explanations _____ |
| Question 4 | To what extent does your organisation have a staff appraisal policy? <input type="checkbox"/> Not at all <input type="checkbox"/> For some staff only <input type="checkbox"/> For most staff <input type="checkbox"/> For all staff Optional comments/explanations _____ If you answered 'Not at all' to this question please go to question 7 |
| Question 5 | To what extent is the staff appraisal policy implemented? <input type="checkbox"/> Not at all <input type="checkbox"/> Partly <input type="checkbox"/> Mostly <input type="checkbox"/> Fully Optional comments/explanations _____ |

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Appendix 5A.9: The Questionnaire continued

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|---|--|
| Question 6 | Does the appraisal policy include staff development opportunities? |
| <input type="checkbox"/> No <input type="checkbox"/> For a few staff only <input type="checkbox"/> For most staff <input type="checkbox"/> For all staff | |
| Optional comments/explanations | |
| Question 7 | To what extent does your organisation encourage staff development activities? |
| <input type="checkbox"/> Not at all <input type="checkbox"/> Partly <input type="checkbox"/> Mostly <input type="checkbox"/> Fully | |
| Optional comments/explanations | |
| Question 8 | Do your employee's contracts of employment have a formal staff development requirement? |
| <input type="checkbox"/> No <input type="checkbox"/> For a few staff only <input type="checkbox"/> For most staff <input type="checkbox"/> For all staff | |
| Optional comments/explanations | |
| Question 9 | Which of the following best describes your organisation's approach to staff development? (please tick ONE box only) |
| <input type="checkbox"/> Staff development isn't necessary. | |
| <input type="checkbox"/> Staff should take full responsibility for their own development. | |
| <input type="checkbox"/> The organisation takes full responsibility for staff development. | |
| <input type="checkbox"/> Staff development is a joint responsibility between organisation and staff. | |
| Optional comments/explanations | |
| Question 10 | Does your organisation have a formal staff development/training unit? |
| <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| Optional comments/explanations | |
| Question 11 | Does your organisation offer or provide staff development/training opportunities to non-employees (e.g. subcontractors' / suppliers staff)? |
| <input type="checkbox"/> No <input type="checkbox"/> Yes Subcontractors' staff <input type="checkbox"/> Yes Self-employed staff <input type="checkbox"/> Yes Suppliers' staff | |
| Optional comments/explanations | |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------------------|--|
| Question 12 | Below are a number of reasons commonly given by organisations for not undertaking staff development. Please indicate your organisations approach to each statement. |
| a) | Our staff don't need development: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| b) | Staff development is too expensive: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| c) | Staff development is too time-consuming: <input type="checkbox"/> Don't agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| d) | Staff are too busy to undertake staff development: <input type="checkbox"/> Don't agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| e) | If we develop staff they will probably leave and go to another employer who would pay them more: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| f) | We don't have the training resources available: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| g) | It will stop and/or clash with other training: <input type="checkbox"/> Don't agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| h) | Staff development takes too long: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| i) | Those needing to learn lack the skills necessary to learn: <input type="checkbox"/> Don't agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| j) | There is a lack of potential in those needing to learn: <input type="checkbox"/> Fully agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Don't agree |
| k) | Training is rejected by management, learners or the culture of the organisation: <input type="checkbox"/> Don't agree <input type="checkbox"/> Partly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| Optional comments/explanations | |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------|--|
| Question 13 | Does your organisation support/encourage employees' interaction with higher education institutions (universities) in any of the following ways? (please tick all that apply) |
| | <input type="checkbox"/> Giving guest lectures/talks. |
| | <input type="checkbox"/> Host site visits. |
| | <input type="checkbox"/> Provide students with industrial placements. |
| | <input type="checkbox"/> Part-time lectureships. |
| | <input type="checkbox"/> Provide bursaries/sponsorships for students in higher education (universities). |
| | <input type="checkbox"/> Provide students with workplace learning opportunities. |
| | <input type="checkbox"/> Supply learning/support materials to academic institutions, e.g. projects, reports, etc. |
| | <input type="checkbox"/> Others (please specify). |
| | Optional comments/explanations |

| | |
|--------------------|--|
| Question 14 | Does your organisation support formal links with higher education institutions (universities) in any of the following ways? (please tick all that apply) |
| | <input type="checkbox"/> Sponsoring prizes for students. |
| | <input type="checkbox"/> Sponsoring of courses. |
| | <input type="checkbox"/> Sponsoring of educational resources (computers, books, materials, software, etc.). |
| | <input type="checkbox"/> Sponsoring of academic staff. |
| | <input type="checkbox"/> Sponsoring of educational facilities (computer rooms, libraries, laboratories, resource rooms, etc.). |
| | <input type="checkbox"/> Provide work placement secondments for university staff. |
| | <input type="checkbox"/> Allow academic secondments for your employees. |
| | <input type="checkbox"/> Provision of learning/support materials to academic institutions, e.g. projects, reports, etc. |
| | <input type="checkbox"/> Others (please specify) |
| | Optional comments/explanations |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------|---|
| Question 15 | Which of the following non-academic education, training and development opportunities does your organisation support/employ? (please tick all that apply) |
| | <input type="checkbox"/> Desk/work-place briefings. |
| | <input type="checkbox"/> In-tray exercises. |
| | <input type="checkbox"/> Colleague mentoring. |
| | <input type="checkbox"/> External management/training consultants. |
| | <input type="checkbox"/> In-house training & development staff. |
| | <input type="checkbox"/> Management-led talks/seminars/workshops (non-T&D staff) |
| | <input type="checkbox"/> CPD accredited by professional institutions |
| | <input type="checkbox"/> Others (please specify) |
| | Optional comments/explanations |

| | |
|--------------------|---|
| Question 16 | How effective does your organisation find each of the following in meeting its needs: |
| a) | Desk/workplace briefings: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| b) | In-tray exercises: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| c) | Colleague mentoring: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| d) | External management/training consultants: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| e) | In-house training and development staff: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| f) | Management-led talks/seminars/workshops (non-T&D staff): |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| g) | CPD accredited by professional institutions: |
| | <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| | Optional comments/explanations |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------|---|
| Question 17 | Which of the following academic education, training and development opportunities does your organisation support/employ? (please tick all that apply) |
| | <input type="checkbox"/> Block-release sub-degree level courses run by further education institutions |
| | <input type="checkbox"/> Part-time sub-degree level courses run by further education institutions |
| | <input type="checkbox"/> Full-time sub-degree level courses run by further education institutions |
| | <input type="checkbox"/> Distance-learning sub-degree level courses run by further education institutions |
| | <input type="checkbox"/> Block-release degree level courses run by higher education institutions |
| | <input type="checkbox"/> Part-time degree level courses run by higher education institutions |
| | <input type="checkbox"/> Full-time degree level courses run by higher education institutions |
| | <input type="checkbox"/> Distance-learning degree level courses run by higher education institutions |
| | <input type="checkbox"/> Block-release post-graduate degree level courses run by higher education institutions |
| | <input type="checkbox"/> Part-time post-graduate degree level courses run by higher education institutions |
| | <input type="checkbox"/> Full-time post-graduate degree level courses run by higher education institutions |
| | <input type="checkbox"/> Distance-learning post-graduate degree level courses run by higher education institutions |
| | <input type="checkbox"/> Others (please specify) |
| | Optional comments/explanations |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------------------|---|
| Question 18 | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs. |
| a) | Block-release sub-degree level courses run by further education institutions: <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| b) | Part-time sub-degree level courses run by further education institutions: <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| c) | Full-time sub-degree level courses run by further education institutions: <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| d) | Distance-learning sub-degree level courses run by further education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| e) | Block-release degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| f) | Part-time degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| g) | Full-time degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| h) | Distance-learning degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| i) | Block-release post-graduate degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| j) | Part-time post-graduate degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| k) | Full-time post-graduate degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| l) | Distance-learning post-graduate degree level courses run by higher education institutions <input type="checkbox"/> Not effective <input type="checkbox"/> Rarely Effective <input type="checkbox"/> Mostly Effective <input type="checkbox"/> Fully Effective |
| Optional comments/explanations | |
| | |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------------------|---|
| Question 19 | Please indicate your organisation's use of education/training and development in respect of the following situations (other than for trainees and induction of new employees): |
| a) | To overcome current skills/knowledge deficits: <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| b) | In response to past problems of skills /knowledge deficits : <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| c) | To meet anticipated future skills/knowledge deficits <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| d) | To prepare staff for future career advancement (future promotion). <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| e) | To enable staff to become effective in new roles (newly promoted) <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| f) | To widen staff skills/knowledge in existing roles. <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| g) | To enhance staff skills/knowledge in existing roles. <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| h) | To maintain effectiveness of staff skills/knowledge in current roles. <input type="checkbox"/> Never <input type="checkbox"/> Occasionally <input type="checkbox"/> Often <input type="checkbox"/> Always |
| Optional comments/explanations | |

| | |
|--------------------------------|---|
| Question 20 | To what extent does your organisation believe that staff training and development activities should be linked to: |
| a) | Accumulating credits towards academic qualifications: <input type="checkbox"/> Not at all <input type="checkbox"/> Slightly <input type="checkbox"/> Mostly <input type="checkbox"/> Fully |
| b) | Accumulating credits towards professional qualifications: <input type="checkbox"/> Don't agree <input type="checkbox"/> Slightly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| c) | Meeting the organisation's needs only: <input type="checkbox"/> Don't agree <input type="checkbox"/> Slightly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| d) | Meeting the employee's needs only: <input type="checkbox"/> Don't agree <input type="checkbox"/> Slightly agree <input type="checkbox"/> Mostly agree <input type="checkbox"/> Fully agree |
| Optional comments/explanations | |

Appendix 5A.9: The Questionnaire continued

| | |
|--------------------------------|--|
| Question 21 | Does your organisation have a formal policy about the use of computers and internet access? |
| <input type="checkbox"/> No | <input type="checkbox"/> Yes |
| Optional comments/explanations | |

| | | | |
|-------------------------------------|--|---|---------------------------------------|
| Question 22 | To what extent are your staff permitted to use the internet during working hours? | | |
| <input type="checkbox"/> Not at all | <input type="checkbox"/> Restricted use | <input type="checkbox"/> Few restrictions | <input type="checkbox"/> Unrestricted |
| Optional comments/explanations | | | |

| | | | |
|---|---|---------------------------------------|--|
| Question 23 | To what extent does your staff use the internet for work purposes? | | |
| <input type="checkbox"/> Little or no use | <input type="checkbox"/> Moderate use | <input type="checkbox"/> Frequent use | <input type="checkbox"/> Extensive use |
| Optional comments/explanations | | | |

| | | | |
|-------------------------------------|---|---|---------------------------------------|
| Question 24 | To what extent are your staff permitted to use the internet for non-work purposes? | | |
| <input type="checkbox"/> Not at all | <input type="checkbox"/> Restricted use | <input type="checkbox"/> Few restrictions | <input type="checkbox"/> Unrestricted |
| Optional comments/explanations | | | |

| | | | |
|---|---|---------------------------------------|--|
| Question 25 | To what extent does your staff use the internet for non-work purposes? | | |
| <input type="checkbox"/> Little or no use | <input type="checkbox"/> Moderate use | <input type="checkbox"/> Frequent use | <input type="checkbox"/> Extensive use |
| Optional comments/explanations | | | |

| | | | |
|-------------------------------------|--|---|---------------------------------------|
| Question 26 | To what extent do you or would you encourage your staff to use the internet for staff development purposes? | | |
| <input type="checkbox"/> Not at all | <input type="checkbox"/> Restricted use | <input type="checkbox"/> Few restrictions | <input type="checkbox"/> Unrestricted |
| Optional comments/explanations | | | |

Appendix 5A.9: The Questionnaire continued

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Question 27 Please indicate below the level of access your staff have to computer facilities.
(NB: The combined total must equal 100%)

| | | | | | | | | | | | |
|----|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) | Approximately what percentage of staff have exclusive access to/use of a personal computer (including laptops / notebooks)? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) | Approximately what percentage of staff have shared access to/use of a personal computer (including laptops / notebooks)? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) | Approximately what percentage of staff do not have access to/use of a personal computer (including laptops / notebooks)? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Optional comments/explanations

Question 28 Please indicate below your organisation's level of computer connectivity for construction sites.

| | | | | | | | | | | | |
|----|---|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a) | Approximately what percentage of construction sites have broadband connections? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b) | Approximately what percentage of construction sites have telephone based (modern) connections including ISDN? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c) | Approximately what percentage of construction sites do not have any form of connection? | | | | | | | | | | |
| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
| | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Optional comments/explanations

Thank you for your time and effort in completing this questionnaire.

If you would you like to receive a copy of the questionnaire results please complete the 'optional information' section on page 1, or attach your business card.

Appendix 5A.10: Questionnaire Results

Appendix 5A.10.1: Responses to Question 1

Question 1: To what extent does your organisation have a formal staff development policy?

Table 5A.16: Responses to Question 1.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|-------------|-----------|
| No. of Responses | 4 | 6 | 10 | 25 |
| Percentage | 8.89% | 13.33% | 22.22% | 55.56% |
| No. of Respondents | 45 | | Mean R 3.24 | |

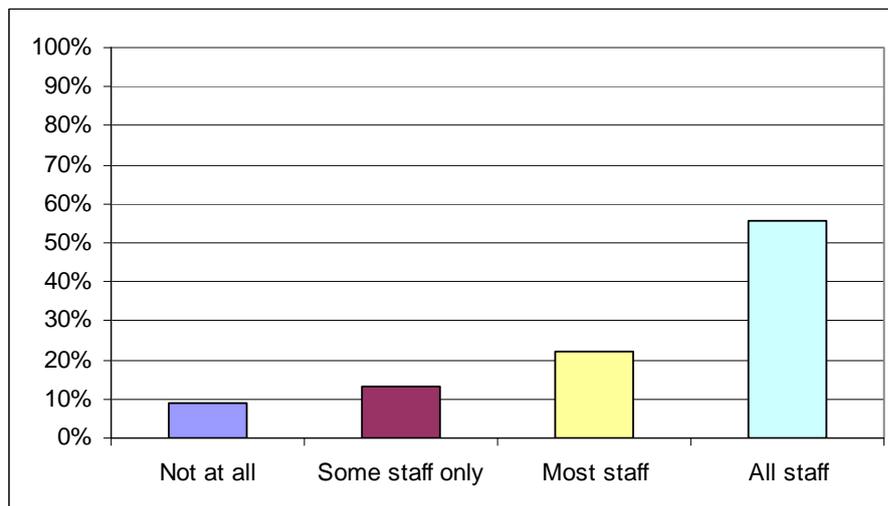


Figure 5A.5: Bar chart of Question 1 responses

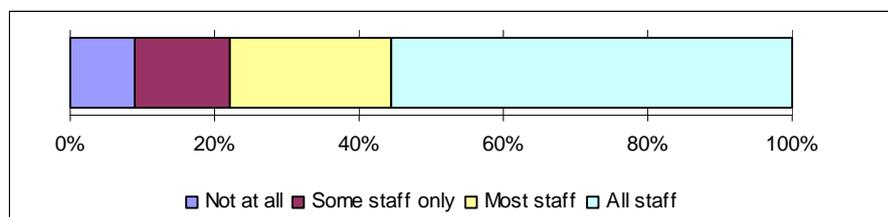


Figure 5A.6: Stacked bar chart of Question 1 responses

Appendix 5A.10.2: Responses to Question 2

Question 2: Does the policy formally require staff to undertake development activities?

Table 5A.17: Responses to Question 2.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|------------|-----------|
| No. of Responses | 10 | 11 | 15 | 9 |
| Percentage | 22.22% | 24.44% | 33.33% | 20.00% |
| No. of Respondents | 45 | | Mean R | 2.51 |

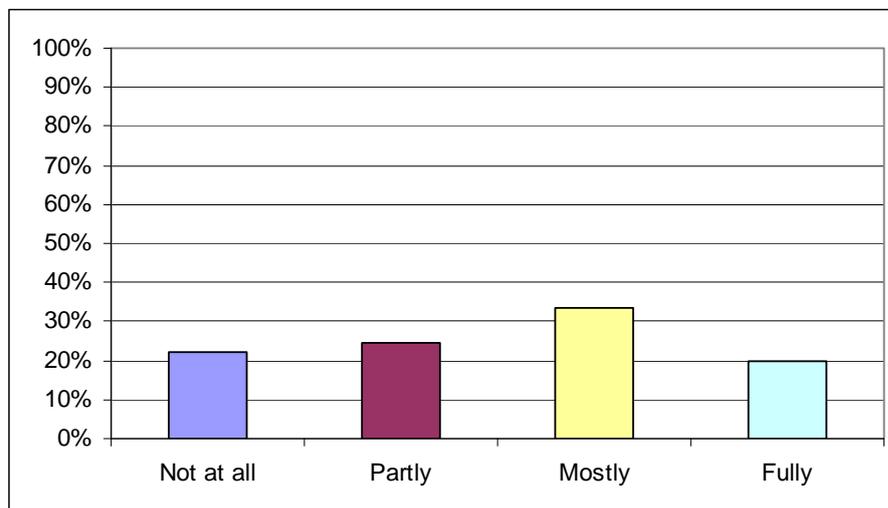


Figure 5A.7: Bar chart of Question 2 responses

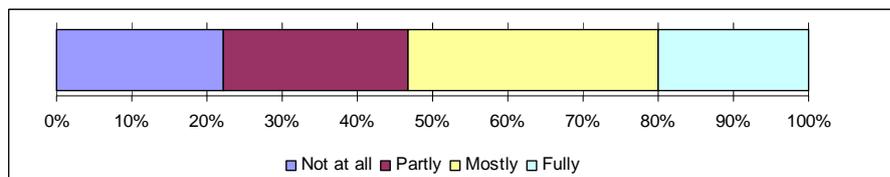


Figure 5A.8: Stacked bar chart of Question 2 responses

Appendix 5A.10.3: Responses to Question 3

Question 3: To what extent is the staff development policy implemented?

Table 5A.18: Responses to Question 3.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|------------|-----------|
| No. of Responses | 4 | 6 | 19 | 16 |
| Percentage | 8.89% | 13.33% | 42.22% | 35.56% |
| No. of Respondents | 45 | | Mean R | 3.04 |

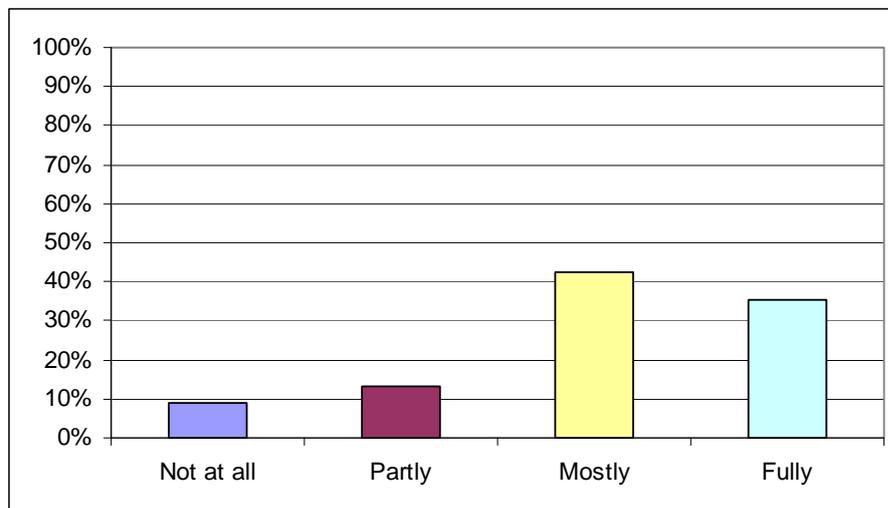


Figure 5A.9: Bar chart of Question 3 responses

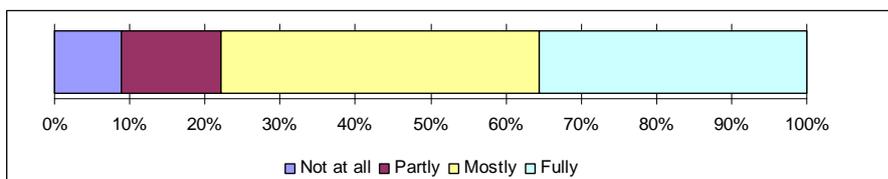


Figure 5A.10: Bar chart of Question 3 responses

Appendix 5A.10.4: Cross-tabulations for Question 1 and Question 2

Table 5A.19: Four-by-Four Cell Contingency Table for Questions 1 and 2.

| | | Q1: To what extent does your organisation have a formal staff development policy? | | | |
|---|------------|---|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q2: Does the policy formally require staff to undertake development activities? | Fully | 0 | 0 | 0 | 9 |
| | | 0.00% | 0.00% | 0.00% | 20.00% |
| | Mostly | 0 | 0 | 6 | 9 |
| | | 0.00% | 0.00% | 13.33% | 20.00% |
| | Partly | 0 | 5 | 2 | 4 |
| | | 0.00% | 11.11% | 4.44% | 8.89% |
| | Not at all | 4 | 1 | 2 | 3 |
| | | 8.89% | 2.22% | 4.44% | 6.67% |

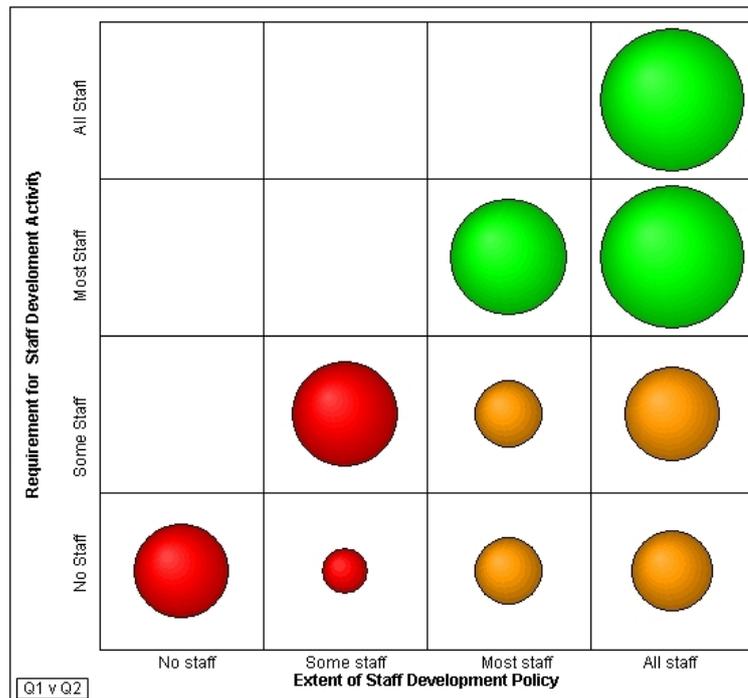


Figure 5A.11: Bubble Diagram for Questions 1 and 2, Four-by-Four Cell Comparison

Table 5A.20: Chi-Square Tests for Questions 1 and 2, Table 5A.19 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 35.190 ^(a) | 9 | 0.000 |
| Likelihood Ratio | 34.429 | 9 | 0.000 |
| Linear-by-Linear Association | 15.114 | 1 | 0.000 |
| N of Valid Cases | 45 | | |

(a) 12 cells (75.0%) have expected count less than 5. The minimum expected count is 0.80.

Table 5A.21: Consolidated Two-by-Two Cell Contingency Table for Questions 1 and 2.

| | | Q1: To what extent does your organisation have a formal staff development policy? | |
|---|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q3: To what extent is the staff development policy implemented? | Fully or Mostly | 0 | 24 |
| | | 0.00% | 53.33% |
| | None or Partly | 10 | 11 |
| | | 22.22% | 24.44% |

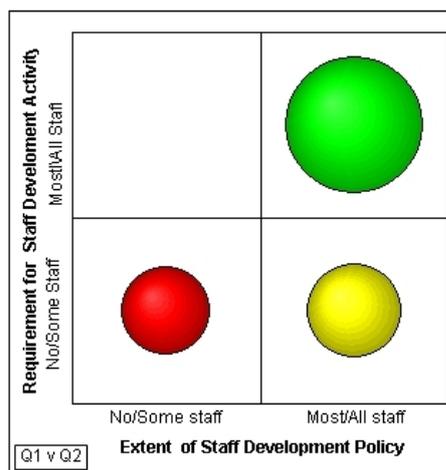


Figure 5A.12: Bubble Diagram for Questions 1 and 2, Two-by-Two Cell Comparison

Table 5A.22: SPSS Chi-Square Tests for Questions 1 and 2, Table 5A.21 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 14.694 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 12.068 | 1 | 0.001 | | |
| Likelihood Ratio | 18.609 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.000 | 0.000 |
| Linear-by-Linear Association | 14.367 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.67.

Table 5A.23: SPSS Symmetric Measures for Questions 1 and 2, Table 5A.21 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.571 | 0.000 |
| | Cramer's V | 0.571 | 0.000 |
| | Contingency Coefficient | 0.496 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.5: Cross-tabulations for Question 1 and Question 3

Table 5A.24: Four-by-Four Cell Contingency Table for Questions 1 and 3.

| | | Q1: To what extent does your organisation have a formal staff development policy? | | | |
|---|------------|---|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q3: To what extent is the staff development policy implemented? | Fully | 0 | 0 | 2 | 14 |
| | | 0.00% | 0.00% | 4.44% | 31.11% |
| | Mostly | 0 | 2 | 7 | 10 |
| | | 0.00% | 4.44% | 15.56% | 22.22% |
| | Partly | 0 | 4 | 1 | 1 |
| | | 0.00% | 8.89% | 2.22% | 2.22% |
| | Not at all | 4 | 0 | 0 | 0 |
| | | 8.89% | 0.00% | 0.00% | 0.00% |

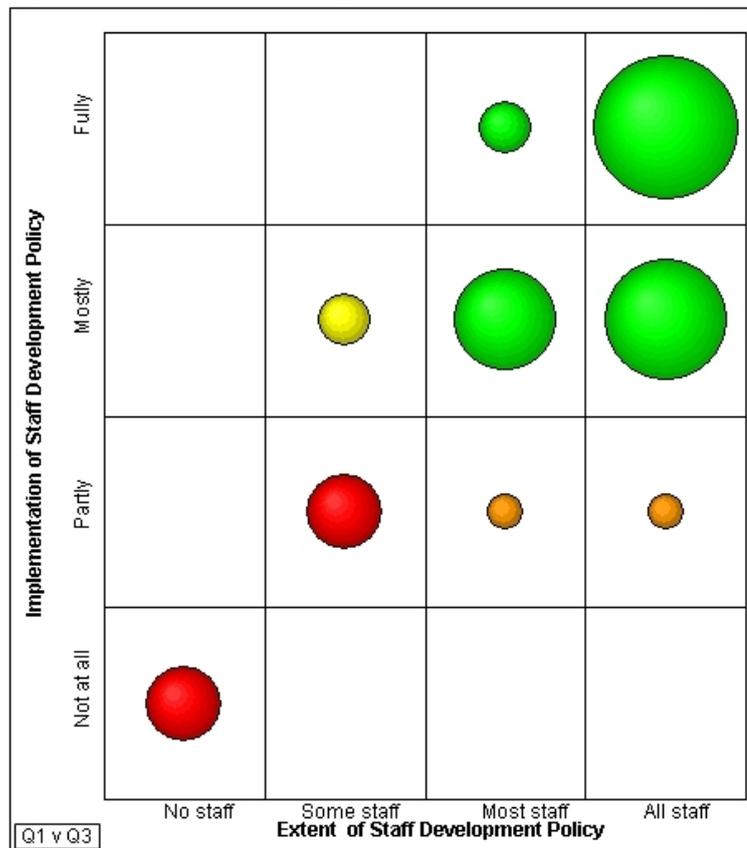


Figure 5A.13: Bubble Diagram for Questions 1 and 3, Four-by-Four Cell Comparison

Table 5A.25: SPSS Chi-Square Tests for Questions 1 and 3, Table 5A.24 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 66.883 ^(a) | 9 | 0.000 |
| Likelihood Ratio | 44.724 | 9 | 0.000 |
| Linear-by-Linear Association | 27.685 | 1 | 0.000 |
| N of Valid Cases | 45 | | |

(a) 14 cells (87.5%) have expected count less than 5. The minimum expected count is 0.36.

Table 5A.26: Consolidated Two-by-Two Cell Contingency Table for Questions 1 and 3.

| | | Q1: To what extent does your organisation have a formal staff development policy? | |
|---|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q3: To what extent is the staff development policy implemented? | Fully or Mostly | 2 4.44% | 33 73.33% |
| | None or Partly | 8 17.78% | 2 4.44% |

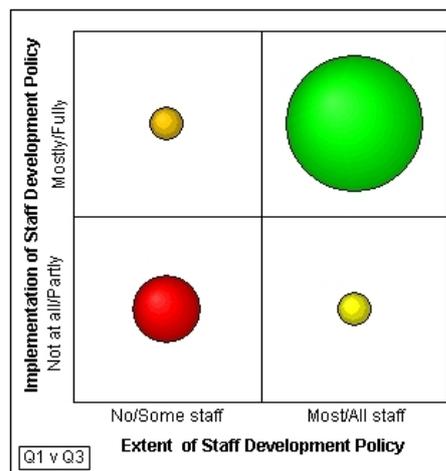


Figure 5A.14: Bubble Diagram for Questions 1 and 3, Two-by-Two Cell Comparison

Table 5A.27: SPSS Chi-Square Tests for Questions 1 and 3, Table 5A.26 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 24.833 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 20.721 | 1 | 0.000 | | |
| Likelihood Ratio | 22.333 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.000 | 0.000 |
| Linear-by-Linear Association | 24.281 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.22.

Table 5A.28: SPSS Symmetric Measures for Questions 1 and 3, Table 5A.26 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.743 | 0.000 |
| | Cramer's V | 0.743 | 0.000 |
| | Contingency Coefficient | 0.596 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.6: Cross-tabulations for Question 2 and Question 3

Table 5A.29: Four-by-Four Cell Contingency for Questions 2 and 3.

| | | Q2: Does the policy formally require staff to undertake development? | | | |
|---|------------|--|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q3: To what extent is the staff development policy implemented? | Fully | 4 | 2 | 3 | 7 |
| | | 8.89% | 4.44% | 6.67% | 15.56% |
| | Mostly | 1 | 5 | 11 | 2 |
| | | 2.22% | 11.11% | 24.44% | 4.44% |
| | Partly | 1 | 4 | 1 | 0 |
| | | 2.22% | 8.89% | 2.22% | 0.00% |
| | Not at all | 4 | 0 | 0 | 0 |
| | | 8.89% | 0.00% | 0.00% | 0.00% |

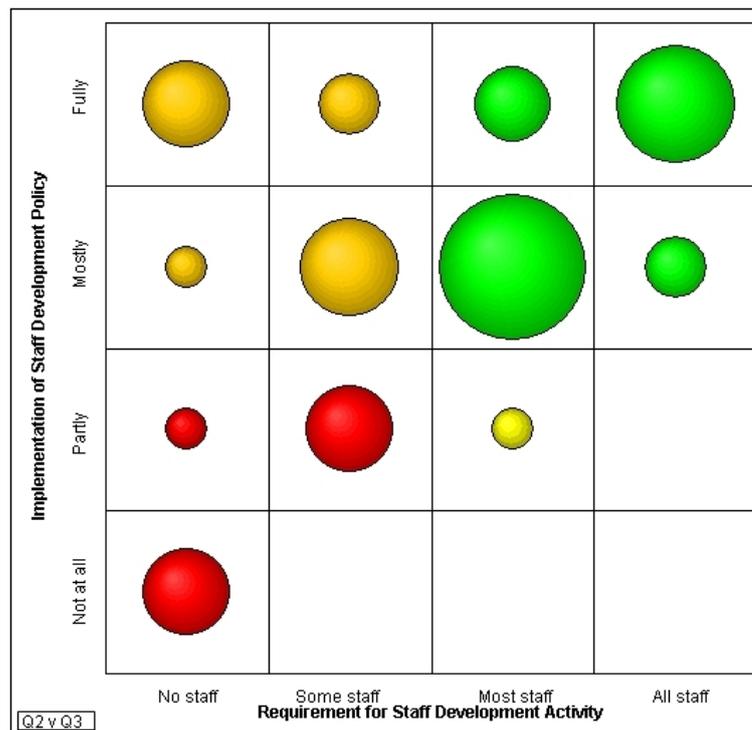


Figure 5A.15: Bubble Diagram for Questions 2 and 3, Four-by-Four Cell Comparison

Table 5A.30: SPSS Chi-Square Tests for Questions 2 and 3, Table 5A.29 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 33.459 ^(a) | 9 | 0.000 |
| Likelihood Ratio | 31.298 | 9 | 0.000 |
| Linear-by-Linear Association | 9.406 | 1 | 0.002 |
| N of Valid Cases | 45 | | |

(a) 14 cells (87.5%) have expected count less than 5. The minimum expected count is 0.80.

Table 5A.31: Consolidated Two-by-Two Cell Contingency Table for Questions 2 and 3.

| | | Q2: Does the policy formally require staff to undertake development? | |
|---|-----------------|--|-------------------|
| | | None or some staff only | Most or all staff |
| Q3: To what extent is the staff development policy implemented? | Fully or Mostly | 12 | 23 |
| | | 26.67% | 51.11% |
| | None or Partly | 9 | 1 |
| | | 20.00% | 2.22% |

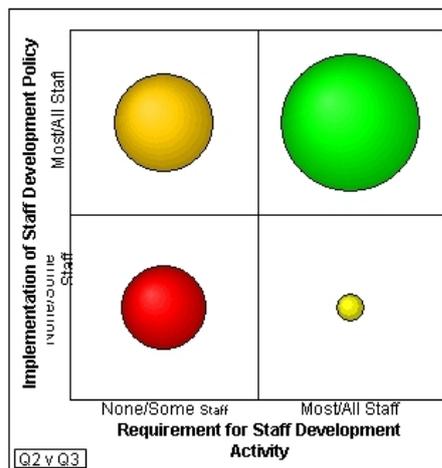


Figure 5A.16: Bubble Diagram for Questions 2 and 3, Two-by-Two Cell Comparison

Table 5A.32: SPSS Chi-Square Tests for Questions 2 and 3, Table 5A.31 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 9.700 ^(b) | 1 | 0.002 | | |
| Continuity Correction ^(a) | 7.591 | 1 | 0.006 | | |
| Likelihood Ratio | 10.678 | 1 | 0.001 | | |
| Fisher's Exact Test | | | | 0.003 | 0.002 |
| Linear-by-Linear Association | 9.485 | 1 | 0.002 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 4.67.

Table 5A.33: SPSS Symmetric Measures for Questions 2 and 3, Table 5A.31 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.464 | 0.002 |
| | Cramer's V | 0.464 | 0.002 |
| | Contingency Coefficient | 0.421 | 0.002 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.7: Responses to Question 4

Question 4: To what extent does your organisation have a staff appraisal policy?

Table 5A.34: Responses to Question 4.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|---------------|-----------|
| No. of Responses | 0 | 5 | 11 | 29 |
| Percentage | 0.00% | 11.11% | 24.44% | 64.44% |
| No. of Respondents | 45 | | Mean R = 3.53 | |

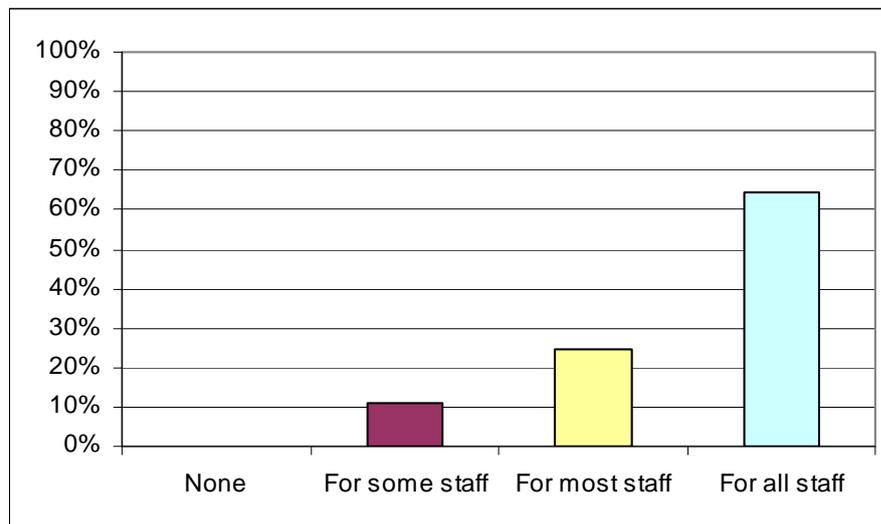


Figure 5A.17: Bar chart of Question 4 responses

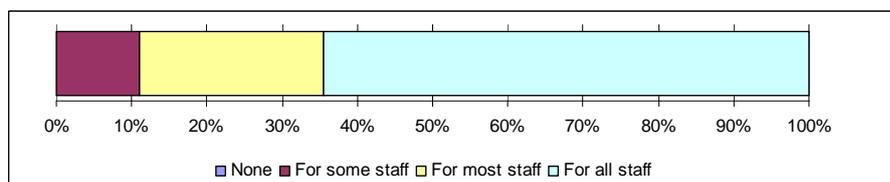


Figure 5A.18: Stacked bar chart of Question 4 responses

Appendix 5A.10.8: Responses to Question 5

Question 5: To what extent is the staff appraisal policy implemented?

Table 5A.35: Responses to Question 5.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|------------|-----------|
| No. of Responses | 1 | 10 | 20 | 14 |
| Percentage | 2.22% | 22.22% | 44.44% | 31.11% |
| No. of Respondents | 45 | | Mean R | 3.04 |

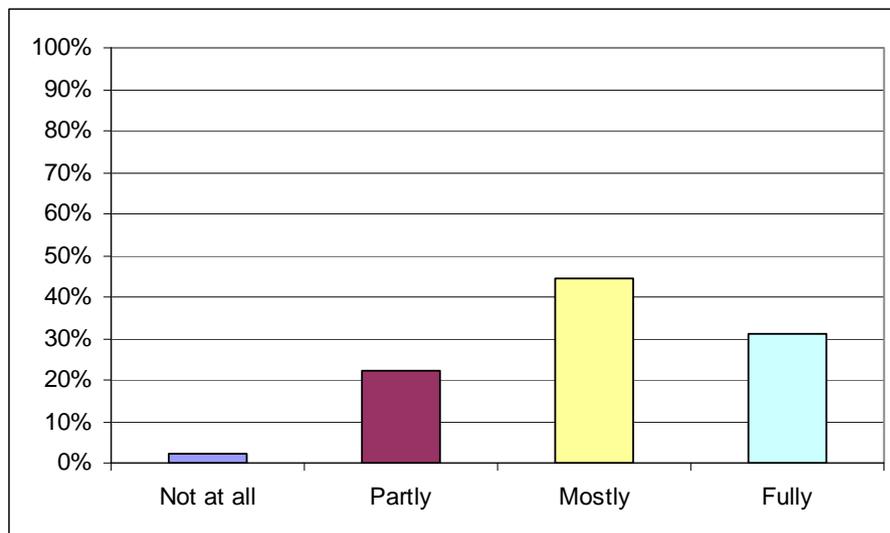


Figure 5A.19: Bar chart of Question 5 responses

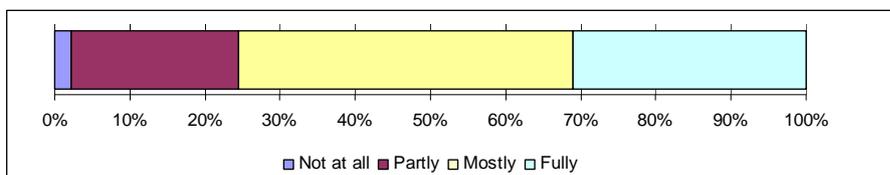


Figure 5A.20: Stacked bar chart of Question 5 responses

Appendix 5A.10.9: Responses to Question 6

Question 6: Does the appraisal policy include staff development opportunities?

Table 5A.36: Responses to Question 6.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|------------|-----------|
| No. of Responses | 1 | 3 | 9 | 32 |
| Percentage | 2.22% | 6.67% | 20.00% | 71.11% |
| No. of Respondents | 45 | | Mean R | 3.60 |

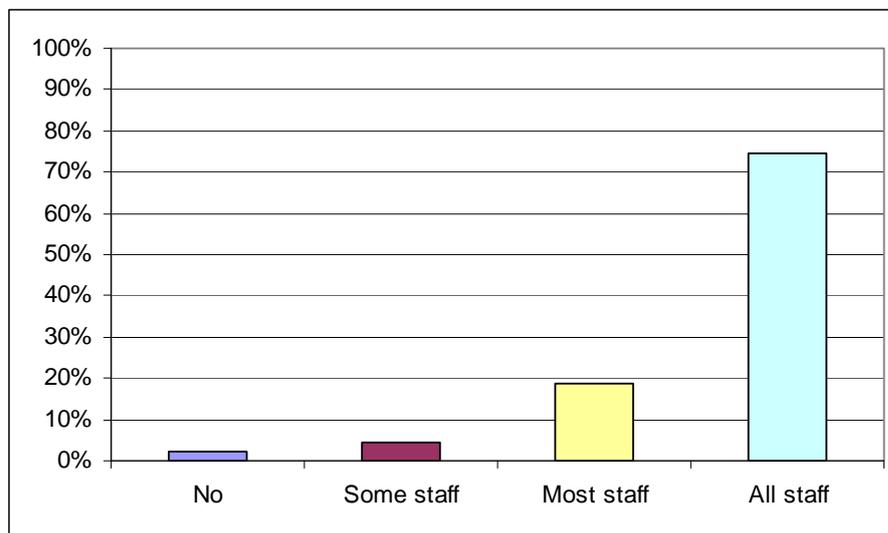


Figure 5A.21: Bar chart of Question 6 responses

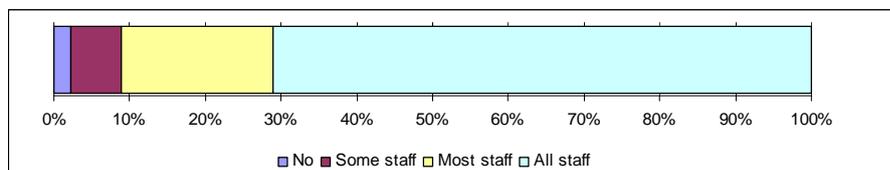


Figure 5A.22: Stacked bar chart of Question 6 responses

Appendix 5A.10.10: Cross-tabulation for Question 4 and Question 5

Table 5A.37: Four-by-Four Cell Contingency Table for Questions 4 and 5.

| | | Q4: To what extent does your organisation have a staff appraisal policy? | | | |
|---|------------|--|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q5: To what extent is the staff appraisal policy implemented? | Fully | 0 | 1 | 1 | 12 |
| | | 0.00% | 2.22% | 2.22% | 26.67% |
| | Mostly | 0 | 1 | 4 | 15 |
| | | 0.00% | 2.22% | 8.89% | 33.33% |
| | Partly | 0 | 2 | 6 | 2 |
| | | 0.00% | 4.44% | 13.33% | 4.44% |
| | Not at all | 0 | 1 | 0 | 0 |
| | | 0.00% | 2.22% | 0.00% | 0.00% |

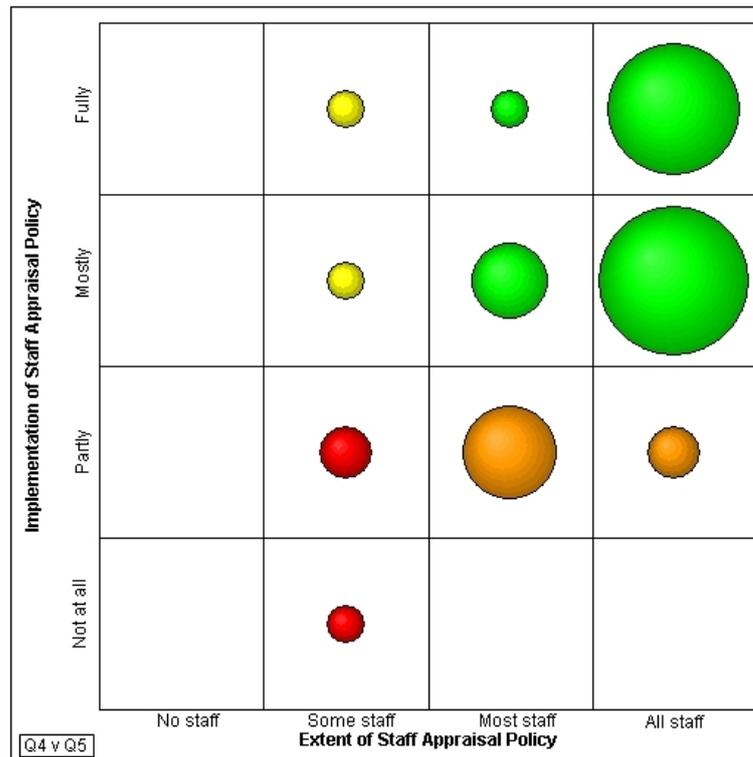


Figure 5A.23: Bubble Diagram for Questions 4 and 5, Four-by-Four Cell Comparison

Table 5A.38: SPSS Chi-Square Tests for Questions 4 and 5, Table 5A.37 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 21.023 ^(a) | 6 | 0.002 |
| Likelihood Ratio | 17.690 | 6 | 0.007 |
| Linear-by-Linear Association | 10.589 | 1 | 0.001 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.11.

Table 5A.39: Consolidated Two-by-Two Cell Contingency Table for Questions 4 and 5.

| | | Q4: To what extent does your organisation have a staff appraisal policy? | |
|---|-----------------|--|-------------------|
| | | None or some staff only | Most or all staff |
| Q5: To what extent is the staff appraisal policy implemented? | Fully or Mostly | 2 | 32 |
| | | 4.44% | 71.11% |
| | None or Partly | 3 | 8 |
| | | 6.67% | 17.78% |

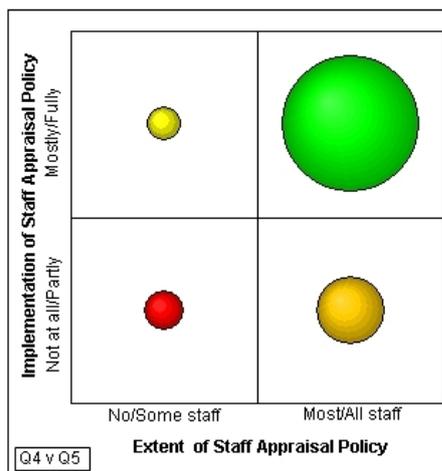


Figure 5A.24: Bubble Diagram for Questions 4 and 5, Two-by-Two Cell Comparison

Table 5A.40: SPSS Chi-Square Tests for Questions 4 and 5, Table 5A.39 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 3.850 ^(b) | 1 | 0.050 | | |
| Continuity Correction ^(a) | 1.989 | 1 | 0.158 | | |
| Likelihood Ratio | 3.291 | 1 | 0.070 | | |
| Fisher's Exact Test | | | | 0.085 | 0.085 |
| Linear-by-Linear Association | 3.765 | 1 | 0.052 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.22.

Table 5A.41: SPSS Symmetric Measures for Questions 4 and 5, Table 5A.39 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.293 | 0.050 |
| | Cramer's V | 0.293 | 0.050 |
| | Contingency Coefficient | 0.281 | 0.050 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.11: Cross-tabulations for Question 4 and Question 6

Table 5A.42: Four-by-Four Cell Contingency Table for Questions 4 and 6.

| | | Q4: To what extent does your organisation have a staff appraisal policy? | | | |
|--|-----------------|--|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q6: Does the appraisal policy include staff development opportunities? | All Staff | 0 | 2 | 4 | 26 |
| | | 0.00% | 4.44% | 8.89% | 57.78% |
| | Most staff | 0 | 2 | 4 | 3 |
| | | 0.00% | 4.44% | 8.89% | 6.67% |
| | Some staff only | 0 | 0 | 3 | 0 |
| | | 0.00% | 0.00% | 6.67% | 0.00% |
| | Not at all | 0 | 1 | 0 | 0 |
| | | 0.00% | 2.22% | 0.00% | 0.00% |

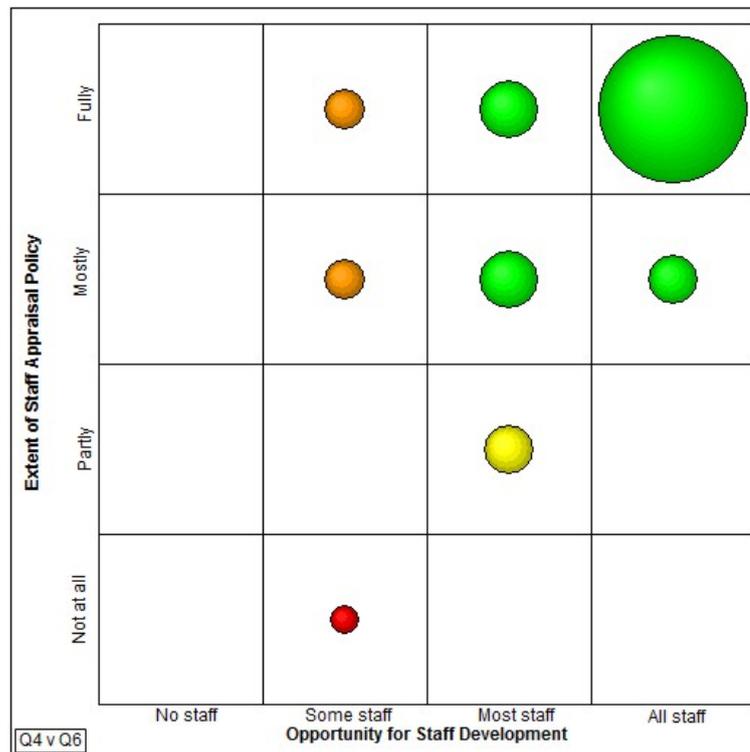


Figure 5A.25: Bubble Diagram for Questions 4 and 6, Four-by-Four Cell Comparison

Table 5A.43: SPSS Chi-Square Tests for Questions 4 and 6, Table 5A.42 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 25.048 ^(a) | 6 | 0.000 |
| Likelihood Ratio | 20.830 | 6 | 0.002 |
| Linear-by-Linear Association | 12.249 | 1 | 0.000 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.11.

Table 5A.44: Consolidated Two-by-Two Cell Contingency Table for Questions 4 and 6.

| | | Q4: To what extent does your organisation have a staff appraisal policy? | |
|--|-----------------|--|-------------------|
| | | None or some staff only | Most or all staff |
| Q6: Does the appraisal policy include staff development opportunities? | Fully or Mostly | 4 8.89% | 37 82.22% |
| | None or Partly | 1 2.22% | 3 6.67% |



Figure 5A.26: Bubble Diagram for Questions 4 and 6, Two Cell Comparison

Table 5A.45: SPSS Chi-Square Tests for Questions 4 and 6, Table 5A.44 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 0.857 ^(b) | 1 | 0.354 | | |
| Continuity Correction ^(a) | 0.009 | 1 | 0.926 | | |
| Likelihood Ratio | 0.682 | 1 | 0.409 | | |
| Fisher's Exact Test | | | | 0.387 | 0.387 |
| Linear-by-Linear Association | 0.838 | 1 | 0.360 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 3 cells (75.0%) have expected count less than 5. The minimum expected count is 0.44.

Table 5A.46: SPSS Symmetric Measures for Questions 4 and 6, Table 5A.44 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.138 | 0.354 |
| | Cramer's V | 0.138 | 0.354 |
| | Contingency Coefficient | 0.137 | 0.354 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.12: Cross-tabulations for Question 5 and Question 6

Table 5A.47: Four-by-Four Cell Contingency Table for Questions 5 and 6.

| | | Q5: To what extent is the staff appraisal policy implemented? | | | |
|---|------------|---|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q6: Does the appraisal policy include staff development activities? | Fully | 0 | 5 | 15 | 12 |
| | | 0.00% | 11.11% | 33.33% | 26.67% |
| | Mostly | 0 | 2 | 5 | 2 |
| | | 0.00% | 4.44% | 11.11% | 4.44% |
| | Partly | 0 | 3 | 0 | 0 |
| | | 0.00% | 6.67% | 0.00% | 0.00% |
| | Not at all | 1 | 0 | 0 | 0 |
| | | 2.22% | 0.00% | 0.00% | 0.00% |

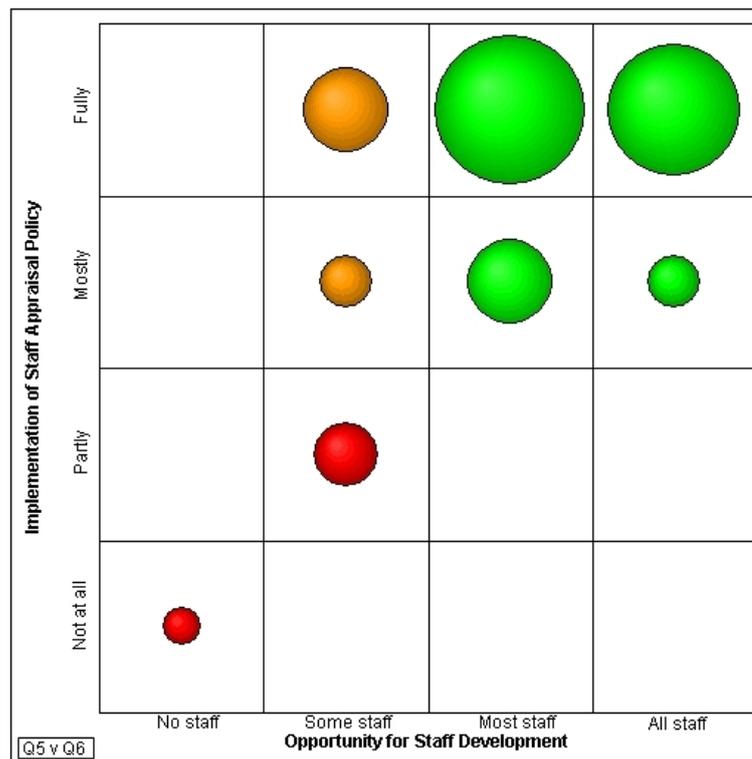


Figure 5A.27: Bubble Diagram for Questions 5 and 6, Four-by-Four Cell Comparison

Table 5A.48: SPSS Chi-Square Tests for Questions 5 and 6, Table 5A.47 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 56.979 ^(a) | 9 | 0.000 |
| Likelihood Ratio | 20.081 | 9 | 0.017 |
| Linear-by-Linear Association | 11.328 | 1 | 0.001 |
| N of Valid Cases | 45 | | |

(a) 13 cells (81.3%) have expected count less than 5. The minimum expected count is 0.02.

| | | Q5: To what extent is the staff appraisal policy implemented? | |
|--|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q6: Does the appraisal policy include staff development opportunities? | Fully or Mostly | 7 15.56% | 34 75.56% |
| | None or Partly | 4 8.89% | 0 0.00% |

Table 5A.49: Consolidated Two-by-Two Cell Contingency Table for Questions 5 and 6.

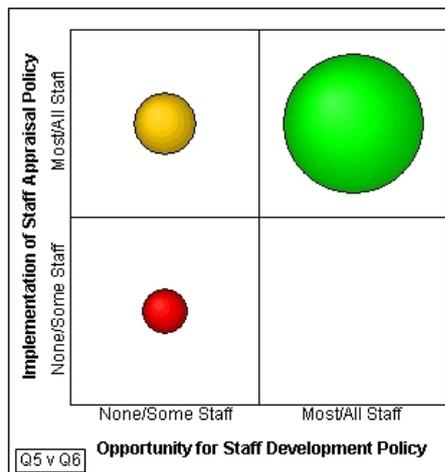


Figure 5A.28: Bubble Diagram for Questions 5 and 6, Two-by-Two Cell Comparison

Table 5A.50: SPSS Chi-Square Tests for Questions 5 and 6, Table 5A.49 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 13.570 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 9.451 | 1 | 0.002 | | |
| Likelihood Ratio | 12.576 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.002 | 0.002 |
| Linear-by-Linear Association | 13.268 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 0.98.

Table 5A.51: SPSS Symmetric Measures for Questions 5 and 6, Table 5A.49 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.549 | 0.000 |
| | Cramer's V | 0.549 | 0.000 |
| | Contingency Coefficient | 0.481 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.13: Cross-tabulations for Question 1 and Question 4

Table 5A.52: Four-by-Four Cell Contingency Table for Questions 1 and 4.

| | | Q1: To what extent does your organisation have a formal staff development policy? | | | |
|--|-----------------|---|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q4: To what extent does your organisation have a staff appraisal policy? | All staff | 0 | 1 | 5 | 23 |
| | | 0.00% | 2.22% | 11.11% | 51.11% |
| | Most staff | 3 | 3 | 3 | 2 |
| | | 6.67% | 6.67% | 6.67% | 4.44% |
| | Some staff only | 1 | 2 | 2 | 0 |
| | | 2.22% | 4.44% | 4.44% | 0.00% |
| | Not at all | 0 | 0 | 0 | 0 |
| | | 0.00% | 0.00% | 0.00% | 0.00% |

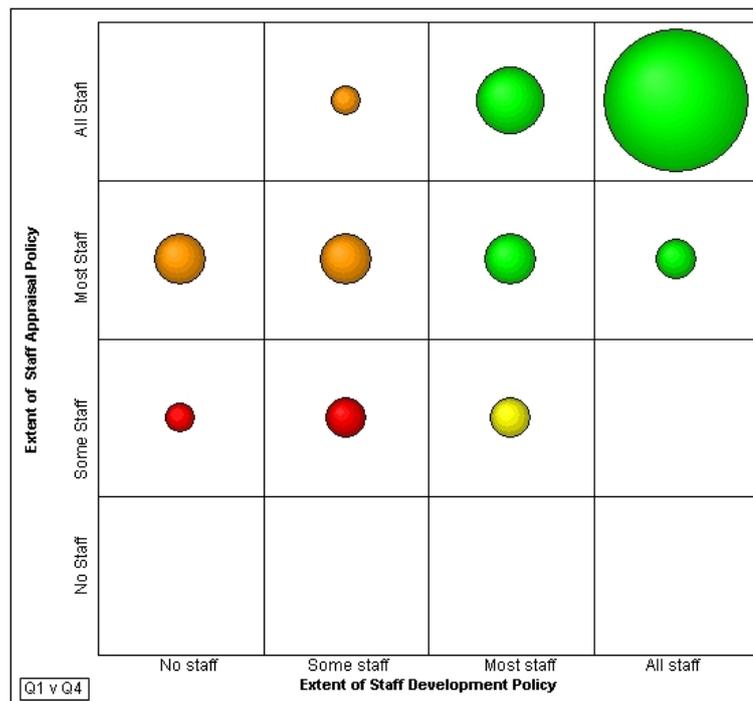


Figure 5A.29: Bubble Diagram for Questions 1 and 4, Four-by-Four Cell Comparison

Table 5A.53: SPSS Chi-Square Tests for Questions 1 and 4, Table 5A.52 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 23.500 ^(a) | 6 | 0.001 |
| Likelihood Ratio | 27.281 | 6 | 0.000 |
| Linear-by-Linear Association | 18.986 | 1 | 0.000 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.44.

| | | Q1: To what extent does your organisation have a formal staff development policy? | |
|--|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q4: To what extent does your organisation have a staff appraisal policy? | Fully or Mostly | 7 15.56% | 33 73.33% |
| | None or Partly | 3 6.67% | 2 4.44% |

Table 5A.54: Consolidated Two-by-Two Cell Contingency Table for Questions 1 and 4.

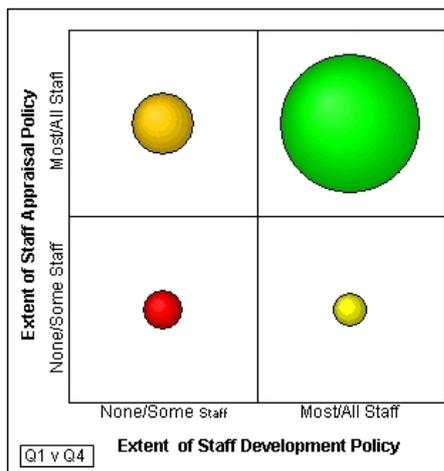


Figure 5A.30: Bubble Diagram for Questions 1 and 4, Two-by-Two Cell Comparison

Table 5A.55: SPSS Chi-Square Tests for Questions 1 and 4, Table 5A.54 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 4.645 ^(b) | 1 | 0.031 | | |
| Continuity Correction ^(a) | 2.511 | 1 | 0.113 | | |
| Likelihood Ratio | 3.845 | 1 | 0.050 | | |
| Fisher's Exact Test | | | | 0.065 | 0.065 |
| Linear-by-Linear Association | 4.541 | 1 | 0.033 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.11.

Table 5A.56: SPSS Symmetric Measures for Questions 1 and 4, Table 5A.54 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.321 | 0.031 |
| | Cramer's V | 0.321 | 0.031 |
| | Contingency Coefficient | 0.306 | 0.031 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.14: Cross-tabulations for Question 2 and Question 6

| | | Q2: Does the policy formally require staff to undertake development? | | | |
|---|-----------------|--|-----------------|------------|-----------|
| | | Not at all | Some staff only | Most staff | All staff |
| Q6: Does the appraisal policy include staff development activities? | All staff | 5 | 8 | 11 | 8 |
| | | 11.11% | 17.78% | 24.44% | 17.78% |
| | Most staff | 3 | 2 | 3 | 1 |
| | | 6.67% | 4.44% | 6.67% | 2.22% |
| | Some staff only | 1 | 1 | 1 | 0 |
| | | 2.22% | 2.22% | 2.22% | 0.00% |
| | Not at all | 1 | 0 | 0 | 0 |
| | | 2.22% | 0.00% | 0.00% | 0.00% |

Table 5A.57: Four-by-Four Cell Contingency Table for Questions 2 and 6.

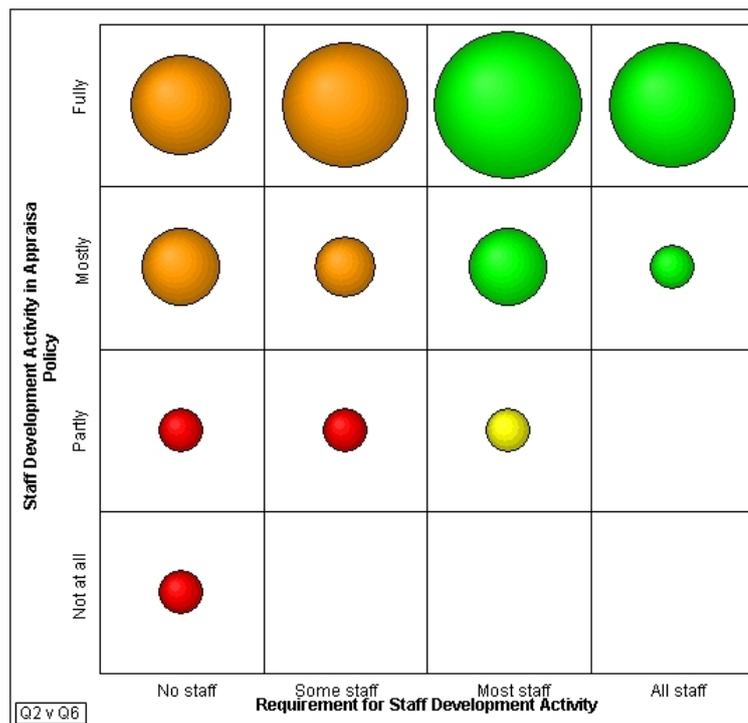


Figure 5A.31: Bubble Diagram for Questions 2 and 6, Four-by-Four Cell Comparison

Table 5A.58: SPSS Chi-Square Tests for Questions 2 and 6, Table 5A.57 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 6.279 ^(a) | 9 | 0.712 |
| Likelihood Ratio | 6.400 | 9 | 0.699 |
| Linear-by-Linear Association | 4.077 | 1 | 0.043 |
| N of Valid Cases | 45 | | |

(a) 12 cells (75.0%) have expected count less than 5. The minimum expected count is 0.20.

Table 5A.59: Consolidated Two-by-Two Cell Contingency Table for Questions 2 and 6.

| | | Q2: Does the policy formally require staff to undertake development? | |
|---|-----------------|--|-------------------|
| | | None or some staff only | Most or all staff |
| Q6: Does the appraisal policy include staff development activities? | Fully or Mostly | 18 40.00% | 23 51.11% |
| | None or Partly | 3 6.67% | 1 2.22% |

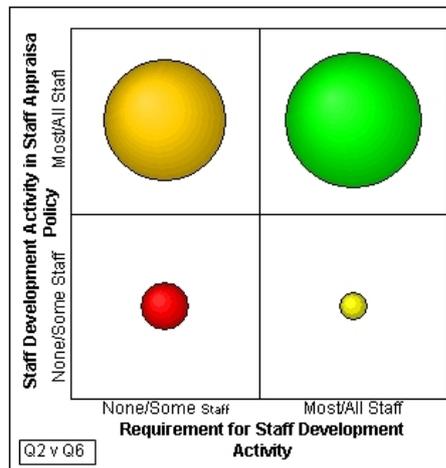


Figure 5A.32: Bubble Diagram for Questions 2 and 6, Two-by-Two Cell Comparison

Table 5A.60: SPSS Chi-Square Tests for Questions 2 and 6, Table 5A.59 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 1.416 ^(b) | 1 | 0.234 | | |
| Continuity Correction ^(a) | .442 | 1 | 0.506 | | |
| Likelihood Ratio | 1.458 | 1 | 0.227 | | |
| Fisher's Exact Test | | | | 0.326 | 0.254 |
| Linear-by-Linear Association | 1.385 | 1 | 0.239 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.87.

Table 5A.61: SPSS Symmetric Measures for Questions 2 and 6, Table 5A.59 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.177 | 0.234 |
| | Cramer's V | 0.177 | 0.234 |
| | Contingency Coefficient | 0.175 | 0.234 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.15: Cross-tabulations for Question 3 and Question 5

Table 5A.62: Four-by-Four Cell Contingency Table for Questions 3 and 5.

| | | Q3: To what extent is the staff development policy implemented? | | | |
|---|------------|---|--------|--------|--------|
| | | Not at all | Partly | Mostly | Fully |
| Q5: To what extent is the staff appraisal policy implemented? | Fully | 0 | 1 | 5 | 8 |
| | | 0.00% | 2.22% | 11.11% | 17.78% |
| | Mostly | 2 | 0 | 11 | 7 |
| | | 4.44% | 0.00% | 24.44% | 15.56% |
| | Partly | 1 | 5 | 3 | 1 |
| | | 2.22% | 11.11% | 6.67% | 2.22% |
| | Not at all | 1 | 0 | 0 | 0 |
| | | 2.22% | 0.00% | 0.00% | 0.00% |

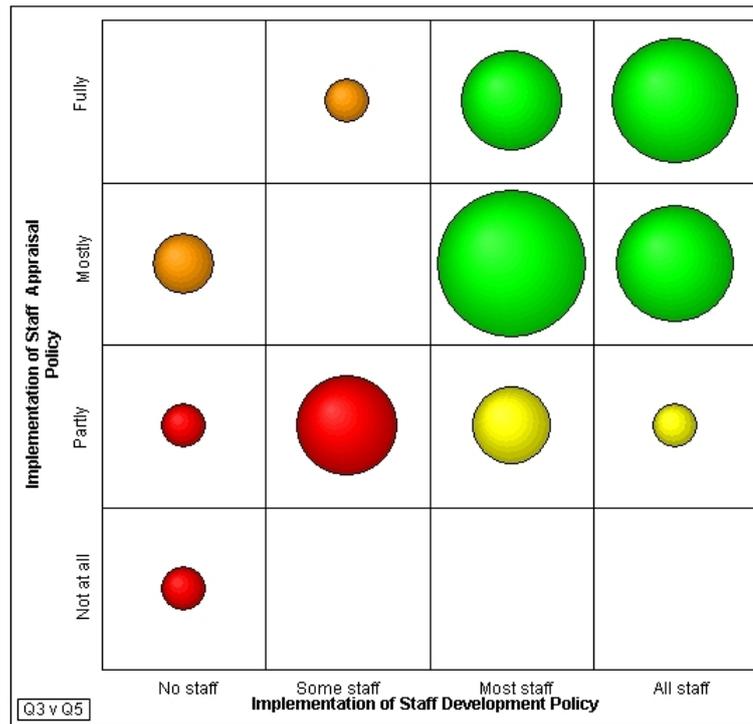


Figure 5A.33: Bubble Diagram for Questions 3 and 5, Four by-Four Cell Comparison

Table 5A.63: SPSS Chi-Square Tests for Questions 3 and 5, Table 5A.62 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 29.630 ^(a) | 9 | 0.001 |
| Likelihood Ratio | 24.443 | 9 | 0.004 |
| Linear-by-Linear Association | 11.892 | 1 | 0.001 |
| N of Valid Cases | 45 | | |

(a) 13 cells (81.3%) have expected count less than 5. The minimum expected count is 0.09.

Table 5A.64: Consolidated Two-by-Two Cell Contingency Table for Questions 3 and 5.

| | | Q3: To what extent is the staff development policy implemented? | |
|---|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q5: To what extent is the staff appraisal policy implemented? | Fully or Mostly | 3 6.67% | 31 68.89% |
| | None or Partly | 7 15.56% | 4 8.89% |

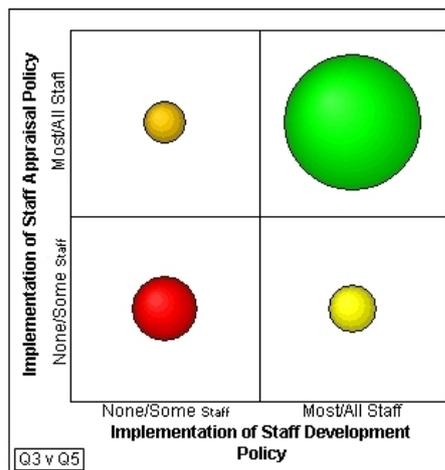


Figure 5A.34: Bubble Diagram for Questions 3 and 5, Two-by-Two Cell Comparison

Table 5A.65: SPSS Chi-Square Tests for Questions 3 and 5, Table 5A.64 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 14.447 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 11.450 | 1 | 0.001 | | |
| Likelihood Ratio | 12.959 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.001 | 0.001 |
| Linear-by-Linear Association | 14.126 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.44.

Table 5A.66: SPSS Symmetric Measures for Questions 3 and 5, Table 5A.64 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.567 | 0.000 |
| | Cramer's V | 0.567 | 0.000 |
| | Contingency Coefficient | 0.493 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.16: Responses to Question 7

Question 7: To what extent does your organisation encourage staff development activities?

Table 5A.67: Responses to Question 7.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|------------|-----------|
| No. of Responses | 0 | 4 | 13 | 28 |
| Percentage | 0.00% | 8.89% | 28.89% | 62.22% |
| No. of Respondents | 45 | | Mean R | 3.53 |

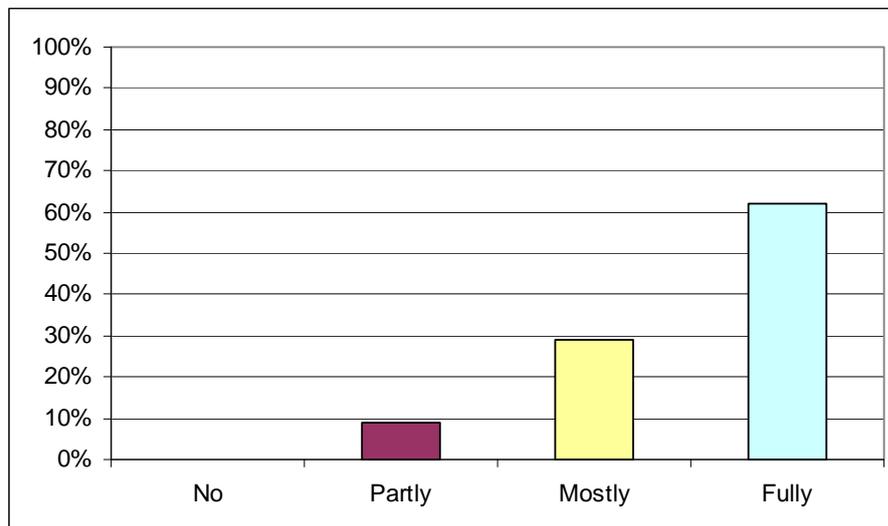


Figure 5A.35: Bar chart of Question 7 responses

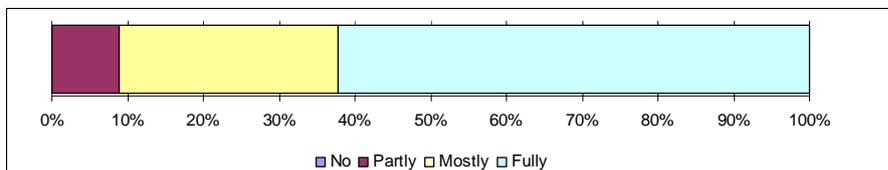


Figure 5A.36: Stacked bar chart of Question 7 responses

Appendix 5A.10.17: Responses to Question 8

Question 8: Do your employee’s contracts of employment have a formal staff development requirement?

Table 5A.68: Responses to Question 8.

| | Not at all | Some staff only | Most staff | All staff |
|--------------------|------------|-----------------|-------------|-----------|
| No. of Responses | 34 | 3 | 4 | 3 |
| Percentage | 77.27% | 6.82% | 9.09% | 6.82% |
| No. of Respondents | 44 | | Mean R 1.45 | |

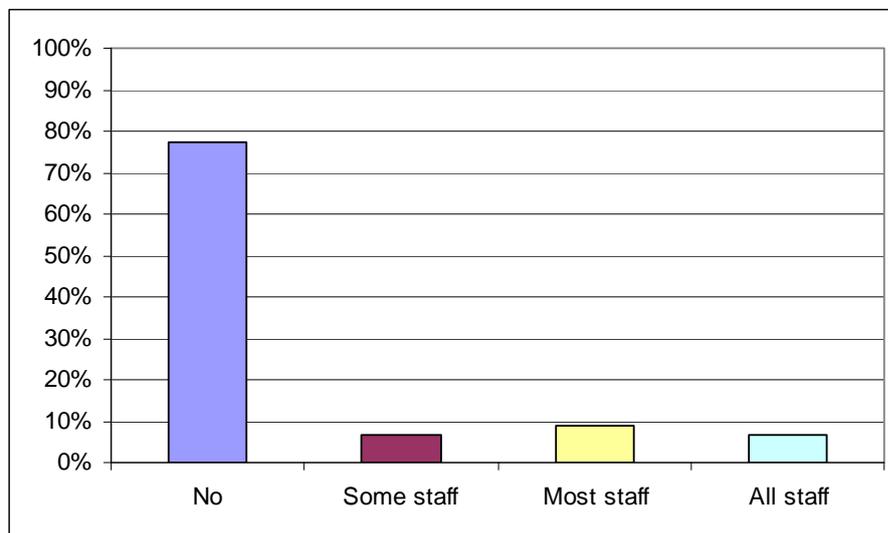


Figure 5A.37: Bar chart of Question 8 responses

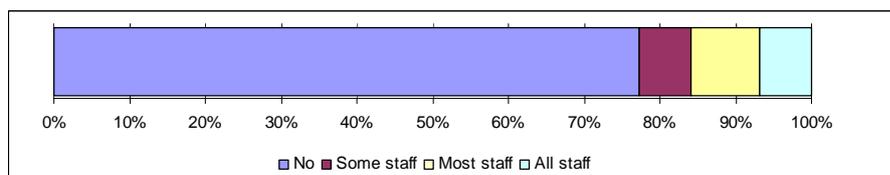


Figure 5A.38: Stacked bar chart of Question 8 responses

Appendix 5A.10.18: Responses to Question 9

Question 9: Which of the following best describes your organisation’s approach to staff development?

Table 5A.69: Responses to Question 9.

| | Not necessary | Staff responsibility | Organisation responsibility | Joint responsibility |
|--------------------|---------------|----------------------|-----------------------------|----------------------|
| No. of Responses | 0 | 1 | 2 | 42 |
| Percentage | 0.00% | 2.22% | 4.44% | 93.33% |
| No. of Respondents | 45 | | Mean R | 3.91 |

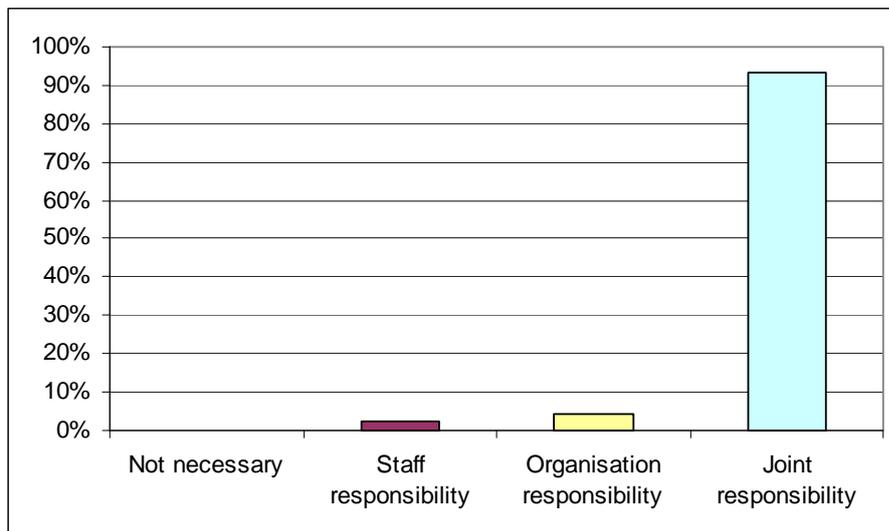


Figure 5A.39: Bar chart of Question 9 responses

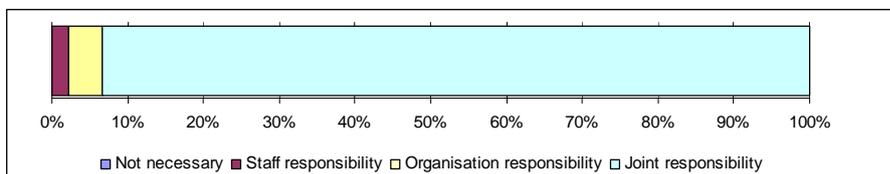


Figure 5A.40: Stacked bar chart of Question 9 responses

Appendix 5A.10.19: Cross-tabulations for Question 7 and Question 2

Table 5A.70: Four-by-Four Cell Contingency Table for Questions 7 and 2.

| | | Q7: To what extent do you encourage staff development activities? | | | |
|---|------------|---|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q2: Does the policy formally require staff to undertake development activities? | Fully | 0 | 0 | 2 | 7 |
| | | 0.00% | 0.00% | 4.44% | 15.56% |
| | Mostly | 0 | 2 | 2 | 11 |
| | | 0.00% | 4.44% | 4.44% | 24.44% |
| | Partly | 0 | 1 | 5 | 5 |
| | | 0.00% | 2.22% | 11.11% | 11.11% |
| | Not at all | 0 | 1 | 4 | 5 |
| | | 0.00% | 2.22% | 8.89% | 11.11% |

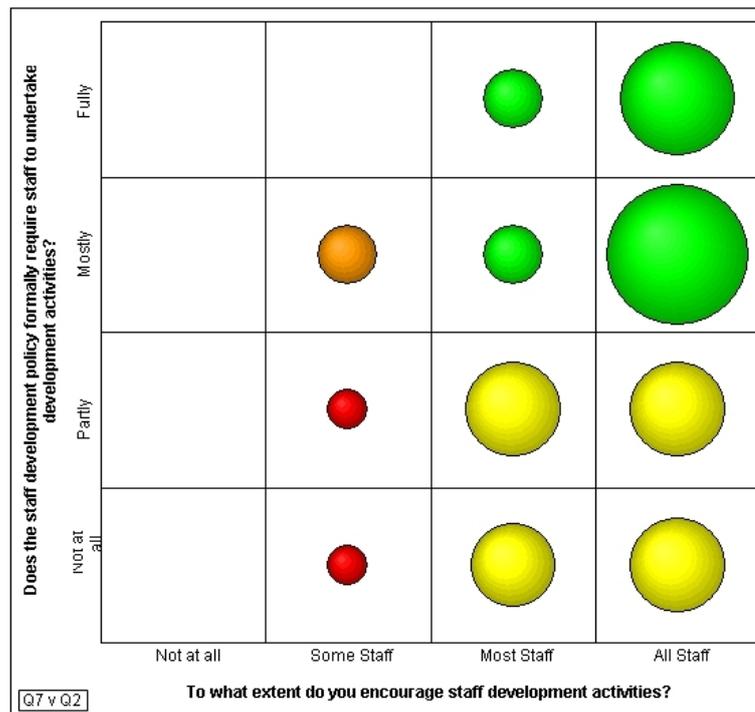


Figure 5A.41: Bubble Diagram for Questions 7 and 2, Four-by-Four Cell Comparison

Table 5A.71: SPSS Chi-Square Tests for Questions 7 and 2, Table 5A.70 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 5.400 ^(a) | 6 | 0.494 |
| Likelihood Ratio | 6.308 | 6 | 0.390 |
| Linear-by-Linear Association | 2.110 | 1 | 0.146 |
| N of Valid Cases | 45 | | |

(a) 8 cells (66.7%) have expected count less than 5. The minimum expected count is 0.80.

Table 5A.72: Consolidated Two-by-Two Cell Contingency Table for Questions 7 and 2.

| | | Q7: To what extent do you encourage staff development activities? | |
|---|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q2: Does the policy formally require staff to undertake development activities? | Fully or Mostly | 2 4.44% | 22 48.89% |
| | None or Partly | 2 4.44% | 19 42.22% |

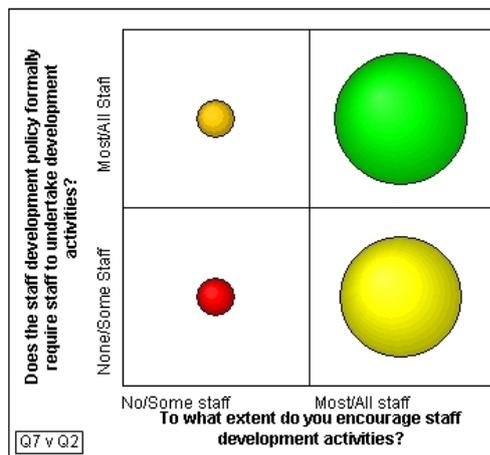


Figure 5A.42: Bubble Diagram for Questions 7 and 2, Two-by-Two Cell Comparison

Table 5A.73: SPSS Chi-Square Tests for Questions 7 and 2, Table 5A.72 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 0.020 ^(b) | 1 | 0.889 | | |
| Continuity Correction ^(a) | 0.000 | 1 | 1.000 | | |
| Likelihood Ratio | 0.020 | 1 | 0.889 | | |
| Fisher's Exact Test | | | | 1.000 | 0.643 |
| Linear-by-Linear Association | 0.019 | 1 | 0.890 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.87.

Table 5A.74: SPSS Symmetric Measures for Questions 7 and 2 Table 5A.72 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.021 | 0.889 |
| | Cramer's V | 0.021 | 0.889 |
| | Contingency Coefficient | 0.021 | 0.889 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.20: Cross-tabulations for Question 7 and Question 3

Table 5A.75: Four-by-Four Cell Contingency Table for Questions 7 and 3.

| | | Q7 To what extent do you encourage staff development activities? | | | |
|---|------------|--|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q3: To what extent is the staff development policy implemented? | Fully | 0 | 0 | 2 | 14 |
| | | 0.00% | 0.00% | 4.44% | 31.11% |
| | Mostly | 0 | 1 | 6 | 12 |
| | | 0.00% | 2.22% | 13.33% | 26.67% |
| | Partly | 0 | 2 | 4 | 0 |
| | | 0.00% | 4.44% | 8.89% | 0.00% |
| | Not at all | 0 | 1 | 1 | 2 |
| | | 0.00% | 2.22% | 2.22% | 4.44% |

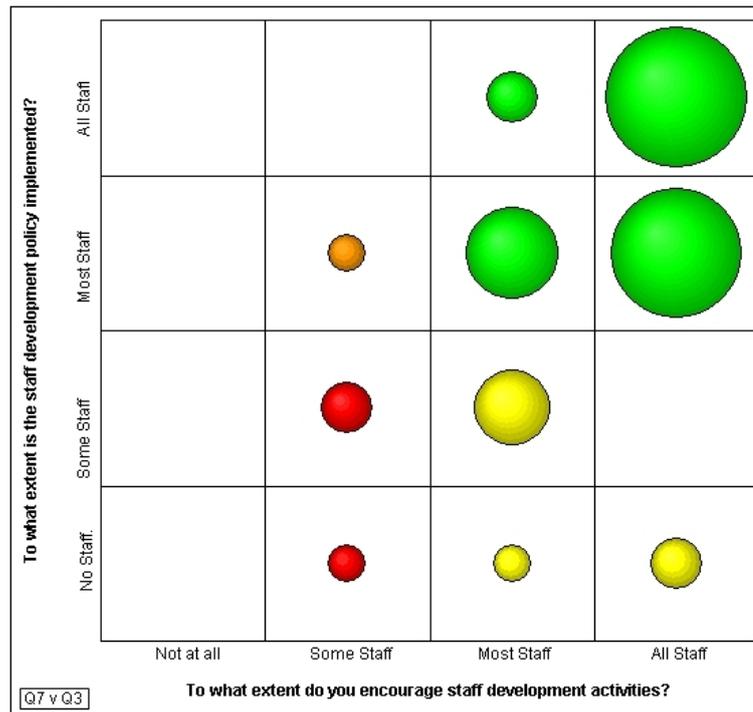


Figure 5A.43: Bubble Diagram for Questions 7 and 3, Four-by-Four Cell Comparison

Table 5A.76: SPSS Chi-Square Tests for Questions 7 and 3, Table 5A.75 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 16.900 ^(a) | 6 | .010 |
| Likelihood Ratio | 19.455 | 6 | .003 |
| Linear-by-Linear Association | 10.111 | 1 | .001 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.36.

Table 5A.77: Consolidated Two-by-Two Cell Contingency Table for Questions 7 and 3.

| | | Q7: To what extent do you encourage staff development activities? | |
|---|-----------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q2: Does the policy formally require staff to undertake development activities? | Fully or Mostly | 1 | 34 |
| | | 2.22% | 75.56% |
| | None or Partly | 3 | 7 |
| | | 6.67% | 15.56% |

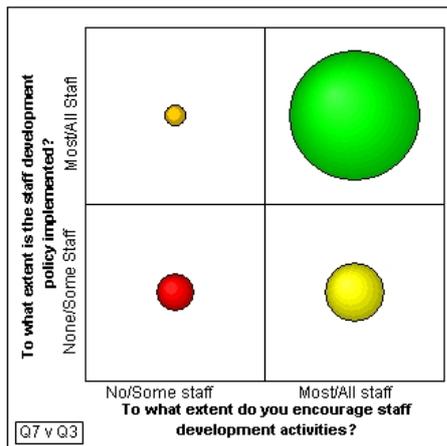


Figure 5A.44: Bubble Diagram for Questions 7 and 3, Two-by-Two Cell Comparison

Table 5A.78: SPSS Chi-Square Tests for Questions 7 and 3, Table 5A.77 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 7.075 ^(b) | 1 | 0.008 | | |
| Continuity Correction ^(a) | 4.121 | 1 | 0.042 | | |
| Likelihood Ratio | 5.697 | 1 | 0.017 | | |
| Fisher's Exact Test | | | | 0.030 | 0.030 |
| Linear-by-Linear Association | 6.918 | 1 | 0.009 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 0.89.

Table 5A.79: SPSS Symmetric Measures for Questions 7 and 3, Table 5A.77 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.397 | 0.008 |
| | Cramer's V | 0.397 | 0.008 |
| | Contingency Coefficient | 0.369 | 0.008 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.21: Cross-tabulations for Question 7 and Question 5

Table 5A.80: Four-by-Four Cell Contingency Table for Questions 7 and 5.

| | | Q7 To what extent do you encourage staff development activities? | | | |
|---|------------|--|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q5: To what extent is the staff appraisal policy implemented? | All Staff | 0 | 0 | 3 | 11 |
| | | 0.00% | 0.00% | 6.67% | 24.44% |
| | Most Staff | 0 | 0 | 6 | 14 |
| | | 0.00% | 0.00% | 13.33% | 31.11% |
| | Some Staff | 0 | 3 | 4 | 3 |
| | | 0.00% | 6.67% | 8.89% | 6.67% |
| | Not at all | 0 | 1 | 0 | 0 |
| | | 0.00% | 2.22% | 0.00% | 0.00% |

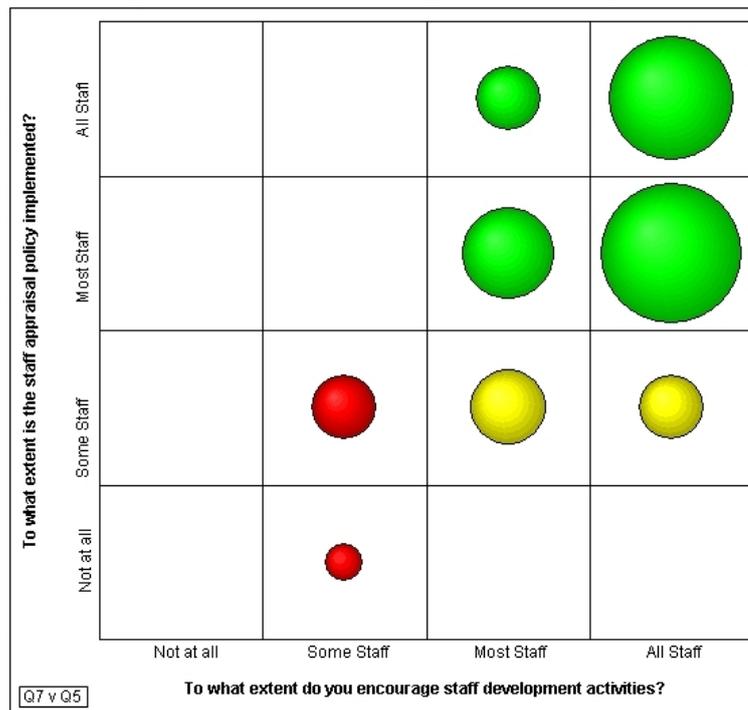


Figure 5A.45: Bubble Diagram for Questions 7 and 5, Four-by-Four Cell Comparison

Table 5A.81: SPSS Chi-Square Tests for Questions 7 and 5, Table 5A.80 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 21.456 ^(a) | 6 | 0.002 |
| Likelihood Ratio | 17.456 | 6 | 0.008 |
| Linear-by-Linear Association | 11.692 | 1 | 0.001 |
| N of Valid Cases | 45 | | |

(a) 8 cells (66.7%) have expected count less than 5. The minimum expected count is 0.09.

Table 5A.82: Consolidated Two-by-Two Cell Contingency Table for Questions 7 and 5.

| | | Q7: To what extent do you encourage staff development activities? | |
|---|--------------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q5: To what extent is the staff appraisal policy implemented? | Most or All Staff | 0 0.00% | 34 75.56% |
| | None or Some Staff | 4 8.89% | 7 15.56% |

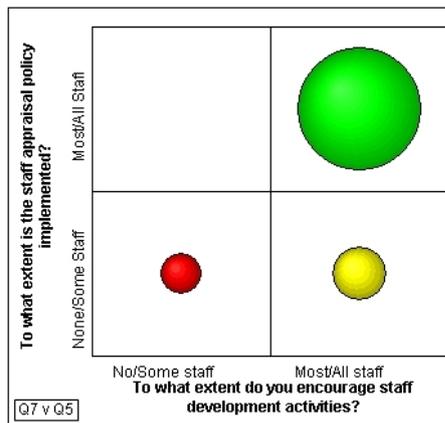


Figure 5A.46: Bubble Diagram for Questions 7 and 5 Comparison

Table 5A.83: SPSS Chi-Square Tests for Questions 7 and 5, Table 5A.82 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 13.570 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 9.451 | 1 | 0.002 | | |
| Likelihood Ratio | 12.576 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.002 | 0.002 |
| Linear-by-Linear Association | 13.268 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is .98.

Table 5A.84: SPSS Symmetric Measures for Questions 7 and 5, Table 5A.82 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.549 | 0.000 |
| | Cramer's V | 0.549 | 0.000 |
| | Contingency Coefficient | 0.481 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.22: Cross-tabulations for Question 7 and Question 6

Table 5A.85: Four-by-Four Cell Contingency Table for Questions 7 and 6.

| | | Q7 To what extent do you encourage staff development activities? | | | |
|---|------------|--|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q6: Does the appraisal policy include staff development activities? | All Staff | 0 | 1 | 7 | 24 |
| | | 0.00% | 2.22% | 15.56% | 53.33% |
| | Most Staff | 0 | 0 | 5 | 4 |
| | | 0.00% | 0.00% | 11.11% | 8.89% |
| | Some Staff | 0 | 2 | 1 | 0 |
| | | 0.00% | 4.44% | 2.22% | 0.00% |
| | Not at all | 0 | 1 | 0 | 0 |
| | | 0.00% | 2.22% | 0.00% | 0.00% |

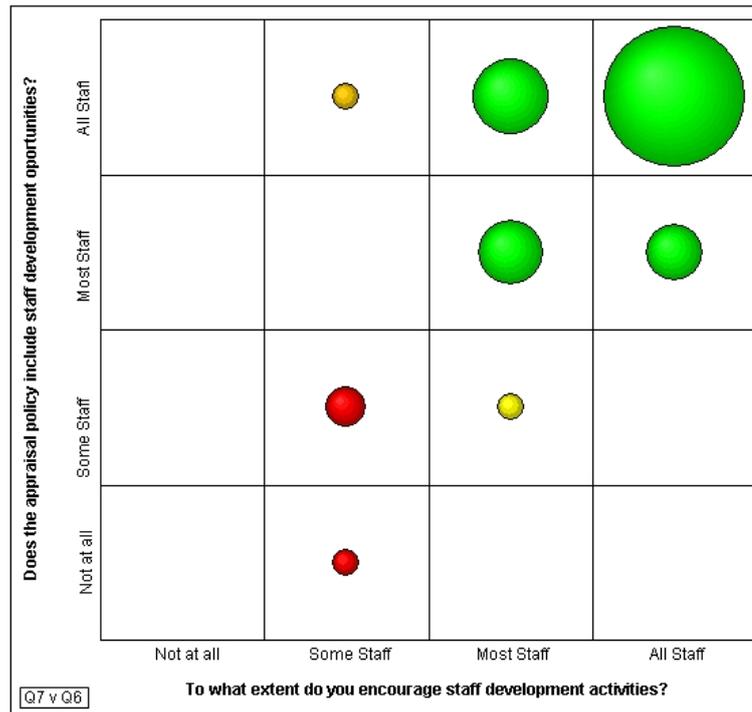


Figure 5A.47: Bubble Diagram for Questions 7 and 6, Four-by-Four Comparison

Table 5A.86: SPSS Chi-Square Tests for Questions 7 and 6, Table 5A.85 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 29.457 ^(a) | 6 | 0.000 |
| Likelihood Ratio | 20.015 | 6 | 0.003 |
| Linear-by-Linear Association | 15.957 | 1 | 0.000 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.09.

Table 5A.87: Consolidated Two-by-Two Cell Contingency Table for Questions 7 and 6.

| | | Q7: To what extent do you encourage staff development activities? | |
|---|--------------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q6: Does the appraisal policy include staff development activities? | Most or All Staff | 1 2.22% | 40 88.89% |
| | None or Some Staff | 3 6.69% | 1 2.22% |

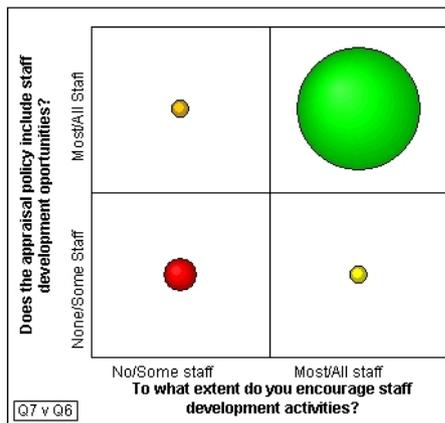


Figure 5A.48: Bubble Diagram for Questions 7 and 6, Two-by-Two Cell Comparison

Table 5A.88: SPSS Chi-Square Tests for Questions 7 and 6, Table 5A.87 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|-----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 23.693 ^(b) | 1 | 0.000 | | |
| Continuity Correction ^(a) | 15.580 | 1 | 0.000 | | |
| Likelihood Ratio | 13.095 | 1 | 0.000 | | |
| Fisher's Exact Test | | | | 0.001 | 0.001 |
| Linear-by-Linear Association | 23.166 | 1 | 0.000 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 3 cells (75.0%) have expected count less than 5. The minimum expected count is 0.36.

Table 5A.89: SPSS Symmetric Measures for Questions 7 and 6 Table 5A.87 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.726 | 0.000 |
| | Cramer's V | 0.726 | 0.000 |
| | Contingency Coefficient | 0.587 | 0.000 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.23: Cross-tabulations for Question 8 and Question 1

Table 5A.90: Four-by-Four Cell Contingency Table for Questions 8 and 1.

| | | Q8: Do your employee's contracts of employment have a formal staff development requirement? | | | |
|---|------------|---|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q1: To what extent does your organisation have a formal staff development policy? | All Staff | 5 | 1 | 2 | 1 |
| | | 11.36% | 2.27% | 4.55% | 2.27% |
| | Most Staff | 9 | 1 | 2 | 2 |
| | | 20.45% | 2.27% | 4.55% | 4.55% |
| | Some Staff | 11 | 0 | 0 | 0 |
| | | 25.00% | 0.00% | 0.00% | 0.00% |
| | Not at all | 9 | 1 | 0 | 0 |
| | | 20.45% | 2.27% | 0.00% | 0.00% |

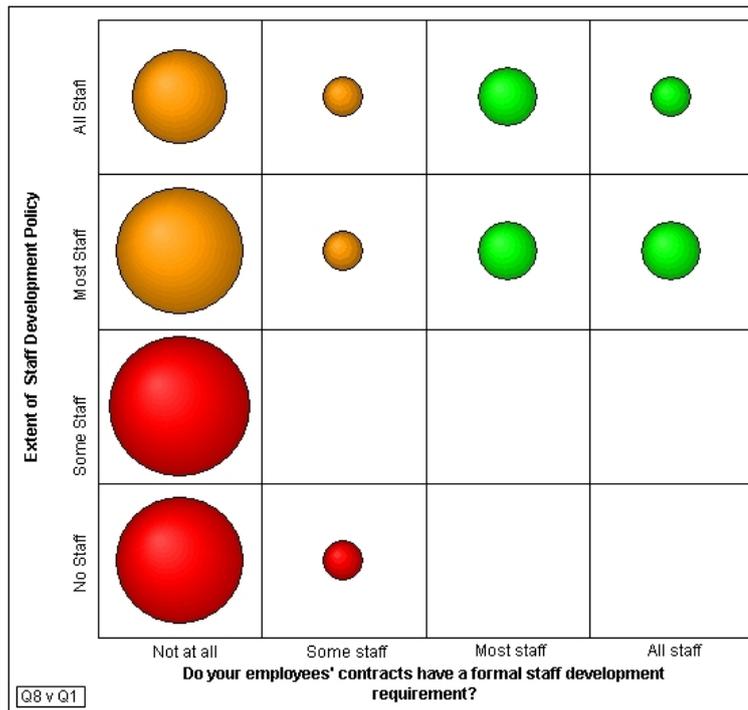


Figure 5A.49: Bubble Diagram for Questions 8 and 1, Four-by-Four Cell Comparison

Table 5A.91: SPSS Chi-Square Tests for Questions 8 and 6, Table 1.A.90 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 9.541 ^(a) | 9 | 0.389 |
| Likelihood Ratio | 11.800 | 9 | 0.225 |
| Linear-by-Linear Association | 3.496 | 1 | 0.062 |
| N of Valid Cases | 44 | | |

(a) 14 cells (87.5%) have expected count less than 5. The minimum expected count is 0.27.

Table 5A.92: Consolidated Two-by-Two Cell Contingency Table for Questions 8 and 1.

| | | Q8: Do your employee's contracts of employment have a formal staff development requirement? | |
|---|-------------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q1: To what extent does your organisation have a formal staff development policy? | Most or All Staff | 16 36.36% | 7 15.91% |
| | None Some Staff | 21 47.73% | 0 0.00% |

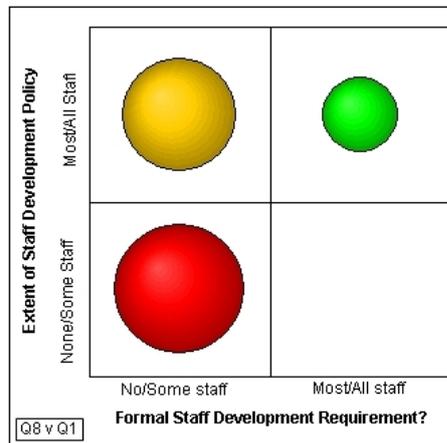


Figure 5A.50: Bubble Diagram for Questions 8 and 1, Two-by-Two Cell Comparison

Table 5A.93: SPSS Chi-Square Tests for Questions 8 and 1 Table 5A.92 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 2.448 ^(b) | 1 | 0.118 | | |
| Continuity Correction ^(a) | 1.151 | 1 | 0.283 | | |
| Likelihood Ratio | 3.983 | 1 | 0.046 | | |
| Fisher's Exact Test | | | | 0.177 | 0.140 |
| Linear-by-Linear Association | 2.393 | 1 | 0.122 | | |
| N of Valid Cases | 44 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 1.59.

Table 5A.94: SPSS Symmetric Measures for Questions 8 and 1 Table 5A.92 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.236 | 0.118 |
| | Cramer's V | 0.236 | 0.118 |
| | Contingency Coefficient | 0.230 | 0.118 |
| N of Valid Cases | | 44 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.24: Cross-tabulations for Question 8 and Question 4

Table 5A.95: Four-by-Four Cell Contingency Table for Questions 8 and 4.

| | | Q8: Do your employee's contracts of employment have a formal staff development requirement? | | | |
|--|------------|---|-----------------|------------|-----------|
| | | Not at all | Some Staff Only | Most Staff | All Staff |
| Q4: To what extent does your organisation have a staff appraisal policy? | All Staff | 19 | 2 | 4 | 3 |
| | | 43.18% | 4.55% | 9.09% | 6.82% |
| | Most Staff | 10 | 1 | 0 | 0 |
| | | 22.73% | 2.27% | 0.00% | 0.00% |
| | Some Staff | 5 | 0 | 0 | 0 |
| | | 11.36% | 0.00% | 0.00% | 0.00% |
| | Not at all | 0 | 0 | 0 | 0 |
| | | 0.00% | 0.00% | 0.00% | 0.00% |

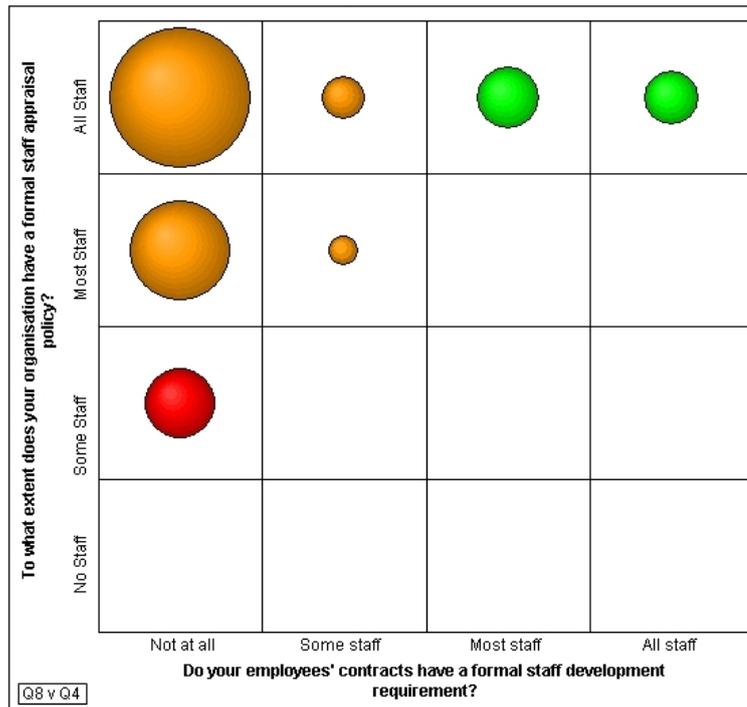


Figure 5A.51: Bubble Diagram for Questions 8 and 4, Four-by-Four Cell Comparison

Table 5A.96: SPSS Chi-Square Tests for Questions 8 and 4, Table 5A.95 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 5.349 ^(a) | 6 | 0.500 |
| Likelihood Ratio | 7.980 | 6 | 0.240 |
| Linear-by-Linear Association | 4.056 | 1 | 0.044 |
| N of Valid Cases | 44 | | |

(a) 10 cells (83.3%) have expected count less than 5. The minimum expected count is 0.34.

Table 5A.97: Consolidated Two-by-Two Cell Contingency Table for Questions 8 and 4.

| | | Q8: Do your employee's contracts of employment have a formal staff development requirement? | |
|--|--------------------|---|-------------------|
| | | None or some staff only | Most or all staff |
| Q4: To what extent does your organisation have a staff appraisal policy? | Most or All Staff | 32 | 7 |
| | | 72.73% | 15.91% |
| | None or Some Staff | 5 | 0 |
| | | 11.36% | 0.00% |

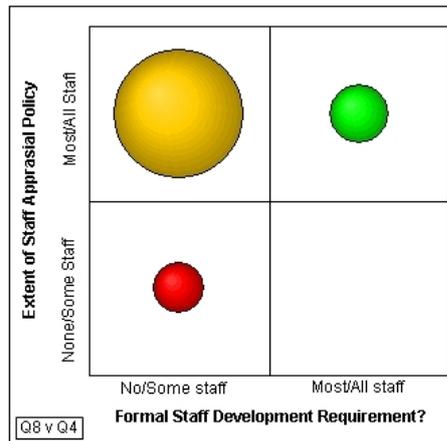


Figure 5A.52: Bubble Diagram for Questions 8 and 4, Two-by-Two Cell Comparison

Table 5A.98: SPSS Chi-Square Tests for Questions 8 and 4, Table 5A.97 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 1.067 ^(b) | 1 | 0.302 | | |
| Continuity Correction ^(a) | 0.147 | 1 | 0.701 | | |
| Likelihood Ratio | 1.850 | 1 | 0.174 | | |
| Fisher's Exact Test | | | | 0.574 | 0.401 |
| Linear-by-Linear Association | 1.043 | 1 | 0.307 | | |
| N of Valid Cases | 44 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 0.80.

Table 5A.99: SPSS Symmetric Measures for Questions 8 and 4, Table 5A.97 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.156 | 0.302 |
| | Cramer's V | 0.156 | 0.302 |
| | Contingency Coefficient | 0.154 | 0.302 |
| N of Valid Cases | | 44 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.25: Cross-tabulations for Question 9 and Question 3

Table 5A.100: Four-by-Four Cell Contingency Table for Questions 9 and 3.

| | | Q9: Which of the following best describes your organisation's approach to staff development? | | | |
|---|------------|--|----------------------|-----------------------------|----------------------|
| | | Not necessary | Staff Responsibility | Organisation Responsibility | Joint Responsibility |
| Q3: To what extent is the staff development policy implemented? | All Staff | 0 | 0 | 1 | 15 |
| | | 0.00% | 0.00% | 2.22% | 33.33% |
| | Most Staff | 0 | 0 | 0 | 19 |
| | | 0.00% | 0.00% | 0.00% | 42.22% |
| | Some Staff | 0 | 0 | 1 | 5 |
| | | 0.00% | 0.00% | 2.22% | 11.11% |
| | Not at all | 0 | 1 | 0 | 3 |
| | | 0.00% | 2.22% | 0.00% | 6.67% |

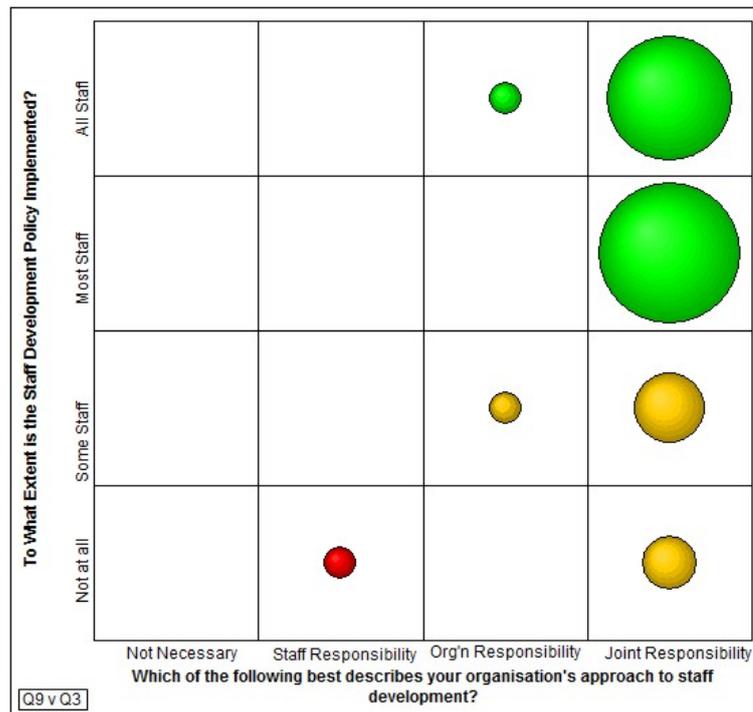


Figure 5A.53: Bubble Diagram for Questions 9 and 3, Four-by-Four Cell Comparison

Table 5A.101: SPSS Chi-Square Tests for Questions 9 and 3, Table 5A.100 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 13.705 ^(a) | 6 | .033 |
| Likelihood Ratio | 8.476 | 6 | .205 |
| Linear-by-Linear Association | 3.589 | 1 | .058 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.09.

Table 5A.102: Four-by-Two Cell Contingency Table for Questions 9 and 3.

| | | Q9: Which of the following best describes your organisation's approach to staff development? | | | |
|---|--------------------|--|----------------------|-----------------------------|----------------------|
| | | Not necessary | Staff Responsibility | Organisation Responsibility | Joint Responsibility |
| Q3: To what extent is the staff development policy implemented? | Most or All Staff | 0 | 0 | 1 | 34 |
| | | 0.00% | 0.00% | 2.22% | 75.56% |
| | None or Some Staff | 0 | 1 | 1 | 8 |
| | | 0.00% | 2.22% | 2.22% | 17.78% |

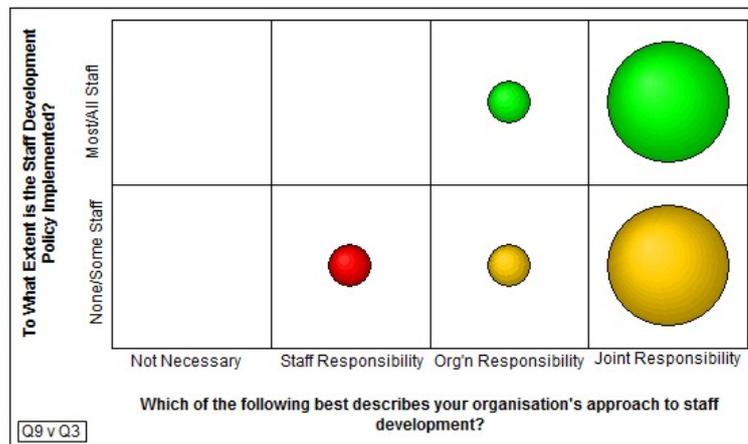


Figure 5A.54: Bubble Diagram for Questions 9 and 3, Four-by-Two Cell Comparison

Table 5A.103: SPSS Chi-Square Tests for Questions 9 and 3, Table 5A.102 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 4.638 ^(a) | 2 | 0.098 |
| Likelihood Ratio | 4.000 | 2 | 0.135 |
| Linear-by-Linear Association | 4.467 | 1 | 0.035 |
| N of Valid Cases | 45 | | |

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is 0.22.

Table 5A.104: SPSS Symmetric Measures for Questions 9 and 3, Table 5A.102 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.321 | 0.098 |
| | Cramer's V | 0.321 | 0.098 |
| | Contingency Coefficient | 0.306 | 0.098 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.26: Cross-tabulations for Question 9 and Question 5

Table 5A.105: Four-by-Four Cell Contingency Table for Questions 9 and 5.

| | | Q9: Which of the following best describes your organisation's approach to staff development? | | | |
|---|------------|--|----------------------|-----------------------------|----------------------|
| | | Not necessary | Staff Responsibility | Organisation Responsibility | Joint Responsibility |
| Q5: To what extent is the staff appraisal policy implemented? | All Staff | 0 | 0 | 2 | 12 |
| | | 0.00% | 0.00% | 4.44% | 26.67% |
| | Most Staff | 0 | 0 | 0 | 20 |
| | | 0.00% | 0.00% | 0.00% | 44.44% |
| | Some Staff | 0 | 0 | 0 | 10 |
| | | 0.00% | 0.00% | 0.00% | 22.22% |
| | Not at all | 0 | 1 | 0 | 0 |
| | | 0.00% | 2.22% | 0.00% | 0.00% |

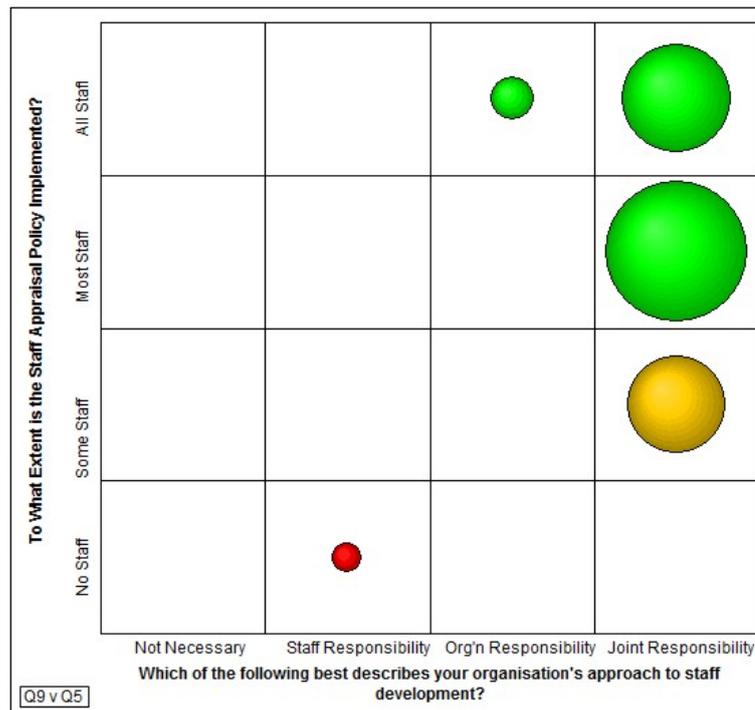


Figure 5A.55: Bubble Diagram for Questions 9 and 5, Four-by-Four Cell Comparison

Table 5A.106: SPSS Chi-Square Tests for Questions 9 and 5, Table 5A.105 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 49.592 ^(a) | 6 | 0.000 |
| Likelihood Ratio | 14.380 | 6 | 0.026 |
| Linear-by-Linear Association | 1.325 | 1 | 0.250 |
| N of Valid Cases | 45 | | |

(a) 9 cells (75.0%) have expected count less than 5. The minimum expected count is 0.02.

Table 5A.107: Four-by-Two Cell Contingency Table for Questions 9 and 5.

| | | Q9: Which of the following best describes your organisation's approach to staff development? | | | |
|---|--------------------|--|----------------------|-----------------------------|----------------------|
| | | Not necessary | Staff Responsibility | Organisation Responsibility | Joint Responsibility |
| Q5: To what extent is the staff appraisal policy implemented? | Most or All Staff | 0 | 0 | 2 | 32 |
| | | 0.00% | 0.00% | 4.44% | 71.11% |
| | None or Some Staff | 0 | 1 | 0 | 10 |
| | | 0.00% | 2.22% | 0.00% | 22.22% |



Figure 5A.56: Bubble Diagram for Questions 9 and 5, Four-by-Two Cell Comparison

Table 5A.108: SPSS Chi-Square Tests for Questions 9 and 5, Table 5A.107 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|----------------------|----|-----------------------|
| Pearson Chi-Square | 3.747 ^(a) | 2 | 0.154 |
| Likelihood Ratio | 3.948 | 2 | 0.139 |
| Linear-by-Linear Association | 0.980 | 1 | 0.322 |
| N of Valid Cases | 45 | | |

(a) 4 cells (66.7%) have expected count less than 5. The minimum expected count is 0.24.

Table 5A.109: SPSS Symmetric Measures for Questions 9 and 5 Table 5A.107 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.289 | 0.154 |
| | Cramer's V | 0.289 | 0.154 |
| | Contingency Coefficient | 0.277 | 0.154 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.27: Responses to Question 10**Question 10: Does your organisation have a formal staff development/training unit?**

Table 5A.110: Responses to Question 10.

| | Yes | No |
|--------------------|--------|--------|
| No. of Responses | 27.5 | 17.5 |
| Percentage | 61.11% | 38.89% |
| No. of Respondents | 45 | |
| Mean R | 1.39 | |

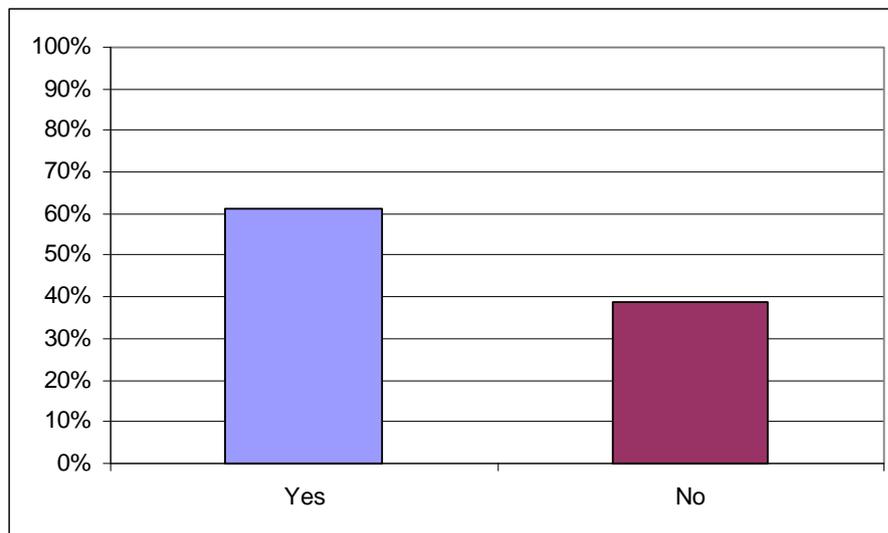


Figure 5A.57: Bar chart of Question 10 responses

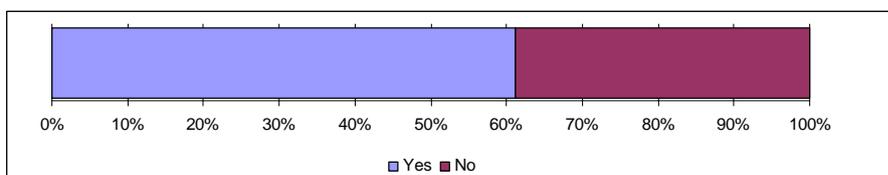


Figure 5A.58: Stacked bar chart of Question 10 responses

Appendix 5A.10.28: Cross-tabulations for Question 10 and Question 1

Table 5A.111: Consolidated Two-by-Two Cell Contingency Table for Questions 10 and 1.

| | | Q10: Does your organisation have a formal staff development/training unit? | |
|---|--------------------|--|--------------|
| | | Yes | No |
| Q1: To what extent does your organisation have a formal staff development policy? | Most or All Staff | 25 55.56% | 10 22.22% |
| | None or Some Staff | 3 6.67% | 7 15.56% |

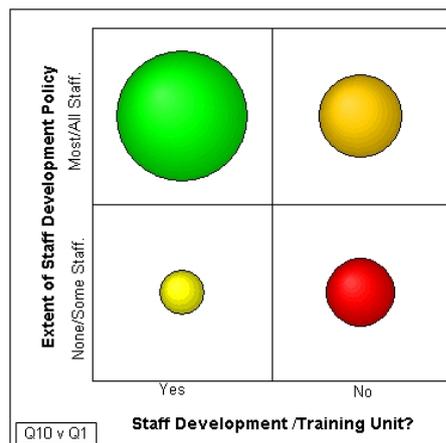


Figure 5A.59: Bubble Diagram for Questions 10 and 1, Two-by-two Cell Comparison

Table 5A.112: SPSS Chi-Square Tests for Questions 10 and 1, Table 5A.111 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 5.679 ^(b) | 1 | 0.017 | | |
| Continuity Correction ^(a) | 4.053 | 1 | 0.044 | | |
| Likelihood Ratio | 5.571 | 1 | 0.018 | | |
| Fisher's Exact Test | | | | 0.027 | 0.023 |
| Linear-by-Linear Association | 5.553 | 1 | 0.018 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 1 cells (25.0%) have expected count less than 5. The minimum expected count is 3.78.

Table 5A.113: SPSS Symmetric Measures for Questions 10 and 1 Table 5A.111 above.

| Symmetric Measures | | Value | Approx. Sig. |
|---------------------------|-------------------------|--------|--------------|
| Nominal by Nominal | Phi | -0.355 | 0.017 |
| | Cramer's V | 0.355 | 0.017 |
| | Contingency Coefficient | 0.335 | 0.017 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.29: Cross-tabulations for Question 10 and Question 4

Table 5A.114: Consolidated Two-by-Two Cell Contingency Table for Questions 10 and 4.

| | | Q10: Does your organisation have a formal staff development/training unit? | |
|---|--------------------|--|--------|
| | | Yes | No |
| Q4: To what extent is the staff development policy implemented? | Most or All Staff | 28 | 12 |
| | | 62.22% | 26.67% |
| | None or Some Staff | 0 | 5 |
| | | 0.00% | 11.11% |

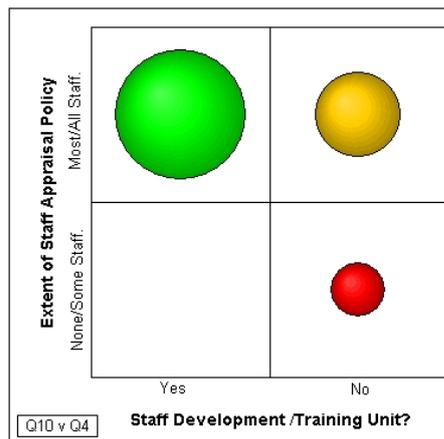


Figure 5A.60: Bubble Diagram for Questions 10 and 4, Two-by-two Cell Comparison

Table 5A.115: SPSS Chi-Square Tests for Questions 10 and 4, Table 5A.114 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 9.265 ^(b) | 1 | 0.002 | | |
| Continuity Correction ^(a) | 6.526 | 1 | 0.011 | | |
| Likelihood Ratio | 10.798 | 1 | 0.001 | | |
| Fisher's Exact Test | | | | 0.005 | 0.005 |
| Linear-by-Linear Association | 9.059 | 1 | 0.003 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.89.

Table 5A.116: SPSS Symmetric Measures for Questions 10 and 4, Table 5A.114 above.

| Symmetric Measures | | Value | Approx. Sig. |
|-----------------------|-------------------------|--------|--------------|
| Nominal by Nominal | Phi | -0.454 | 0.002 |
| | Cramer's V | 0.454 | 0.002 |
| | Contingency Coefficient | 0.413 | 0.002 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.30: Cross-tabulations for Question 10 and Question 7

Table 5A.117: Consolidated Two-by-Two Cell Contingency Table for Questions 10 and 7.

| | | Q10: Does your organisation have a formal staff development/training unit? | |
|--|--------------------|--|--------|
| | | Yes | No |
| Q7: Does the appraisal policy include staff development opportunities? | Most or All Staff | 27 | 14 |
| | | 60.00% | 31.11% |
| | None or Some Staff | 1 | 3 |
| | | 2.22% | 6.67% |

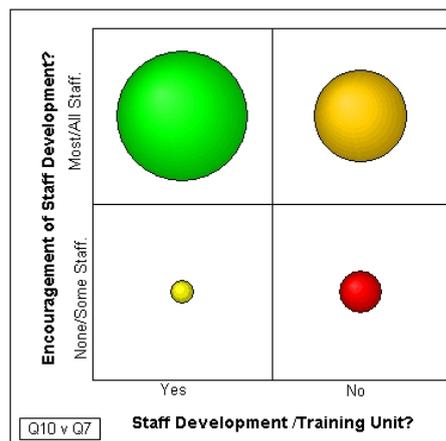


Figure 5A.61: Bubble Diagram for Questions 10 and 7, Two-by-two Cell Comparison

Table 5A.118: SPSS Chi-Square Tests for Questions 10 and 7, Table 5A.117 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 2.588 ^(b) | 1 | 0.108 | | |
| Continuity Correction ^(a) | 1.142 | 1 | 0.285 | | |
| Likelihood Ratio | 2.524 | 1 | 0.112 | | |
| Fisher's Exact Test | | | | 0.144 | 0.144 |
| Linear-by-Linear Association | 2.530 | 1 | 0.112 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.51.

Table 5A.119: SPSS Symmetric Measures for Questions 10 and 7 Table 5A.117 above.

| Symmetric Measures | | Value | Approx. Sig. |
|-----------------------|-------------------------|--------|--------------|
| Nominal by Nominal | Phi | -0.240 | 0.108 |
| | Cramer's V | 0.240 | 0.108 |
| | Contingency Coefficient | 0.233 | 0.108 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.31: Cross-tabulations for Question 10 and Question 8

Table 5A.120: Consolidated Two-by-Two Cell Contingency Table for Questions 10 and 8.

| | | Q10: Does your organisation have a formal staff development/training unit? | |
|---|--------------------|--|--------|
| | | Yes | No |
| Q8: Do your employee's contracts of employment have a formal staff development requirement? | Most or All Staff | 7 | 0 |
| | | 15.56% | 0.00% |
| | None or Some Staff | 20 | 17 |
| | | 44.44% | 37.78% |

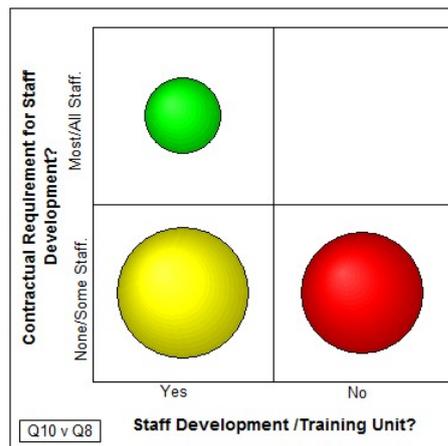


Figure 5A.62: Bubble Diagram for Questions 10 and 8, Two-by-two Cell Comparison

Table 5A.121: SPSS Chi-Square Tests for Questions 10 and 8, Table 5A.120 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 5.241 ^(b) | 1 | 0.022 | | |
| Continuity Correction ^(a) | 3.482 | 1 | 0.062 | | |
| Likelihood Ratio | 7.655 | 1 | 0.006 | | |
| Fisher's Exact Test | | | | 0.032 | 0.023 |
| Linear-by-Linear Association | 5.122 | 1 | 0.024 | | |
| N of Valid Cases | 44 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 2.70.

Table 5A.122: SPSS Symmetric Measures for Questions 10 and 8, Table 5A.120 above.

| Symmetric Measures | | Value | Approx. Sig. |
|-----------------------|-------------------------|--------|--------------|
| Nominal by Nominal | Phi | -0.345 | 0.022 |
| | Cramer's V | 0.345 | 0.022 |
| | Contingency Coefficient | 0.326 | 0.022 |
| N of Valid Cases | | 44 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.32: Responses to Question 11

Question 11: Does your organisation offer or provide staff development/training opportunities to non-employees (e.g. subcontractors' / suppliers' staff)?

| | None | Yes - Subcontractors' Staff | Yes - Self-employed Staff | Yes - Suppliers' Staff |
|--------------------|--------|-----------------------------|---------------------------|------------------------|
| No. of Responses | 12 | 28 | 19 | 11 |
| Percentage | 26.67% | 62.22% | 42.22% | 24.44% |
| No. of Respondents | 45 | | | |

Table 5A.123: Responses to Question 11.

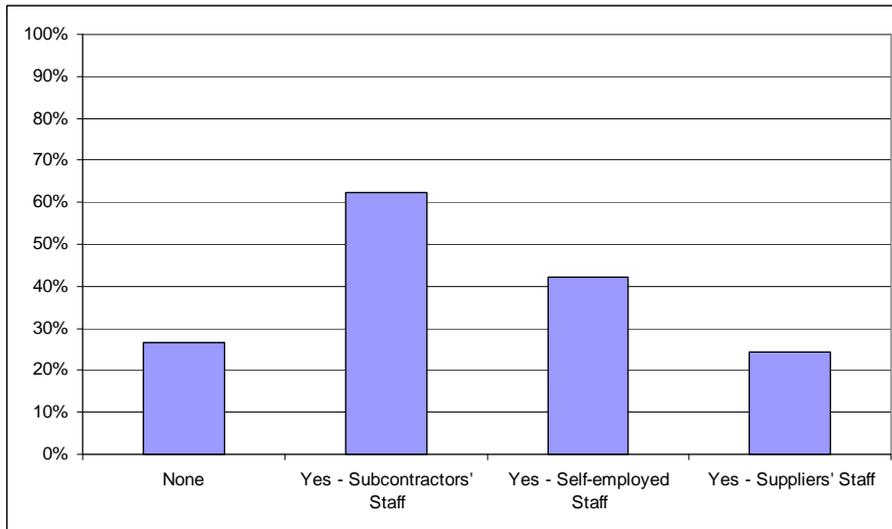


Figure 5A.63: Bar Chart of Question 11 Responses

Table 5A.124: Response Combinations to Question 11.

| Response Combination | Percentage |
|---|------------|
| None | 26.67% |
| Subcontractors' Staff Only | 22.22% |
| Self-employed Staff Only | 6.67% |
| Suppliers' Staff Only | 2.22% |
| Subcontractors' and Self-employed Staff | 20.00% |
| Subcontractors' and Suppliers' Staff | 6.67% |
| Self-employed and Suppliers' Staff | 0.00% |
| Subcontractors', Self-employed and Suppliers' Staff | 13.33% |

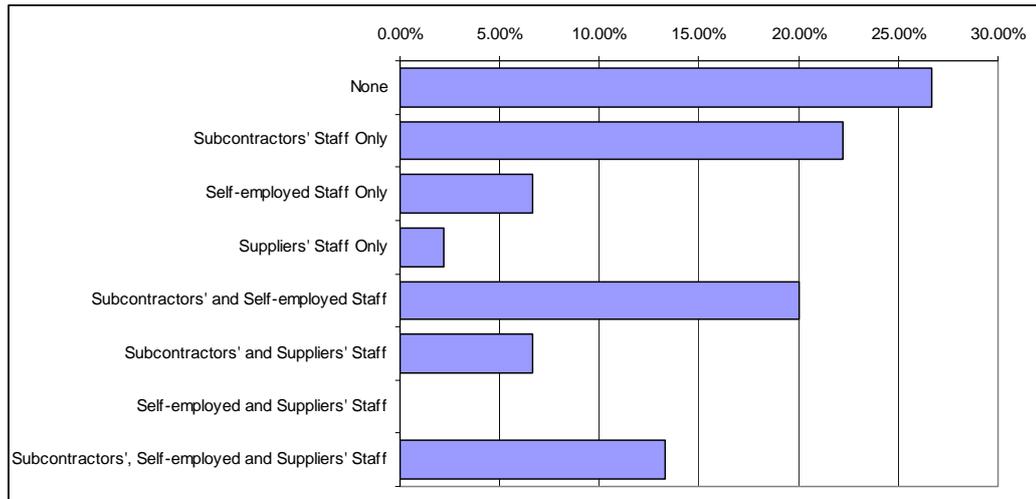


Figure 5A.64: Response Combinations to Question 11.

Appendix 5A.10.33: Responses to Question 12

Question 12: Below are a number of reasons commonly given by organisations for not undertaking staff development. Please indicate your organisations approach to each statement.

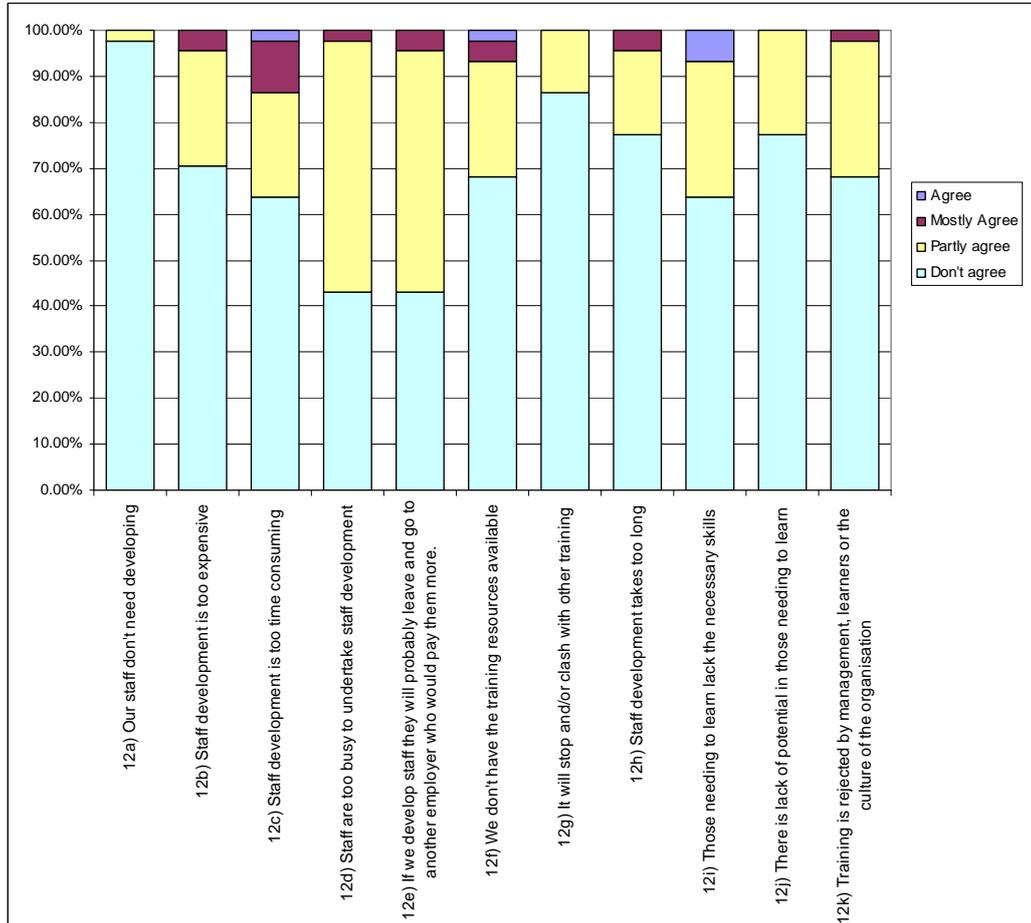


Figure 5A.65: Responses to Question 12: Stacked Bar Chart

Table 5A.125: Relative Importance Indices for Responses to Question 12

| Rank | Below are a number of reasons commonly given by organisations for not undertaking staff development. Please indicate your organisations approach to each statement. | Relative Importance index |
|-------------|--|----------------------------------|
| 1 | 12a) Our staff don't need developing | 99.43 |
| 5 | 12b) Staff development is too expensive | 91.48 |
| 9 | 12c) Staff development is too time consuming | 86.93 |
| 10 | 12d) Staff are too busy to undertake staff development | 85.23 |
| 11 | 12e) If we develop staff they will probably leave and go to another employer who would pay them more. | 84.66 |
| 7 | 12f) We don't have the training resources available | 89.77 |
| 2 | 12g) It will stop and/or clash with other training | 96.59 |
| 4 | 12h) Staff development takes too long | 93.18 |
| 8 | 12i) Those needing to learn lack the skills to learn | 87.50 |
| 3 | 12j) There is a lack of potential in those needing to learn | 94.32 |
| 5 | 12k) Training is rejected by management, learners or the culture of the organisation. | 91.48 |

Appendix 5A.10.34: Responses to Question 12.a

Question 12.a: Our staff don't need development.

Table 5A.126: Responses to Question 12a.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 0 | 1 | 43 |
| Percentage | 0.00% | 0.00% | 2.27% | 97.73% |
| No. of Respondents | 44 | | Mean R | 3.98 |

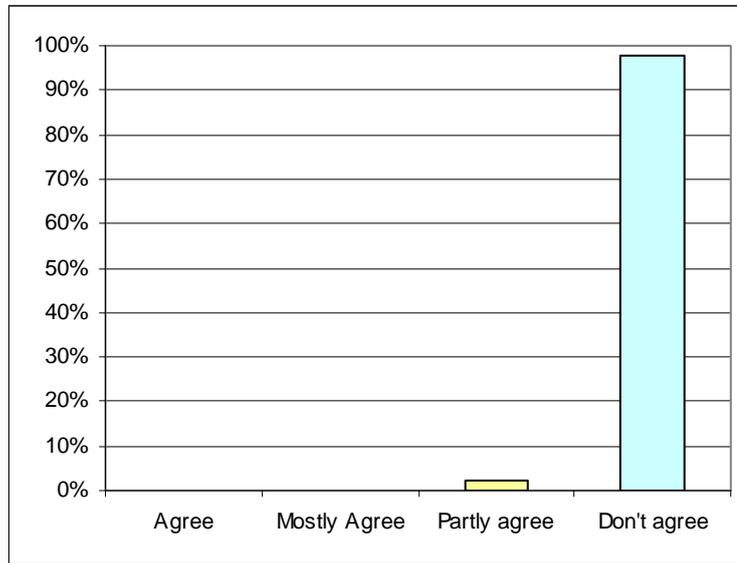


Figure 5A.66: Bar chart of Question 12a responses

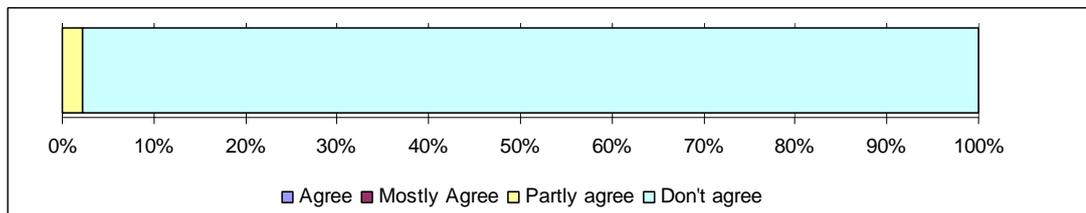


Figure 5A.67: Stacked bar chart of Question 12a responses

Appendix 5A.10.35: Responses to Question 12.b

Question 12.b: Staff development is too expensive.

Table 5A.127: Responses to Question 12b.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 2 | 11 | 31 |
| Percentage | 0.00% | 4.55% | 25.00% | 70.45% |
| No. of Respondents | 44 | | Mean R | 3.66 |

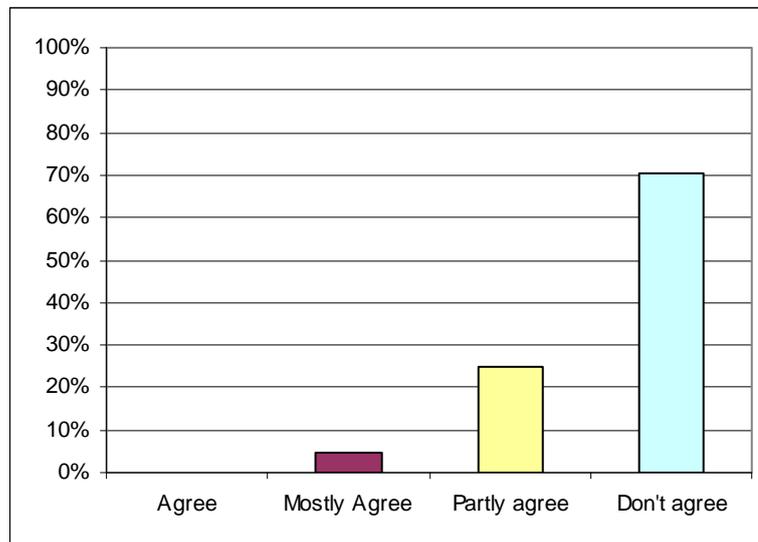


Figure 5A.68: Bar chart of Question 12b responses

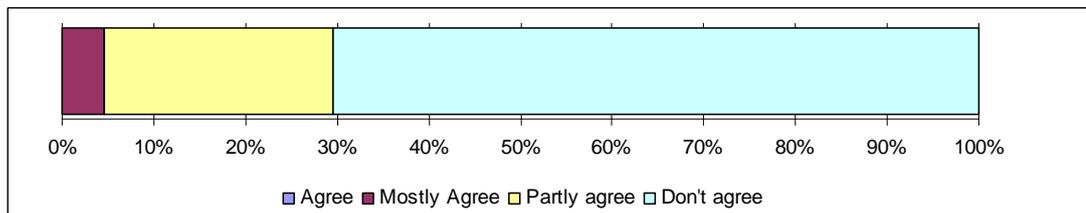


Figure 5A.69: Stacked bar chart of Question 12b responses

Appendix 5A.10.36: Responses to Question 12.c

Question 12.c: Staff development is too time-consuming.

Table 5A.128: Responses to Question 12.c.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 1 | 5 | 10 | 28 |
| Percentage | 2.27% | 11.36% | 22.73% | 63.64% |
| No. of Respondents | 44 | | Mean R 3.48 | |

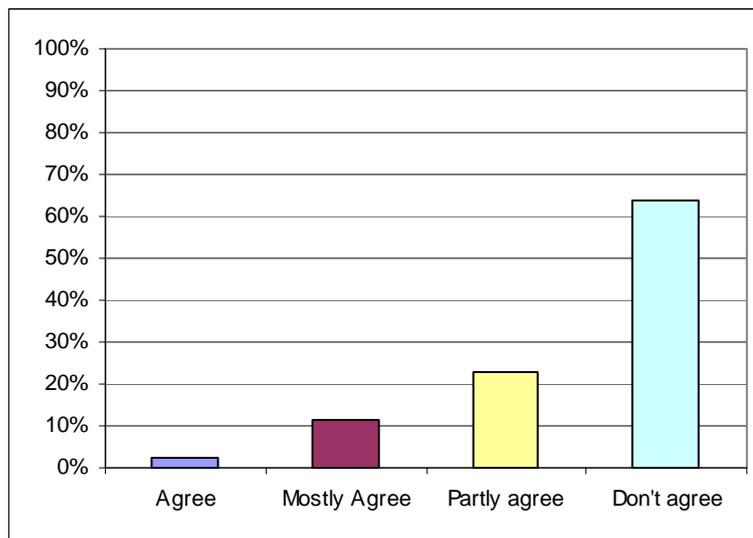


Figure 5A.70: Bar chart of Question 12c responses

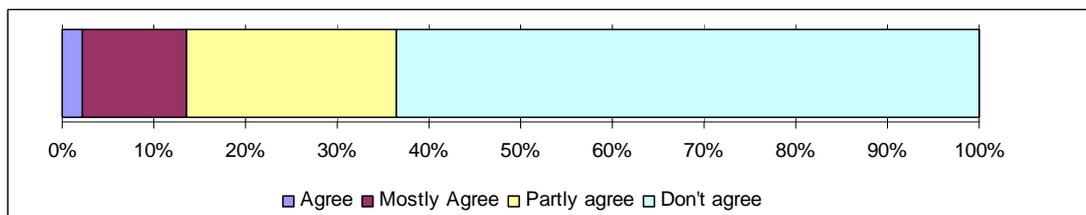


Figure 5A.71: Stacked bar chart of Question 12c responses

Appendix 5A.10.37: Responses to Question 12.d

Question 12.d: Staff are too busy to undertake staff development.

Table 5A.129: Responses to Question 12d.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 1 | 24 | 19 |
| Percentage | 0.00% | 2.27% | 54.55% | 43.18% |
| No. of Respondents | 44 | | Mean R | 3.41 |

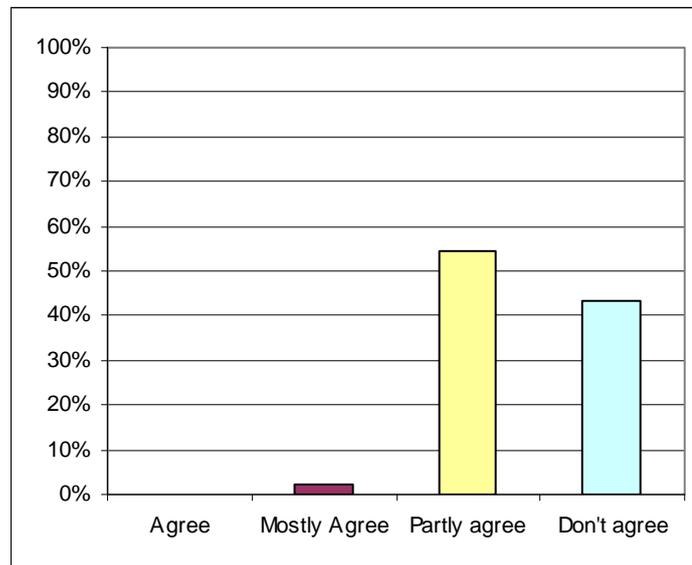


Figure 5A.72: Bar chart of Question 12d responses

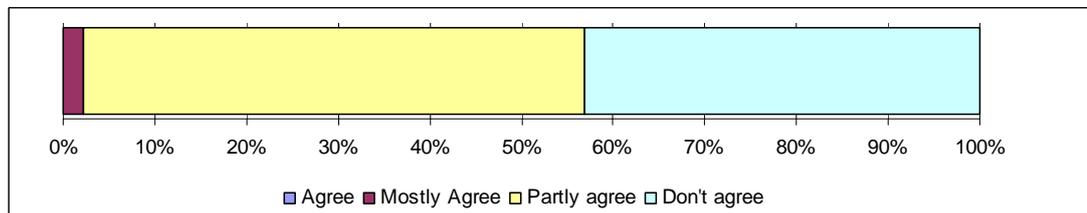


Figure 5A.73: Stacked bar chart of Question 12d responses

Appendix 5A.10. 38: Responses to Question 38

Question 12.e: If we develop staff they will probably leave and go to another employer who would pay them more.

Table 5A.130: Responses to Question 12e.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 2 | 23 | 19 |
| Percentage | 0.00% | 4.55% | 52.27% | 43.18% |
| No. of Respondents | 44 | | Mean R | 3.39 |

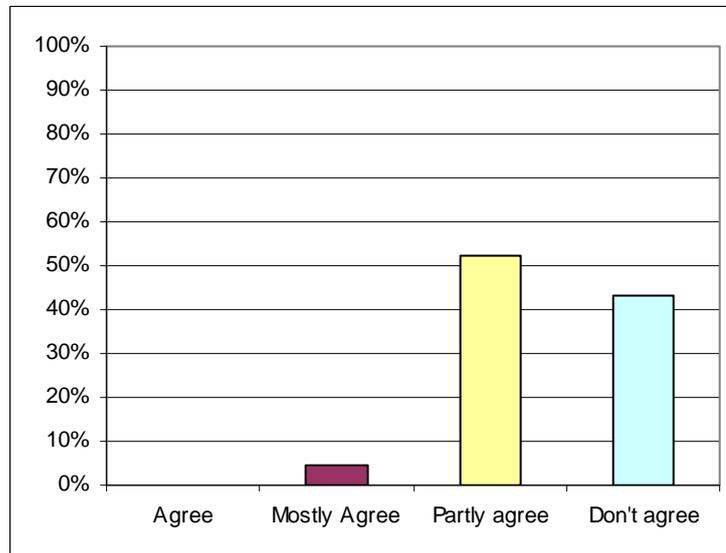


Figure 5A.74: Bar chart of Question 12e responses

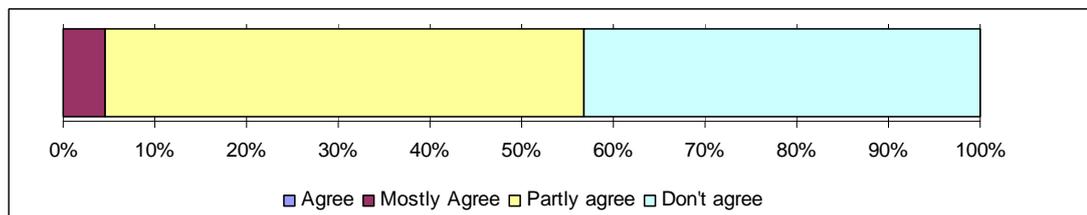


Figure 5A.75: Stacked bar chart of Question 12e responses

Appendix 5A.10.39: Responses to Question 12.f

Question 12.f: We don't have the training resources available.

Table 5A.131: Responses to Question 12.f.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 1 | 2 | 11 | 30 |
| Percentage | 2.27% | 4.55% | 25.00% | 68.18% |
| No. of Respondents | 44 | | Mean R | 3.59 |

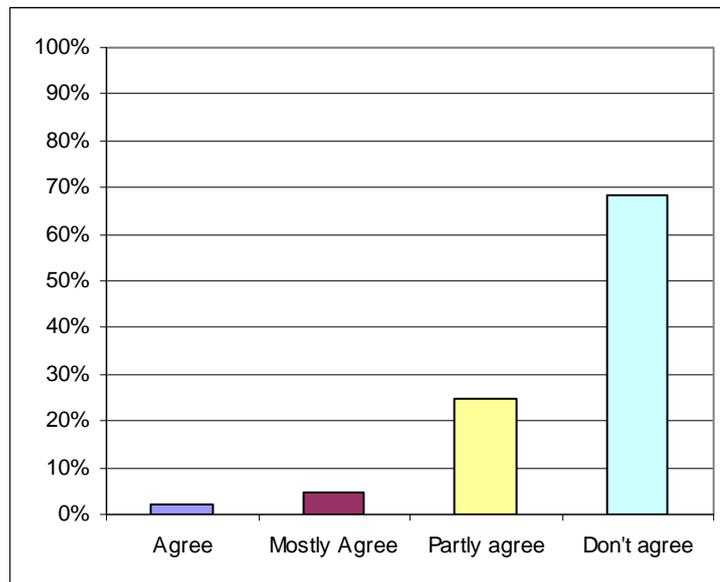


Figure 5A.76: Bar chart of Question 12f responses

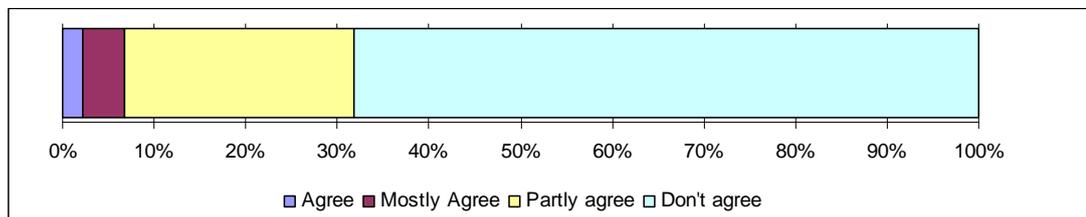


Figure 5A.77: Stacked bar chart of Question 12f responses

Appendix 5A.10.40: Responses to Question 12.G

Question 12.g: It will stop and/or clash with other training.

Table 5A.132: Responses to Question 12g.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 0 | 6 | 38 |
| Percentage | 0.00% | 0.00% | 13.64% | 86.36% |
| No. of Respondents | 44 | | Mean R | 3.86 |

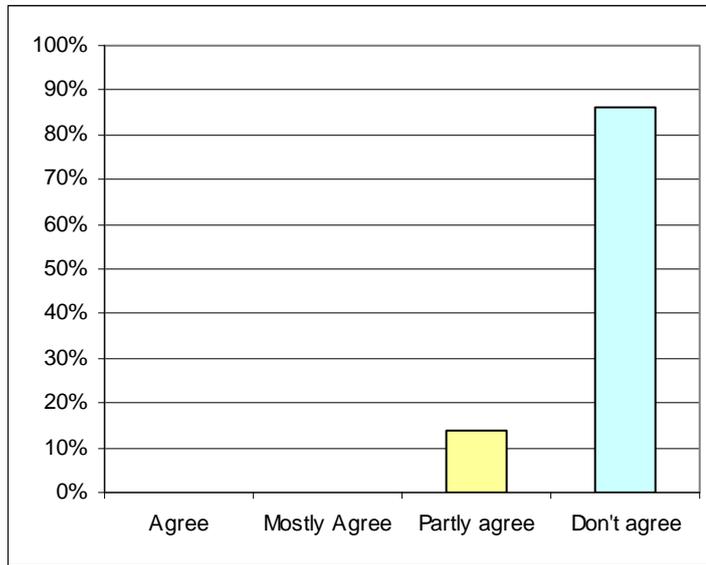


Figure 5A.78: Bar chart of Question 12g responses

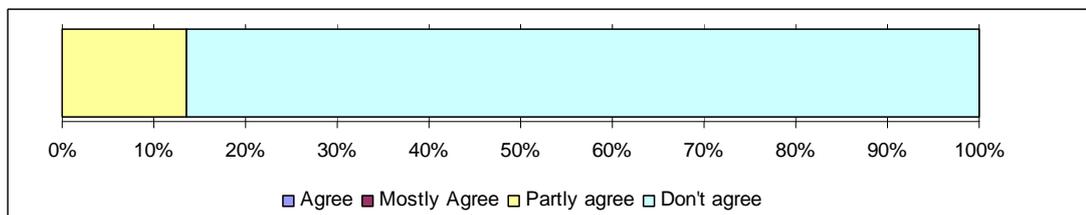


Figure 5A.79: Stacked bar chart of Question 12g responses

Appendix 5A.10.41: Responses to Question 12.h

Question 12.h: Staff development takes too long.

Table 5A.133: Responses to Question 12h.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 2 | 8 | 34 |
| Percentage | 0.00% | 4.55% | 18.18% | 77.27% |
| No. of Respondents | 44 | | Mean R | 3.73 |

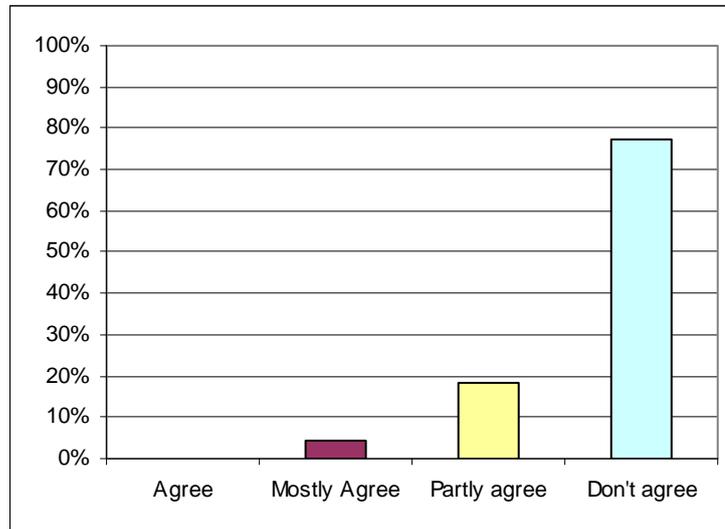


Figure 5A.80: Bar chart of Question 12h responses

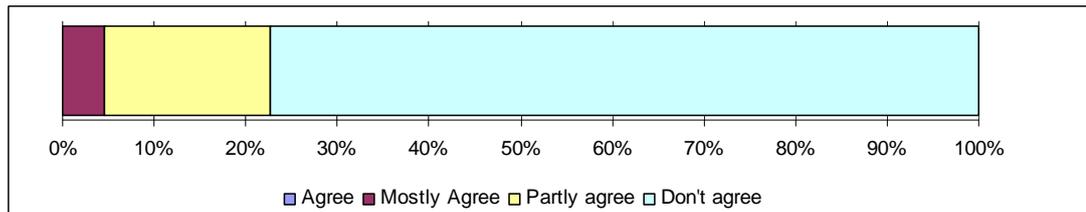


Figure 5A.81: Stacked bar chart of Question 12h responses

Appendix 5A.10.42: Responses to Question 12.i

Question 12.i: Those needing to learn lack the skills necessary to learn:

Table 5A.134: Responses to Question 12.i.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 3 | 0 | 13 | 28 |
| Percentage | 6.82% | 0.00% | 29.55% | 63.64% |
| No. of Respondents | 44 | | Mean R | 3.50 |

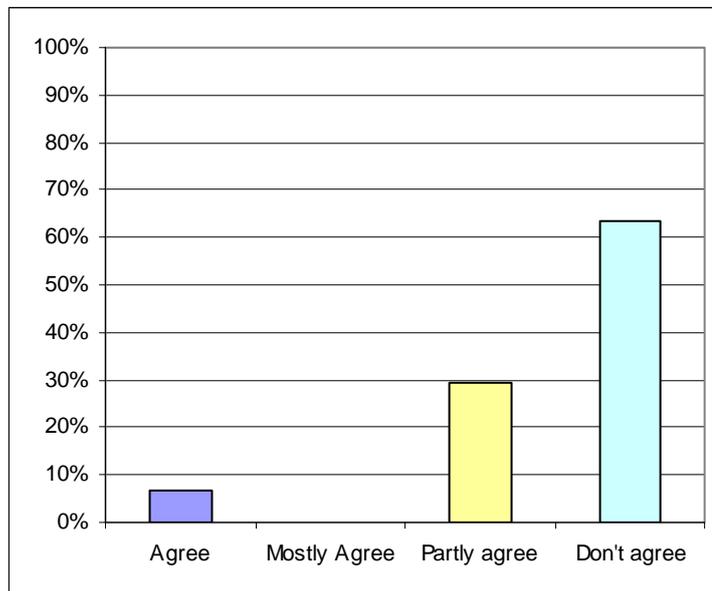


Figure 5A.82: Bar chart of Question 12i responses

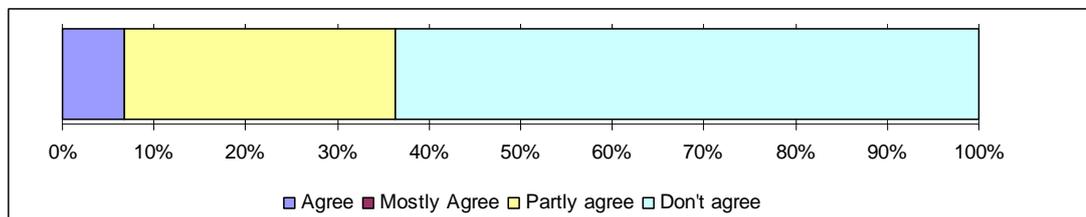


Figure 5A.83: Stacked bar chart of Question 12i responses

Appendix 5A.10.43: Responses to Question 12.j

Question 12.j: There is a lack of potential in those needing to learn.

Table 5A.135: Responses to Question 12.j.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 0 | 10 | 34 |
| Percentage | 0.00% | 0.00% | 22.73% | 77.27% |
| No. of Respondents | 44 | | Mean R | 3.77 |

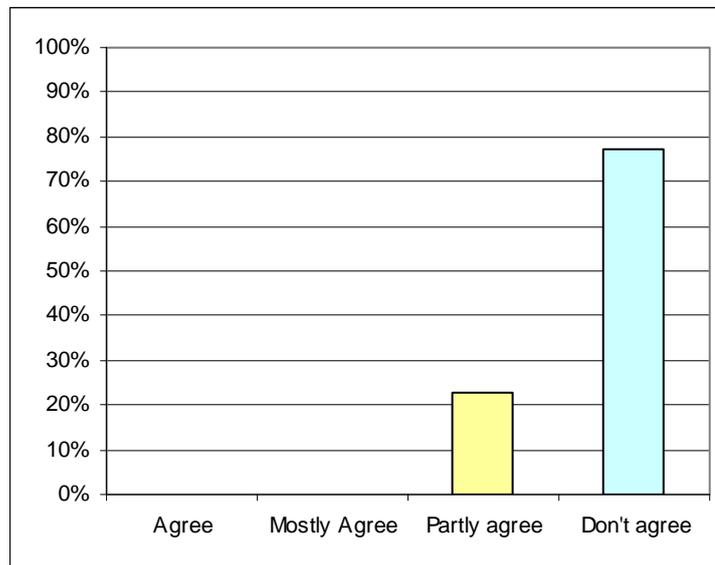


Figure 5A.84: Bar chart of Question 12.j responses

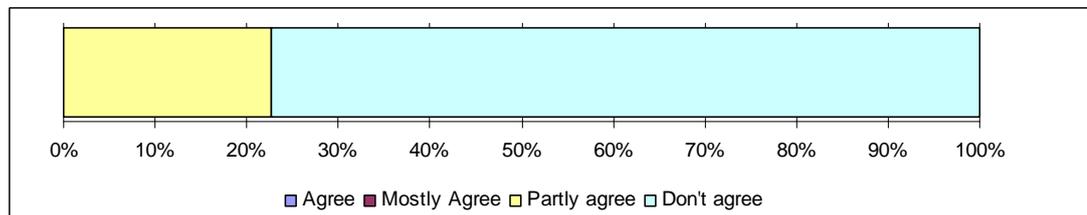


Figure 5A.85: Stacked bar chart of Question 12.j responses

Appendix 5A.10.44: Responses to Question 12.k**Question 12.k: Training is rejected by management, learners or the culture of the organisation.**

Table 5A.136: Responses to Question 12k.

| | Agree | Mostly Agree | Partly agree | Don't agree |
|--------------------|-------|--------------|--------------|-------------|
| No. of Responses | 0 | 1 | 13 | 30 |
| Percentage | 0.00% | 2.27% | 29.55% | 68.18% |
| No. of Respondents | 44 | | Mean R 3.66 | |

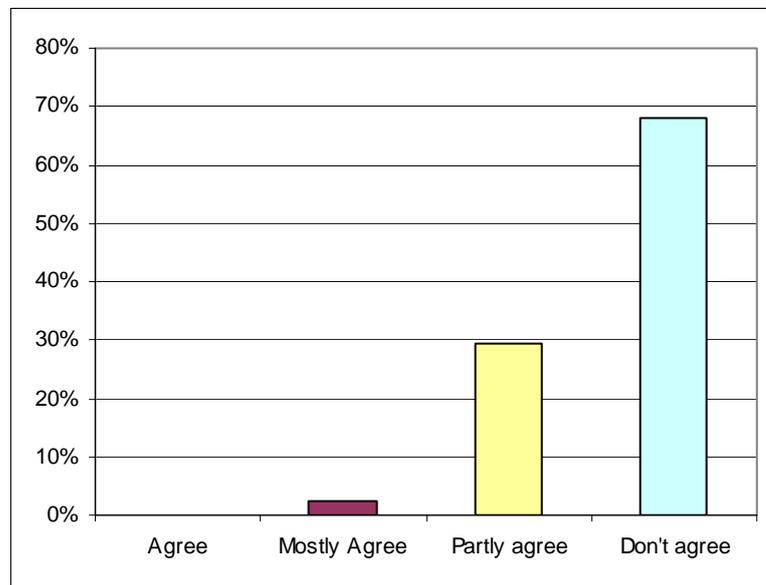


Figure 5A.86: Bar chart of Question 12k responses

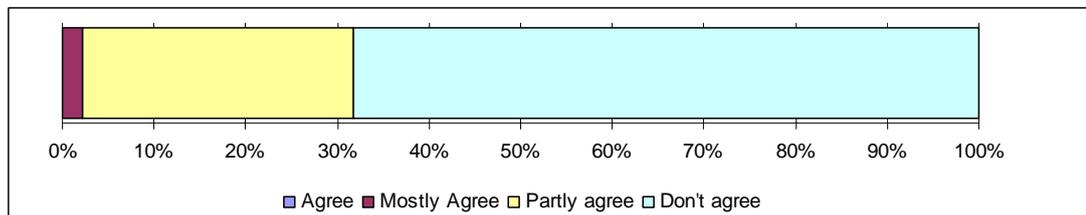


Figure 5A.87: Stacked bar chart of Question 12k responses

Appendix 5A.10.45: Responses to Question 13

Question 13: Does your organisation support/encourage employees' interaction with higher education institutions (universities) in any of the following ways?

Table 5A.137: Responses to Question 13.

| | None | Giving guest lectures/talks | Host site visits | Provide industrial placements | Part-time lectureships | Provide bursaries/sponsorships for students | Provide workplace learning opportunities | Supply learning/support materials. | Others (specify) |
|--------------------|-------|-----------------------------|------------------|-------------------------------|------------------------|---|--|------------------------------------|------------------|
| No. of Responses | 1 | 19 | 21 | 36 | 1 | 32 | 35 | 12 | 1 |
| Percentage | 2.22% | 42.22% | 46.67% | 80.00% | 2.22% | 71.11% | 77.78% | 26.67% | 2.22% |
| No. of Respondents | 45 | | | | | | | | |

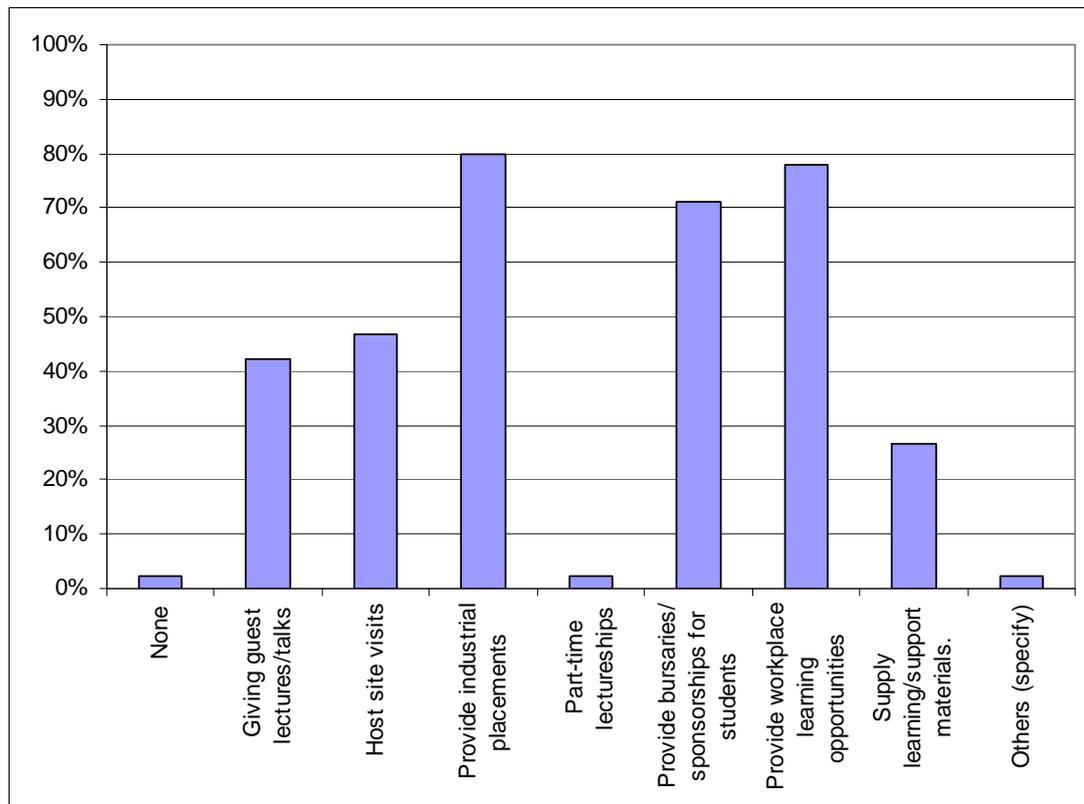


Figure 5A.88: Bar chart of Question 13 responses

Appendix 5A.10.46: Responses to Question 14

Question 14: Does your organisation support formal links with higher education institutions (universities) in any of the following ways?

Table 5A.138: Responses to Question 14.

| | None | Sponsoring prizes for students | Sponsoring of courses | Sponsoring of resources (computers, books, materials, etc) | Sponsoring of academic staff | Sponsoring of facilities (computer rooms, libraries, labs, workshops, etc.) | Provide work placement secondments for academic staff | Academic secondments for own staff | Provide learning/ support materials | Others (specify) |
|--------------------|--------|--------------------------------|-----------------------|--|------------------------------|---|---|------------------------------------|-------------------------------------|------------------|
| No. of Responses | 16 | 14 | 13 | 5 | 4 | 4 | 10 | 5 | 9 | 2 |
| Percentage | 35.56% | 31.11% | 28.89% | 11.11% | 8.89% | 8.89% | 22.22% | 11.11% | 20.00% | 4.44% |
| No. of Respondents | 45 | | | | | | | | | |

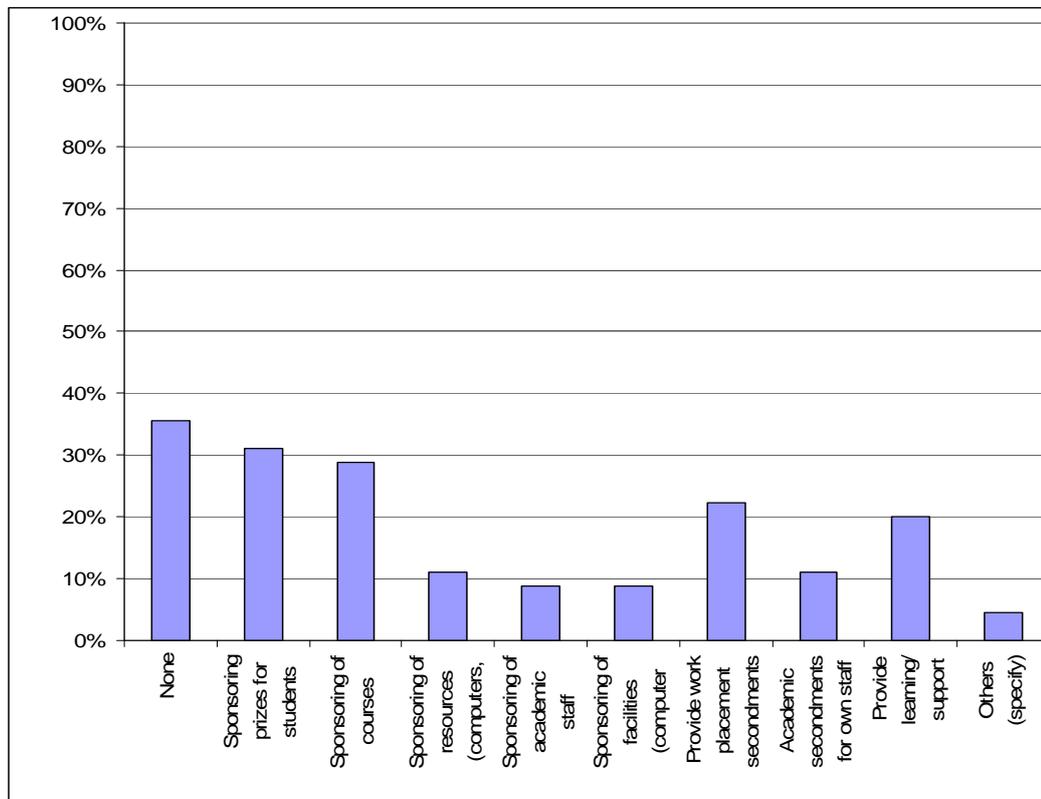


Figure 5A.89: Bar chart of Question 14 responses

Appendix 5A.10.47: Responses to Question 15

Question 15: Which of the following non-academic education, training and development opportunities does your organisation support/employ?

Table 5A.139: Responses to Question 15.

| | Desk/ workplace briefings | In-tray exercises | Colleague mentoring | External management/training consultants | In-house management/training staff | Management-led talks/ seminars, etc | CPD accredited by professional institutions | Others (specify) |
|--------------------|---------------------------|-------------------|---------------------|--|------------------------------------|-------------------------------------|---|------------------|
| No. of Responses | 25 | 5 | 30 | 38 | 41 | 34 | 37 | 1 |
| Percentage | 55.56% | 11.11% | 66.67% | 84.44% | 91.11% | 75.56% | 82.22% | 2.22% |
| No. of Respondents | 45 | | | | | | | |

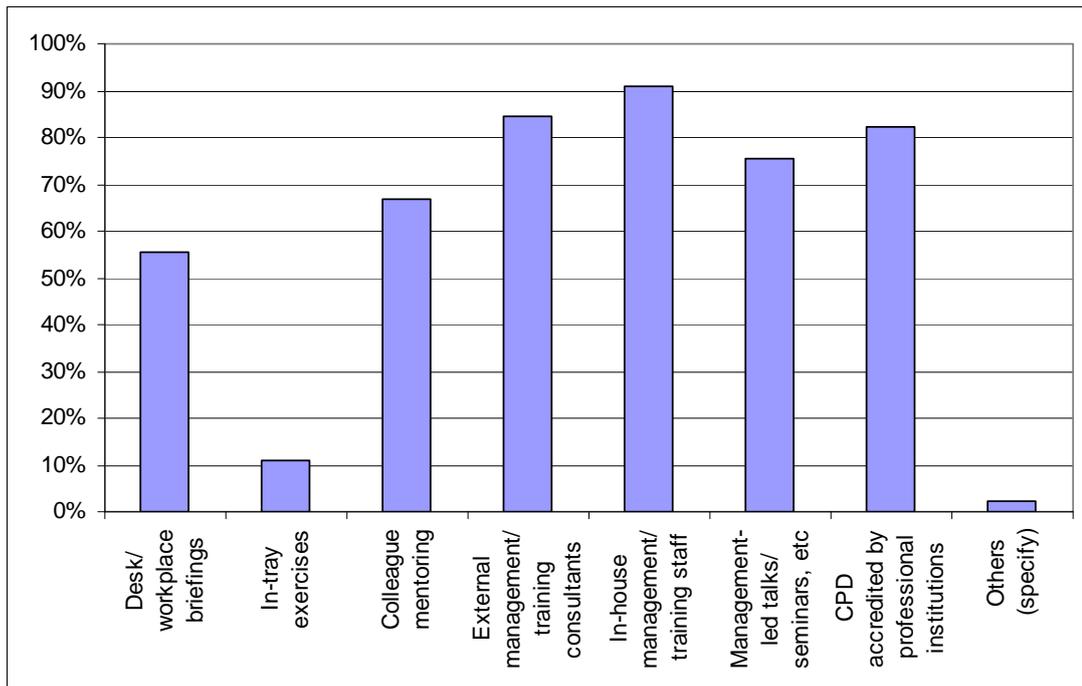


Figure 5A.90: Bar chart of Question 15 responses

Appendix 5A.10.48: Responses to Question 16

Question 16: How effective does your organisation find each of the following in meeting its needs:

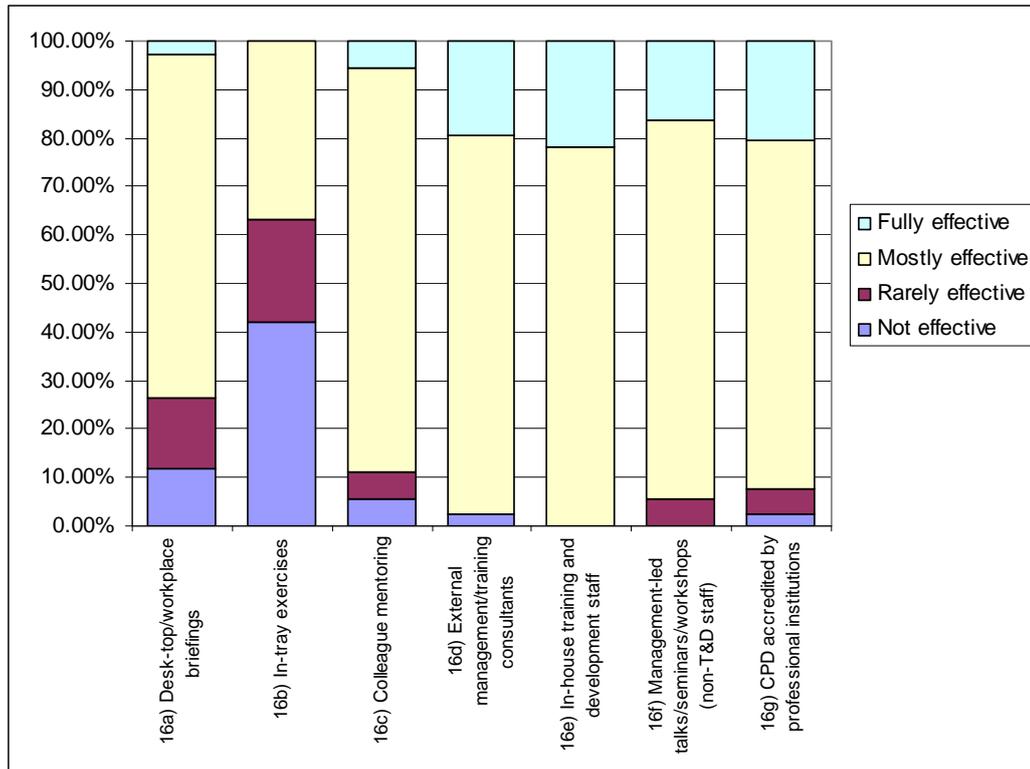


Figure 5A.91: Stacked Bar Chart of Responses to Question 16

Table 5A.140: Relative Importance Indices of Responses to Question 16

| Rank | How effective does your organisation find each of the following in meeting its needs: | Relative Importance Index |
|------|---|---------------------------|
| 6 | 16a) Desk/workplace briefings | 66.18 |
| 7 | 16b) In-tray exercises | 48.68 |
| 5 | 16c) Colleague mentoring | 72.22 |
| 2 | 16d) External management/training courses | 78.66 |
| 1 | 16e) In-house management/training courses | 80.49 |
| 3 | 16f) Management-led talks/seminars, etc. | 77.70 |
| 4 | 16g) CPD accredited by professional institutions | 77.56 |

Appendix 5A.10.49: Responses to Question 16.a**Question 16.a: Desk/workplace briefings:**

Table 5A.141: Responses to Question 16a.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 4 | 5 | 24 | 1 |
| Percentage | 11.76% | 14.71% | 70.59% | 2.94% |
| No. of Respondents | 34 | | Mean R | 2.65 |

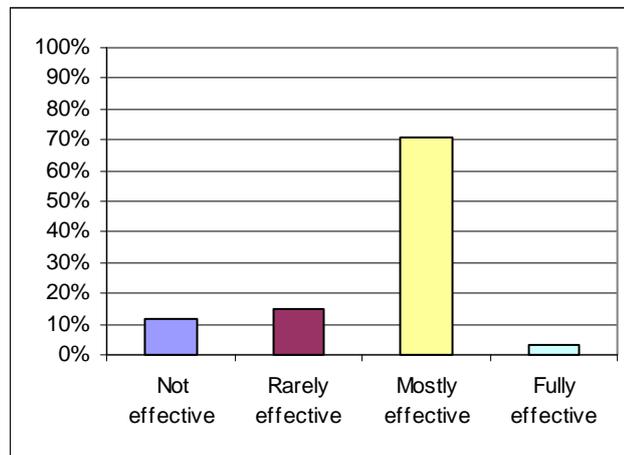


Figure 5A.92: Bar chart of Question 16a responses

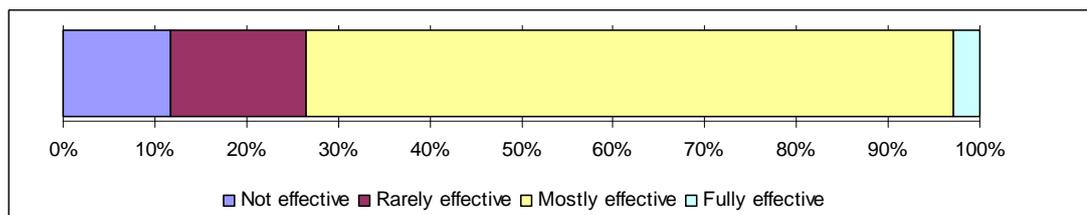


Figure 5A.93: Stacked bar chart of Question 16a responses

Appendix 5A.10.50: Responses to Question 16.b**Question 16.b: In-tray exercises.**

Table 5A.142: Responses to Question 16b.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 8 | 4 | 7 | 0 |
| Percentage | 42.11% | 21.05% | 36.84% | 0.00% |
| No. of Respondents | 19 | | Mean R | 1.95 |

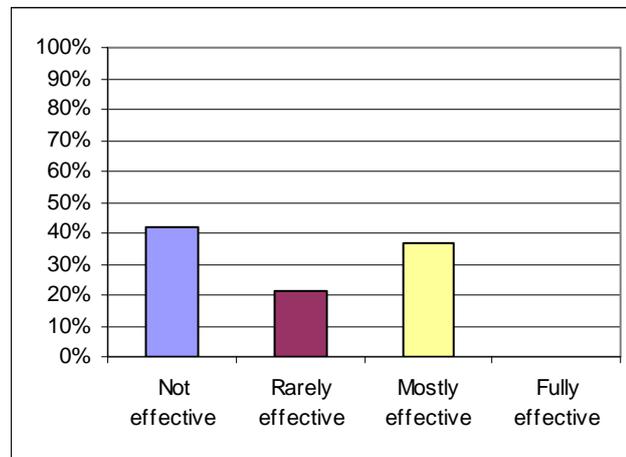


Figure 5A.94: Bar chart of Question 16b responses

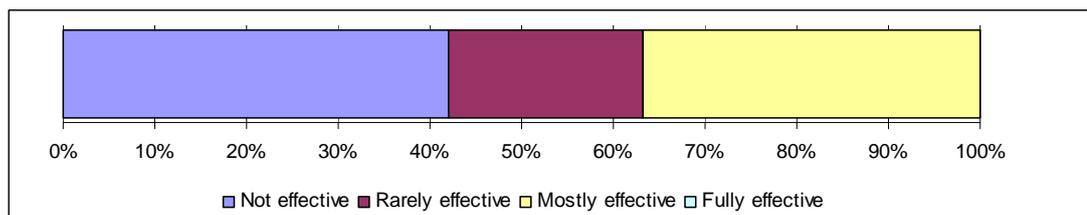


Figure 5A.95: Stacked bar chart of Question 16b responses

Appendix 5A.10.51: Responses to Question 16.c

Question 16.c: Colleague mentoring:

Table 5A.143: Responses to Question 16c.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 2 | 2 | 30 | 2 |
| Percentage | 5.56% | 5.56% | 83.33% | 5.56% |
| No. of Respondents | 36 | | Mean R | 2.89 |

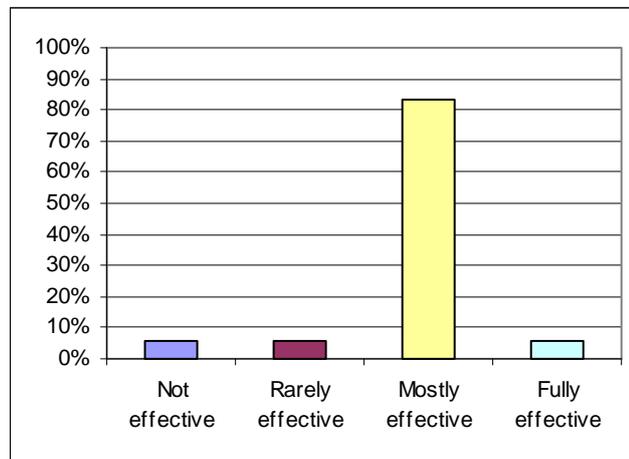


Figure 5A.96: Bar chart of Question 16c responses

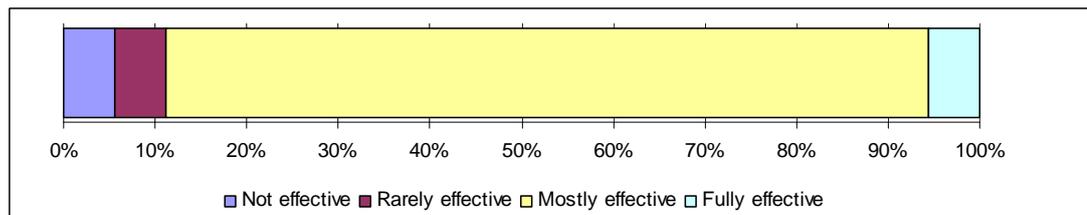


Figure 5A.97: Stacked bar chart of Question 16c responses

Appendix 5A.10.52: Responses to Question 16.d

Question 16.d: External management/training consultants.

Table 5A.144: Responses to Question 16d.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 0 | 32 | 8 |
| Percentage | 2.44% | 0.00% | 78.05% | 19.51% |
| No. of Respondents | 41 | | Mean R | 3.15 |

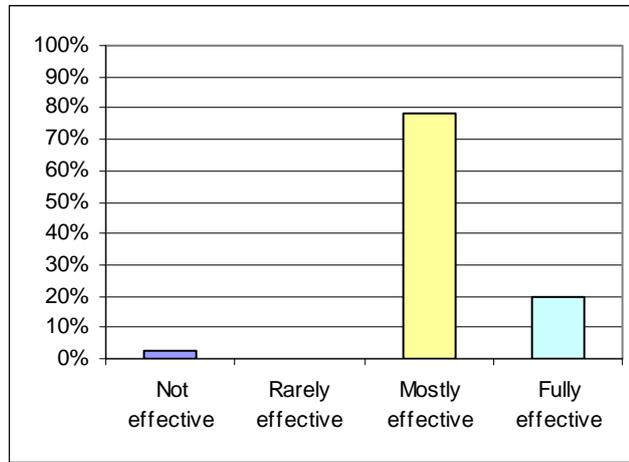


Figure 5A.98: Bar chart of Question 16d responses

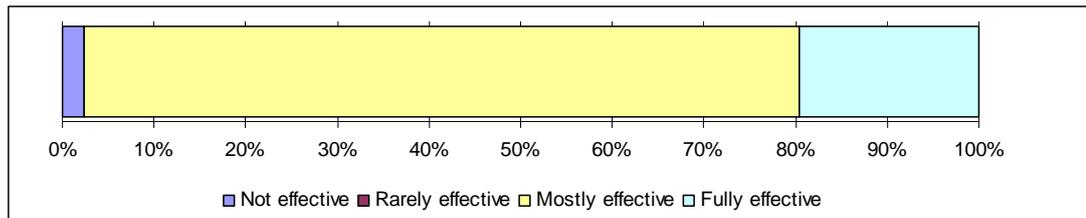


Figure 5A.99: Stacked bar chart of Question 16d responses

Appendix 5A.10.53: Responses to Question 16.e**Question 16.e: In-house training and development staff.**

Table 5A.145: Responses to Question 16e.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 0 | 0 | 32 | 9 |
| Percentage | 0.00% | 0.00% | 78.05% | 21.95% |
| No. of Respondents | 41 | | Mean R | 3.22 |

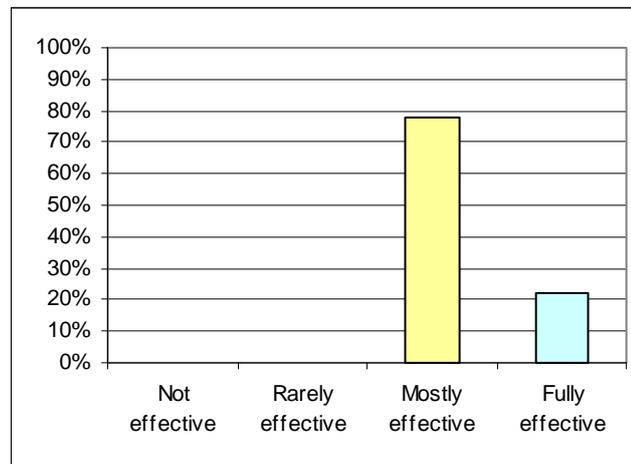


Figure 5A.100: Bar chart of Question 16e responses

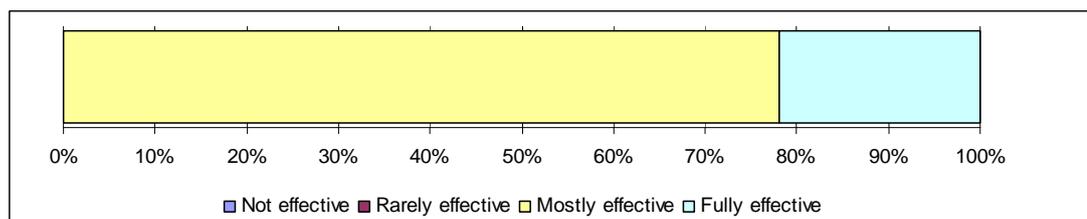


Figure 5A.101: Stacked bar chart of Question 16e responses

Appendix 5A.10.54: Responses to Question 16.f**Question 16.f: Management-led talks/seminars/workshops (non-T&D staff).**

Table 5A.146: Responses to Question 16.f.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 0 | 2 | 29 | 6 |
| Percentage | 0.00% | 5.41% | 78.38% | 16.22% |
| No. of Respondents | 37 | | Mean R | 3.11 |

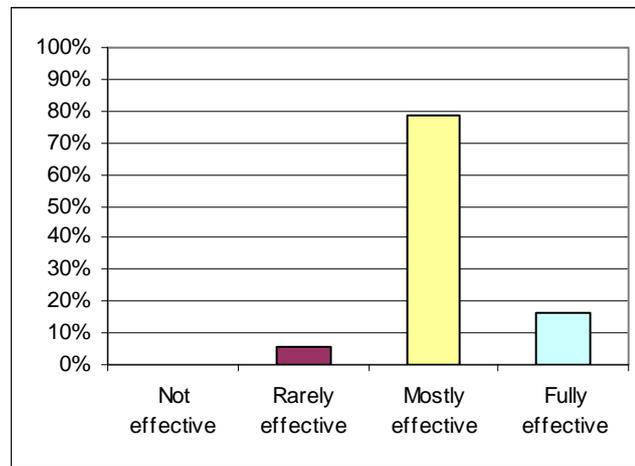


Figure 5A.102: Bar chart of Question 16f responses

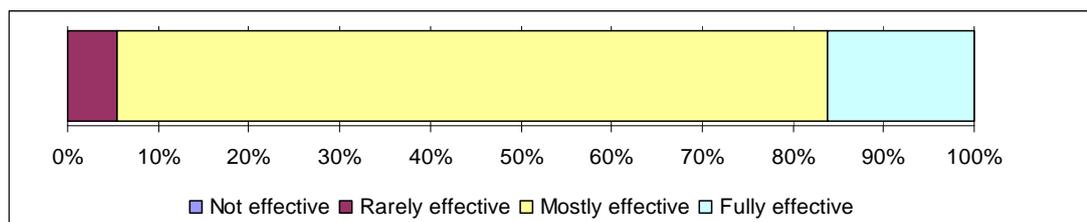


Figure 5A.103: Stacked bar chart of Question 16f responses

Appendix 5A.10.55: Responses to Question 16.g**Question 16.g: CPD accredited by professional institutions.**

Table 5A.147: Responses to Question 16.g.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 2 | 28 | 8 |
| Percentage | 2.56% | 5.13% | 71.79% | 20.51% |
| No. of Respondents | 39 | | Mean R | 3.10 |

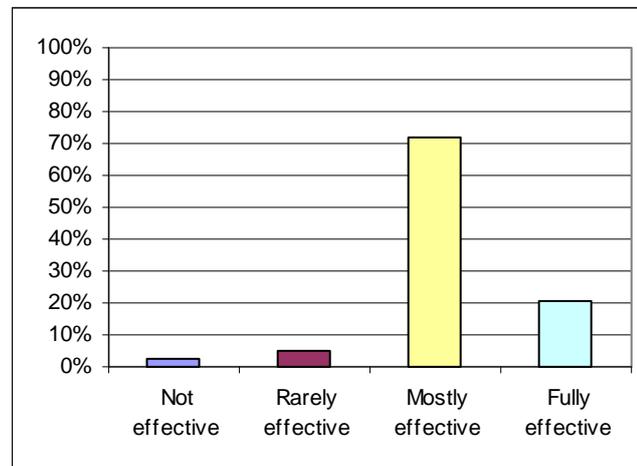


Figure 5A.104: Bar chart of Question 16g responses

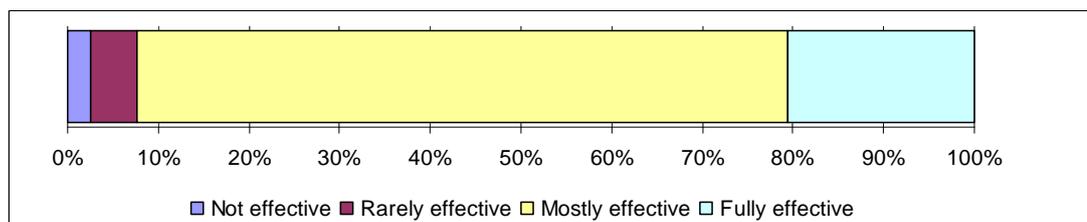


Figure 5A.105: Stacked bar chart of Question 16g responses

Appendix 5A.10.56: Responses to Question 17

Question 17: Which of the following academic education, training and development opportunities does your organisation support/employ?

Table 5A.148: Responses to Question 17.

| | Block-release sub-degree level courses run by FE | Part-time sub-degree level courses run by FE | Full-time sub-degree level courses run by FE | Distance-learning sub-degree level courses run by FE | Block-release degree level courses run by HE | Part-time degree level courses run by HE | Full-time degree level courses run by HE | Distance-learning degree level courses run by HE | Block-release post-graduate degree level courses run by HE | Part-time post-graduate degree level courses run by HE | Full-time post-graduate degree level courses run by HE | Distance-learning post-graduate degree level courses run by HE |
|--------------------|--|--|--|--|--|--|--|--|--|--|--|--|
| No. of Responses | 16 | 39 | 5 | 27 | 10 | 41 | 11 | 26 | 9 | 34 | 2 | 26 |
| Percentage | 35.56% | 86.67% | 11.11% | 60.00% | 22.22% | 91.11% | 24.44% | 57.78% | 20.00% | 75.56% | 4.44% | 57.78% |
| No. of Respondents | 45 | | | | | | | | | | | |

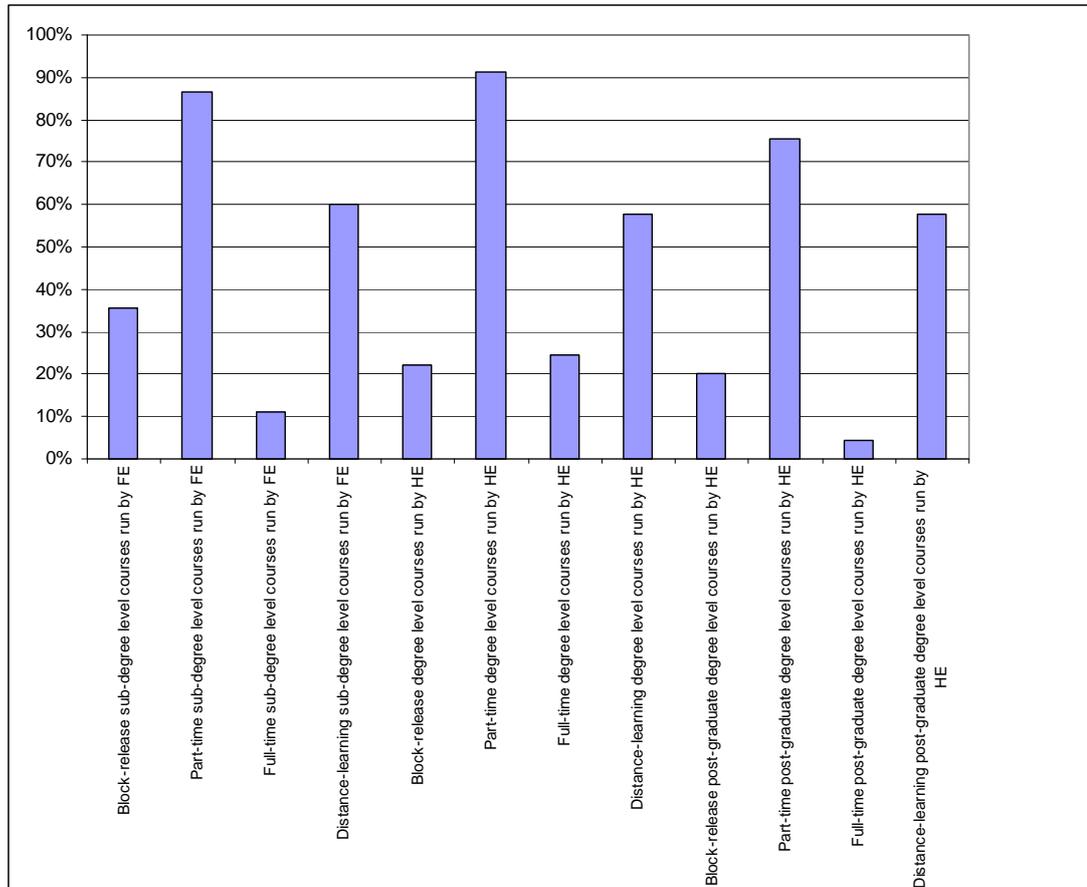


Figure 5A.106: Bar chart of Question 17 responses

Appendix 5A.10.57: Responses to Question 18

Question 18: How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs:

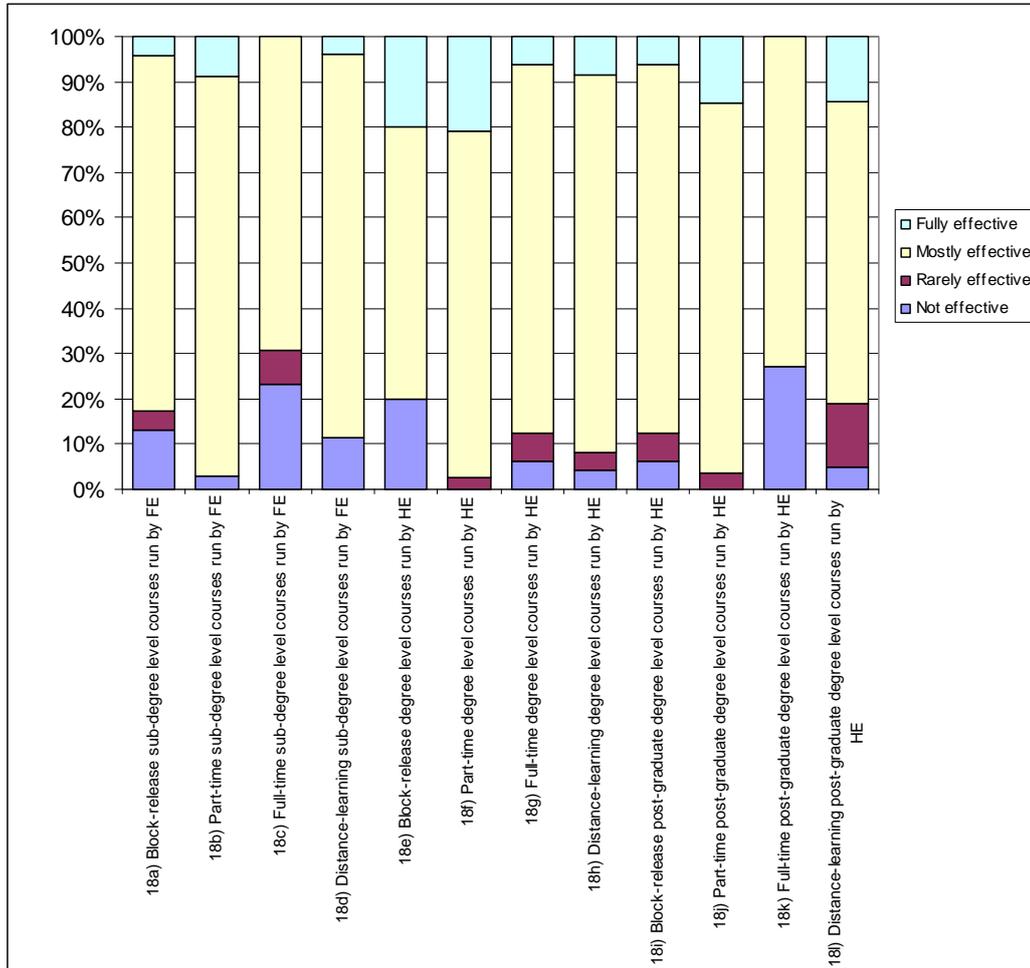


Figure 5A.107: Responses to Question 18

Table 5A.149: Relative Importance Index for Responses to Question 18

| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index |
|------|--|---------------------------|
| 10 | 18a) Block-release sub-degree level courses run by FE institutions | 68.48 |
| 3 | 18b) Part-time sub-degree level courses run by FE institutions | 75.74 |
| 11 | 18c) Full-time sub-degree level courses run by FE institutions | 61.54 |
| 8 | 18d) Distance-learning sub-degree level courses run by FE institutions | 70.19 |
| 9 | 18e) Block-release degree level courses run by HE institutions | 70.00 |
| 1 | 18f) Part-time degree level courses run by HE institutions | 79.61 |
| 6 | 18g) Full-time degree level courses run by HE institutions | 71.88 |
| 4 | 18h) Distance-learning degree level courses run by HE institutions | 73.96 |
| 6 | 18i) Block-release post-graduate degree level courses run by HE institutions | 71.88 |
| 2 | 18j) Part-time post-graduate degree level courses run by HE institutions | 77.78 |
| 12 | 18k) Full-time post-graduate degree level courses run by HE institutions | 61.36 |
| 5 | 18l) Distance-learning post-graduate degree level courses run by HE institutions | 72.62 |

Table 5A.150: Ranked Relative Importance Index for Grouped Responses to Question 18

| Rank | How effective does your organisation find each of the following academic education, training and development opportunities in meeting its needs: | Relative Importance Index |
|------|--|---------------------------|
| 1 | 18b) Part-time sub-degree level courses run by FE institutions | 75.74 |
| 2 | 18d) Distance-learning sub-degree level courses run by FE institutions | 70.19 |
| 3 | 18a) Block-release sub-degree level courses run by FE institutions | 68.48 |
| 4 | 18c) Full-time sub-degree level courses run by FE institutions | 61.54 |
| 1 | 18f) Part-time degree level courses run by HE institutions | 79.61 |
| 2 | 18h) Distance-learning degree level courses run by HE institutions | 73.96 |
| 3 | 18g) Full-time degree level courses run by HE institutions | 71.88 |
| 4 | 18e) Block-release degree level courses run by HE institutions | 70.00 |
| 1 | 18j) Part-time post-graduate degree level courses run by HE institutions | 77.78 |
| 2 | 18l) Distance-learning post-graduate degree level courses run by HE institutions | 72.62 |
| 3 | 18i) Block-release post-graduate degree level courses run by HE institutions | 71.88 |
| 4 | 18k) Full-time post-graduate degree level courses run by HE institutions | 61.36 |

Appendix 5A.10.58: Responses to Question 18.a

Question 18.a: Block-release sub-degree level courses run by further education institutions:

Table 5A.151: Responses to Question 18a.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 3 | 1 | 18 | 1 |
| Percentage | 13.04% | 4.35% | 78.26% | 4.35% |
| No. of Respondents | 23 | | Mean R 2.74 | |

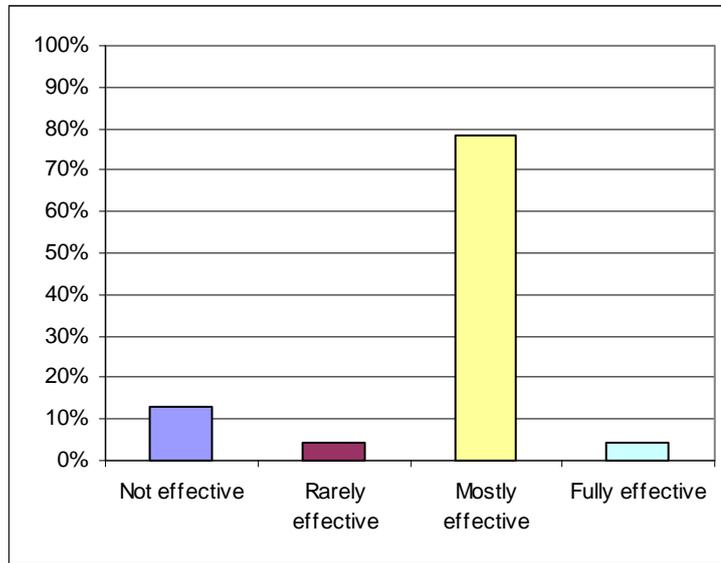


Figure 5A.108: Bar chart of Question 18a responses

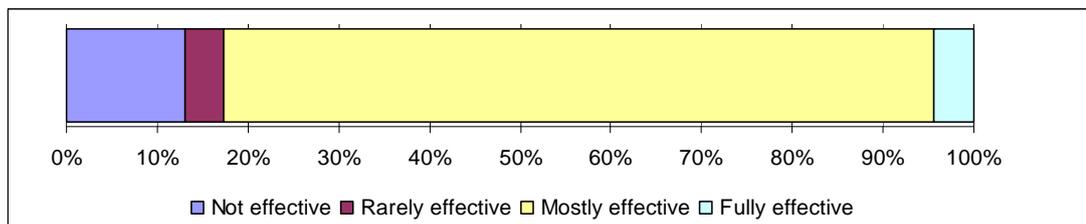


Figure 5A.109: Stacked bar chart of Question 18a responses

Appendix 5A.10.59: Responses to Question 18.b

Question 18.b: Part-time sub-degree level courses run by further education institutions:

Table 5A.152: Responses to Question 18b.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 0 | 30 | 3 |
| Percentage | 2.94% | 0.00% | 88.24% | 8.82% |
| No. of Respondents | 34 | | Mean R | 3.03 |

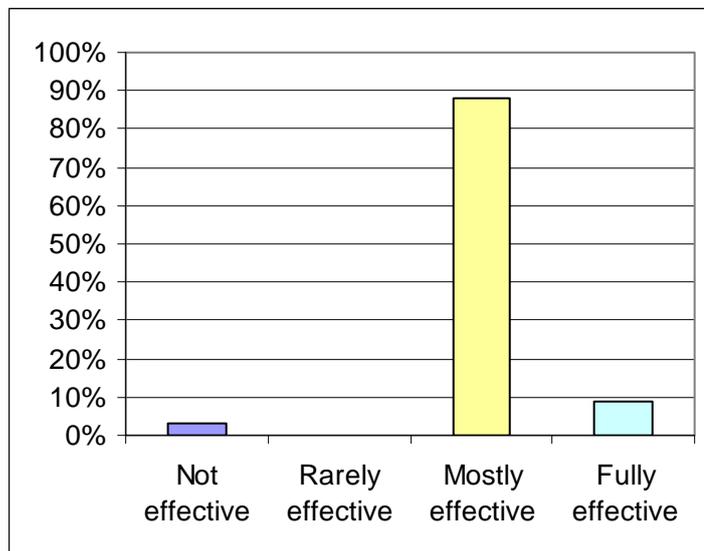


Figure 5A.110: Bar chart of Question 18b responses

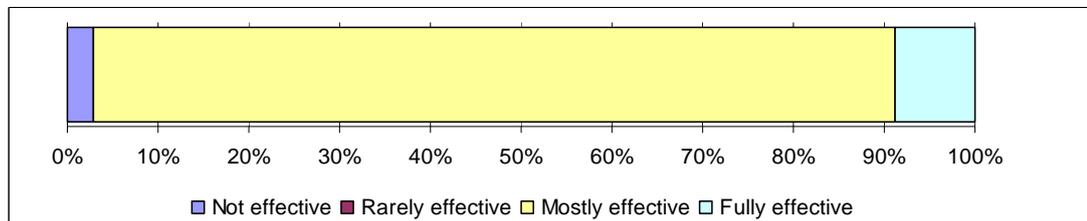


Figure 5A.111: Stacked bar chart of Question 18b responses

Appendix 5A.10.60: Responses to Question 18.c

Question 18.c: Full-time sub-degree level courses run by further education institutions:

Table 5A.153: Responses to Question 18c.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 3 | 1 | 9 | 0 |
| Percentage | 23.08% | 7.69% | 69.23% | 0.00% |
| No. of Respondents | 13 | | Mean R 2.46 | |

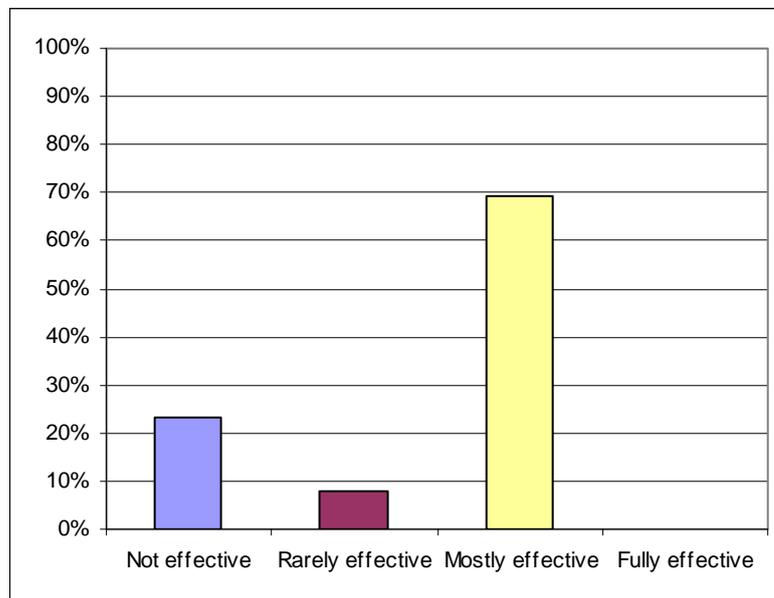


Figure 5A.112: Bar chart of Question 18c responses

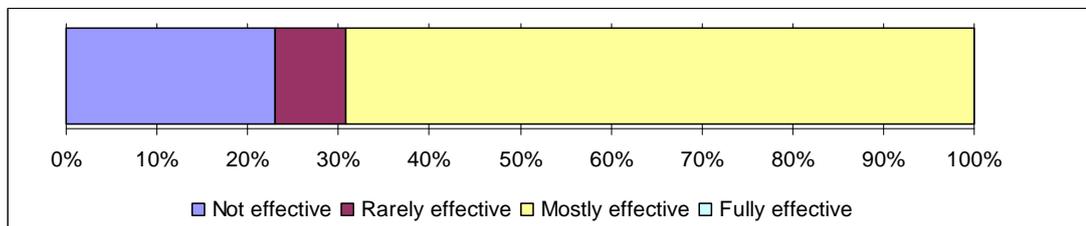


Figure 5A.113: Stacked bar chart of Question 18c responses

Appendix 5A.10.61: Responses to Question 18.d

Question 18.d: Distance-learning sub-degree level courses run by further education institutions

Table 5A.154: Responses to Question 18d.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 3 | 0 | 22 | 1 |
| Percentage | 11.54% | 0.00% | 84.62% | 3.85% |
| No. of Respondents | 26 | | Mean R 2.81 | |

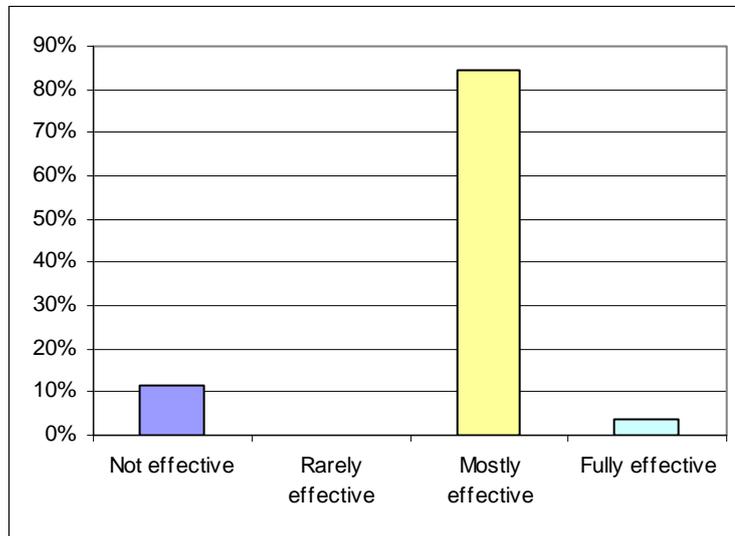


Figure 5A.114: Bar chart of Question 18d responses

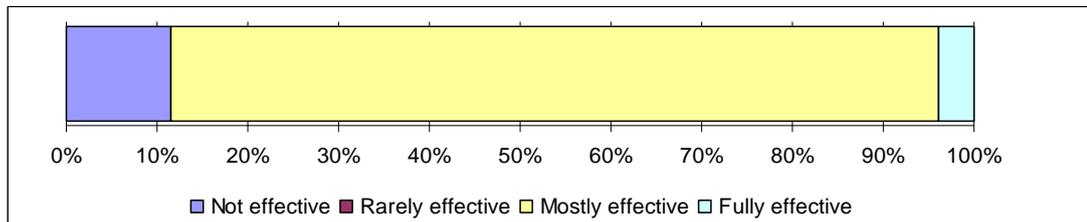


Figure 5A.115: Stacked bar chart of Question 18d responses

Appendix 5A.10.62: Responses to Question 18.e**Question 18.e: Block-release degree level courses run by higher education institutions**

Table 5A.155: Responses to Question 18.e.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 3 | 0 | 9 | 3 |
| Percentage | 20.00% | 0.00% | 60.00% | 20.00% |
| No. of Respondents | 15 | | Mean R | 2.80 |

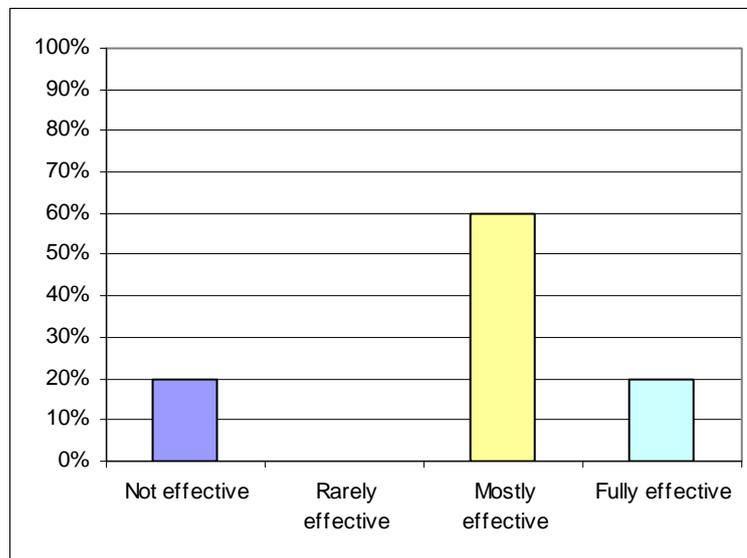


Figure 5A.116: Bar chart of Question 18.e responses

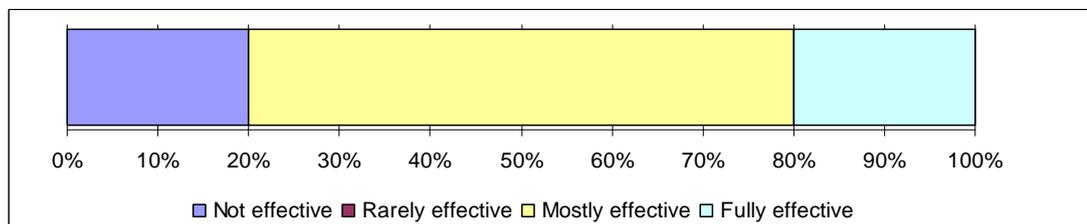


Figure 5A.117: Stacked bar chart of Question 18.e responses

Appendix 5A.10.63: Responses to Question 18.f**Question 18.f: Part-time degree level courses run by higher education institutions**

Table 5A.156: Responses to Question 18f.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 0 | 1 | 29 | 8 |
| Percentage | 0.00% | 2.63% | 76.32% | 21.05% |
| No. of Respondents | 38 | | Mean R 3.18 | |

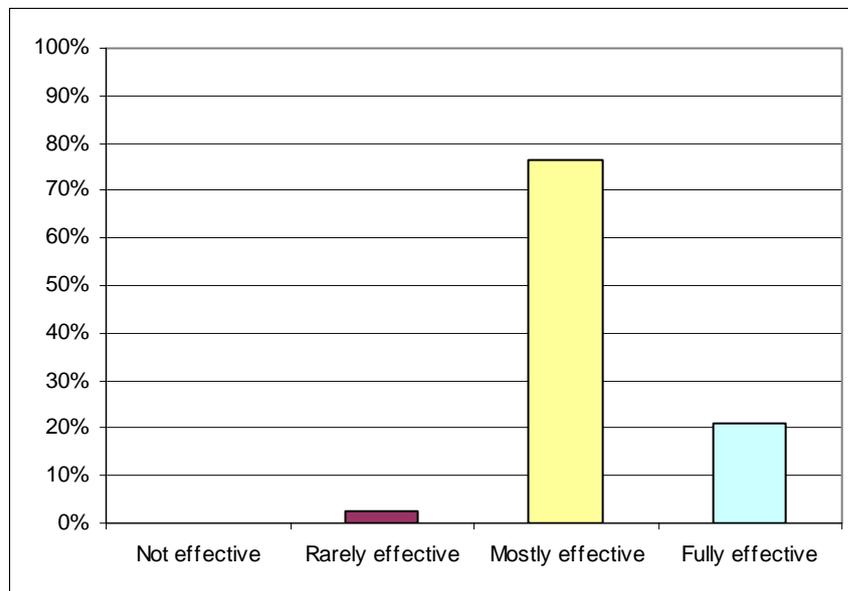


Figure 5A.118: Bar chart of Question 18f responses

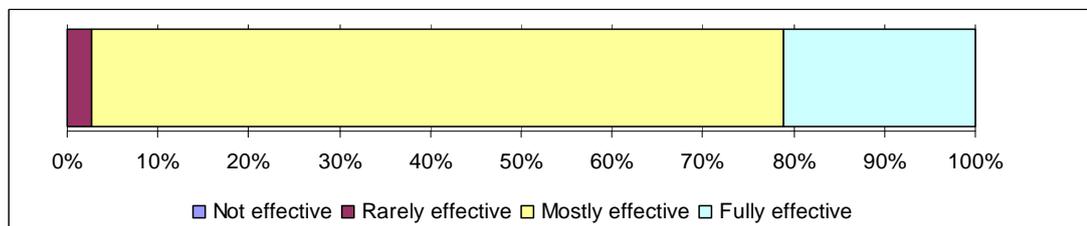


Figure 5A.119: Stacked bar chart of Question 18f responses

Appendix 5A.10.64: Responses to Question 18.g

Question 18.g: Full-time degree level courses run by higher education institutions

Table 5A.157: Responses to Question 18g.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 1 | 13 | 1 |
| Percentage | 6.25% | 6.25% | 81.25% | 6.25% |
| No. of Respondents | 16 | | Mean R | 2.88 |

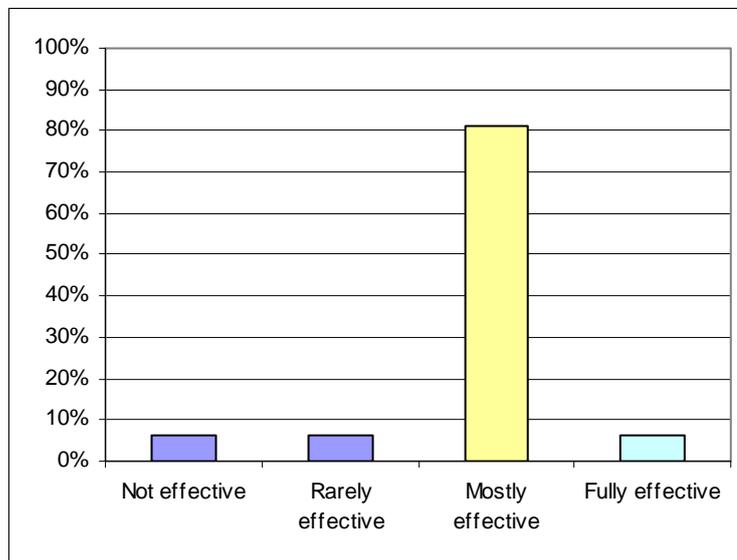


Figure 5A.120: Bar chart of Question 18g responses

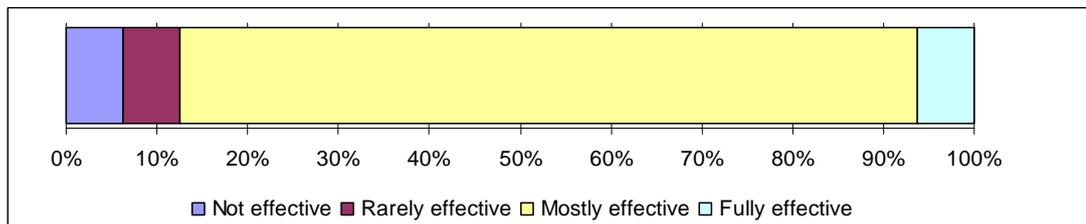


Figure 5A.121: Stacked bar chart of Question 18g responses

Appendix 5A.10.65: Responses to Question 18.h

Question 18.h: Distance-learning degree level courses run by higher education institutions

Table 5A.158: Responses to Question 18h.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 1 | 20 | 2 |
| Percentage | 4.17% | 4.17% | 83.33% | 8.33% |
| No. of Respondents | 24 | | Mean R | 2.96 |

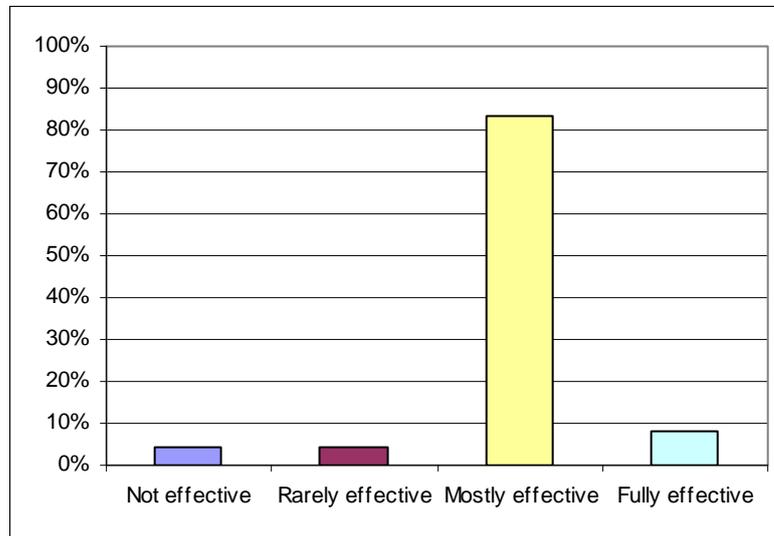


Figure 5A.122: Bar chart of Question 18h responses

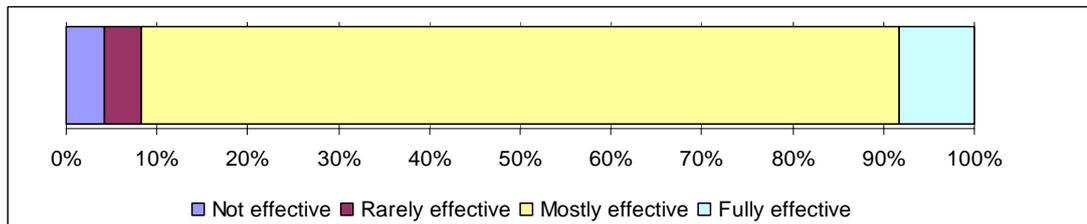


Figure 5A.123: Stacked bar chart of Question 18h responses

Appendix 5A.10.66: Responses to Question 18.i

Question 18.i) Block-release post-graduate degree level courses run by higher education institutions.

Table 5A.159: Responses to Question 18i.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 1 | 13 | 1 |
| Percentage | 6.25% | 6.25% | 81.25% | 6.25% |
| No. of Respondents | 16 | | Mean R | 2.88 |

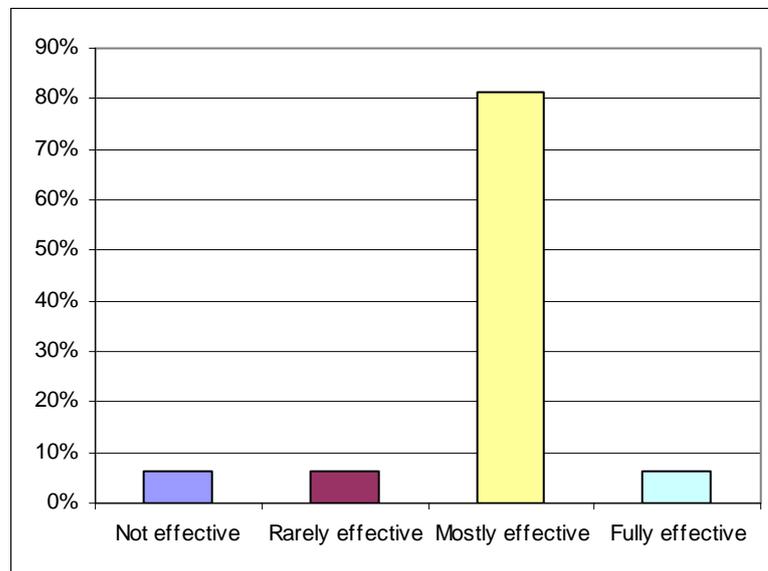


Figure 5A.124: Bar chart of Question 18i responses

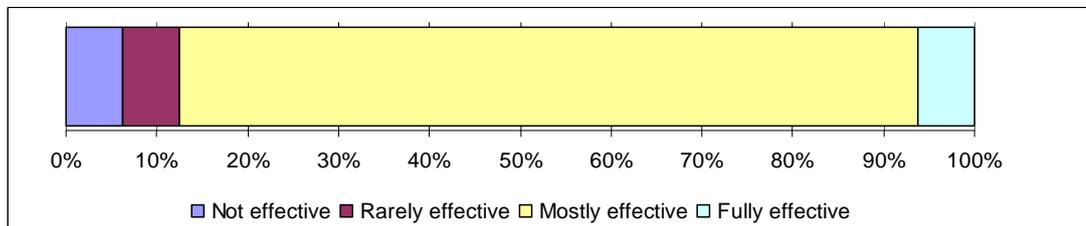


Figure 5A.125: Stacked bar chart of Question 18i responses

Appendix 5A.10.67: Responses to Question 18.j**Question 18.j: Part-time post-graduate degree level courses run by higher education institutions**

Table 5A.160: Responses to Question 18j.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 0 | 1 | 22 | 4 |
| Percentage | 0.00% | 3.70% | 81.48% | 14.81% |
| No. of Respondents | 27 | | Mean R | 3.11 |

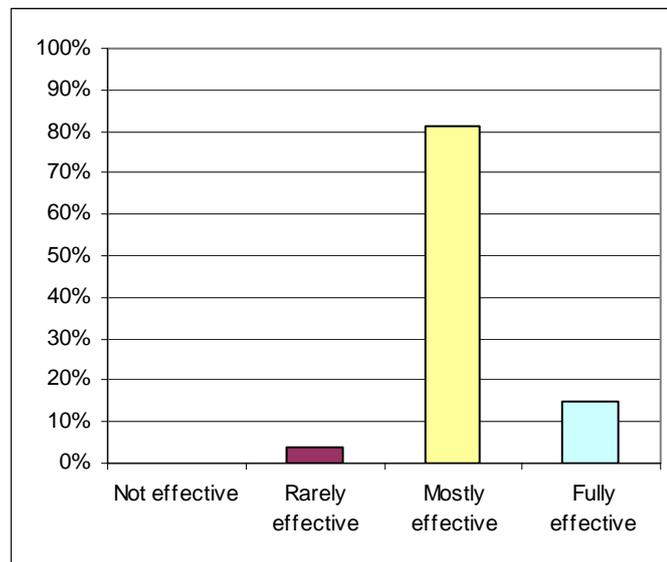


Figure 5A.126: Bar chart of Question 18j responses

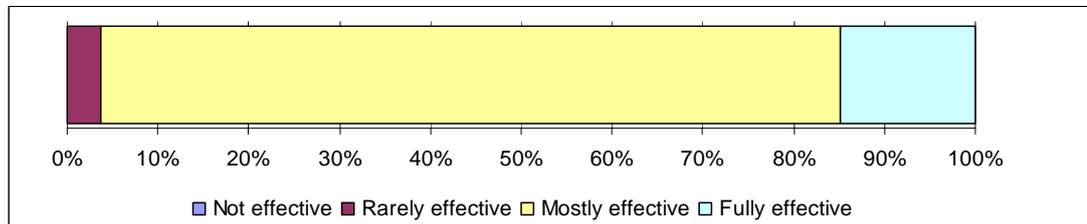


Figure 5A.127: Stacked bar chart of Question 18j responses

Appendix 5A.10.68: Responses to Question 18.k

Question 18.k) Full-time post-graduate degree level courses run by higher education institutions

Table 5A.161: Responses to Question 18k.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 3 | 0 | 8 | 0 |
| Percentage | 27.27% | 0.00% | 72.73% | 0.00% |
| No. of Respondents | 11 | | Mean R 2.45 | |

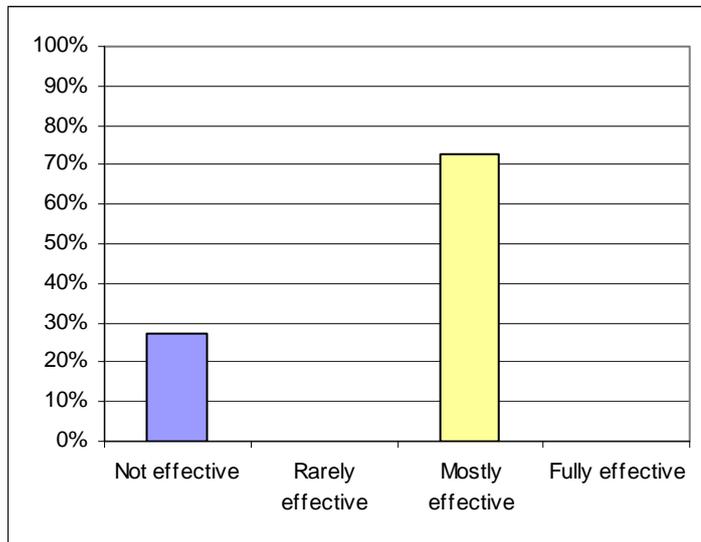


Figure 5A.128: Bar chart of Question 18k responses

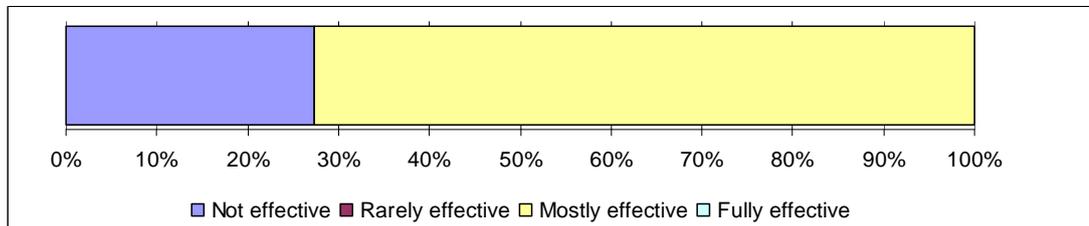


Figure 5A.129: Stacked bar chart of Question 18k responses

Appendix 5A.10.69: Responses to Question 18.1

Question 18.1: Distance-learning post-graduate degree level courses run by higher education institutions

Table 5A.162: Responses to Question 18.1.

| | Not effective | Rarely effective | Mostly effective | Fully effective |
|--------------------|---------------|------------------|------------------|-----------------|
| No. of Responses | 1 | 3 | 14 | 3 |
| Percentage | 4.76% | 14.29% | 66.67% | 14.29% |
| No. of Respondents | 21 | | Mean R | 2.90 |

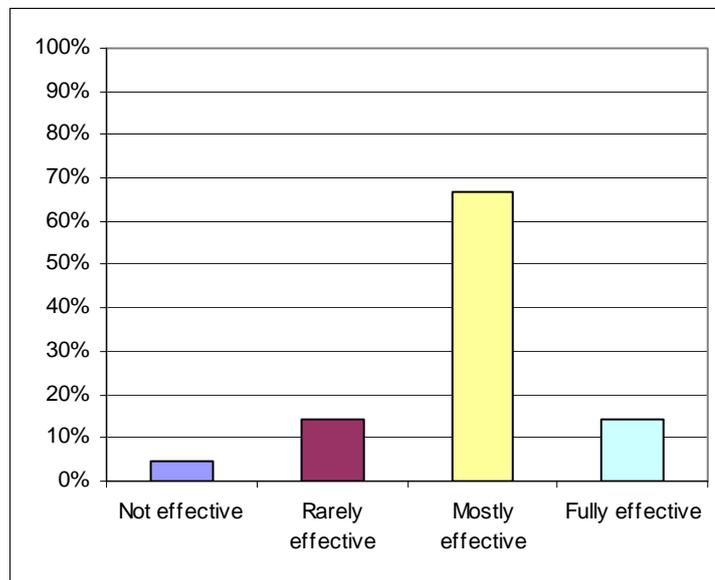


Figure 5A.130: Bar chart of Question 18.1 responses

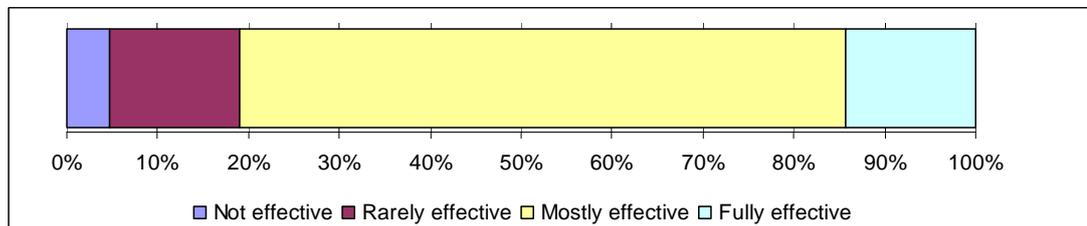


Figure 5A.131: Stacked bar chart of Question 18.1 responses

Appendix 5A.10.70: Responses to Question 19

Question 19: Please indicate your organisation’s use of education/training and development in respect of the following situations (other than for trainees and induction of new employees):

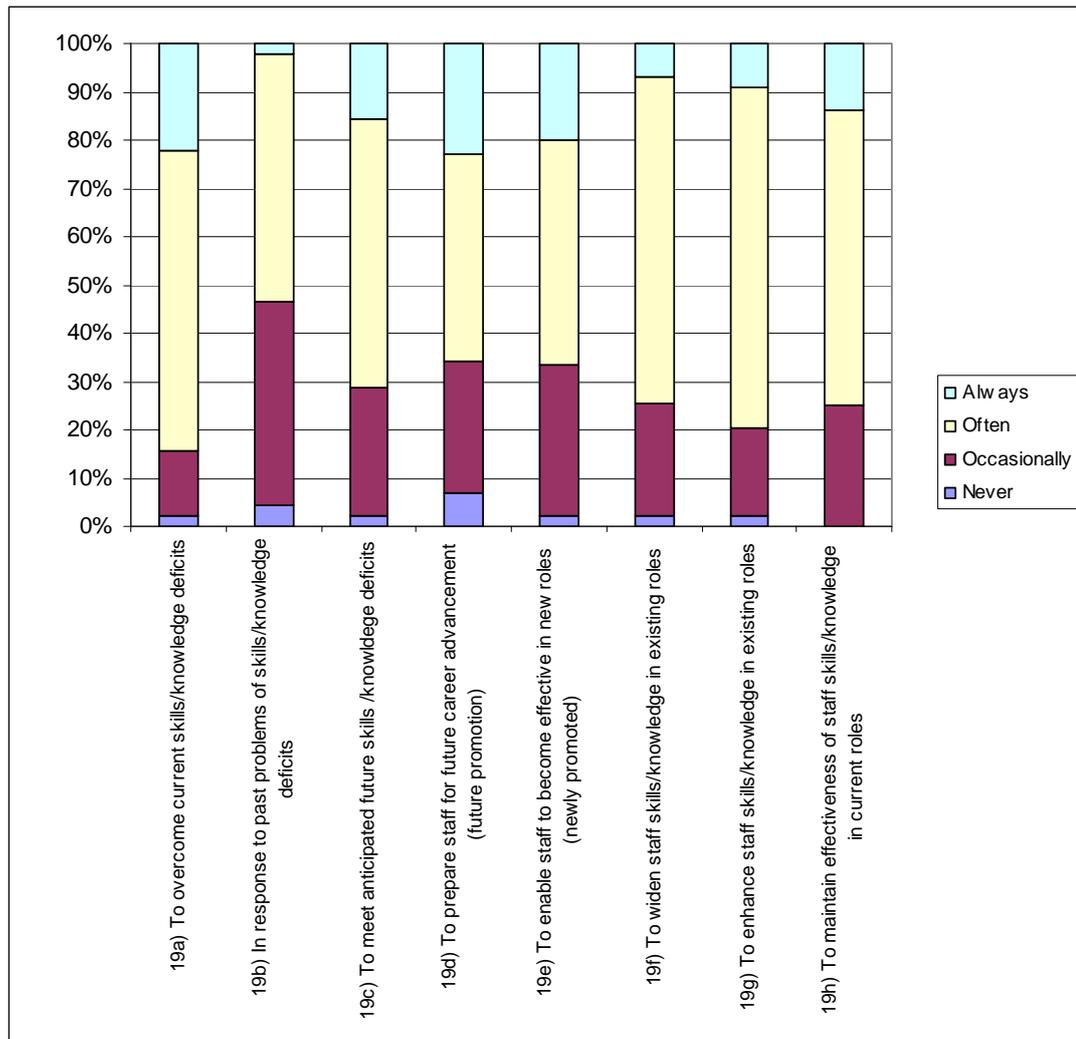


Figure 5A.132: Stacked Bar Chart for Responses to Question 19

Table 5A.163: Relative Importance Indices for Responses to Question 19

| Rank | Please indicate your organisation's use of education/training and development in respect of the following situations (other than for trainees and induction of new employees): | Relative Importance Index |
|-------------|---|----------------------------------|
| 1 | 19a) To overcome current skills/knowledge deficit | 76.11 |
| 7 | 19b) In response to past problems of skills/knowledge deficits | 62.78 |
| 4 | 19c) To meet anticipated future skills/knowledge deficits | 71.11 |
| 6 | 19d) To prepare staff for future career advancement (future promotion) | 70.45 |
| 4 | 19e) To enable staff to become effective in new roles (newly promoted) | 71.11 |
| 3 | 19g) To enhance staff skills/knowledge in existing roles | 71.59 |
| 2 | 19h) To maintain effectiveness of staff skills/knowledge in current roles | 72.16 |

Appendix 5A.10.71: Responses to Question 19.a**Question 19.a: To overcome current skills/knowledge deficits.**

Table 5A.164: Responses to Question 19a.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 1 | 6 | 28 | 10 |
| Percentage | 2.22% | 13.33% | 62.22% | 22.22% |
| No. of Respondents | 45 | | Mean R | 3.04 |

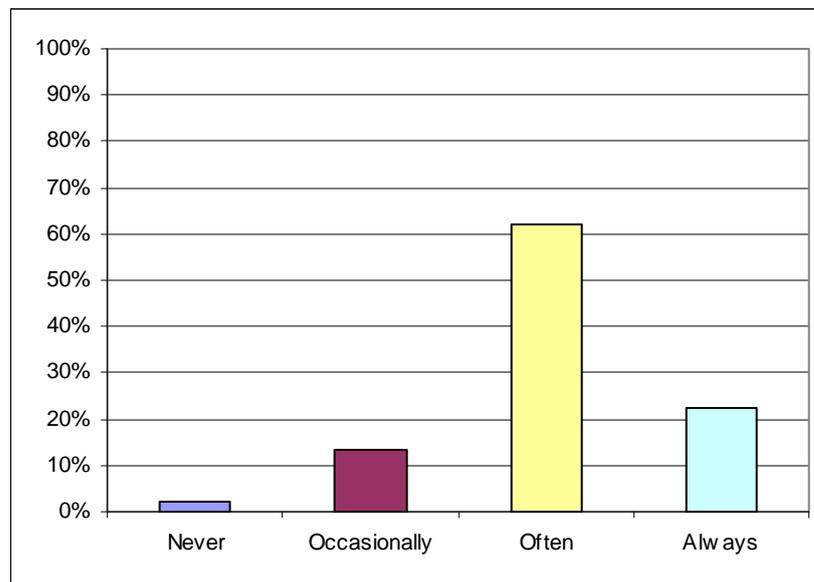


Figure 5A.133: Bar chart of Question 19a responses

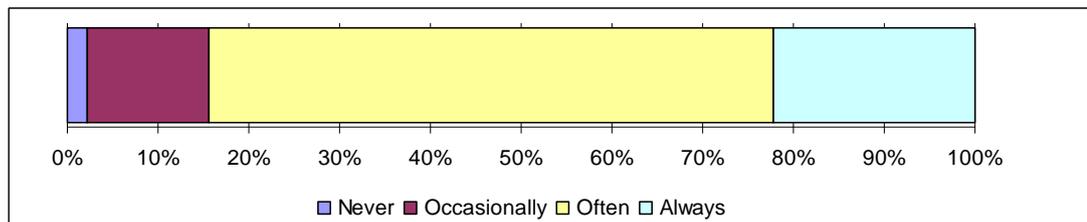


Figure 5A.134: Stacked bar chart of Question 19a responses

Appendix 5A.10.72: Responses to Question 19.b

Question 19.b: In response to past problems of skills /knowledge deficits.

Table 5A.165: Responses to Question 19b.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|-------------|--------|
| No. of Responses | 2 | 19 | 23 | 1 |
| Percentage | 4.44% | 42.22% | 51.11% | 2.22% |
| No. of Respondents | 45 | | Mean R 2.51 | |

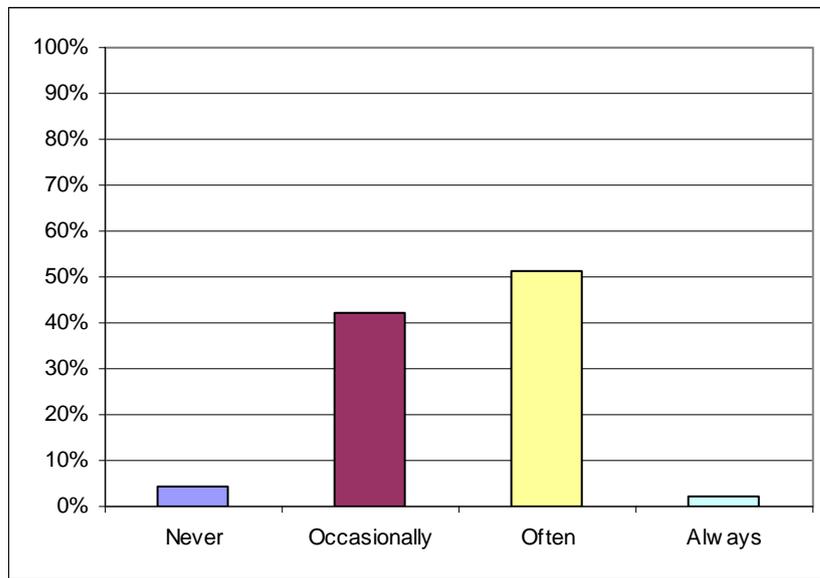


Figure 5A.135: Bar chart of Question 19b responses

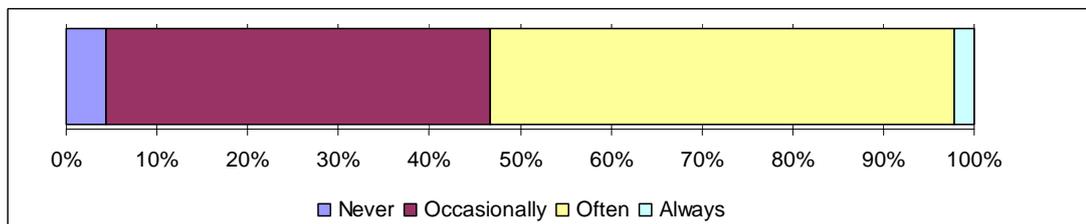


Figure 5A.136: Stacked bar chart of Question 19b responses

Appendix 5A.10.73: Responses to Question 19.c

Question 19.c: To meet anticipated future skills/knowledge deficits.

Table 5A.166: Responses to Question 19c.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 1 | 12 | 25 | 7 |
| Percentage | 2.22% | 26.67% | 55.56% | 15.56% |
| No. of Respondents | 45 | | Mean R | 2.84 |

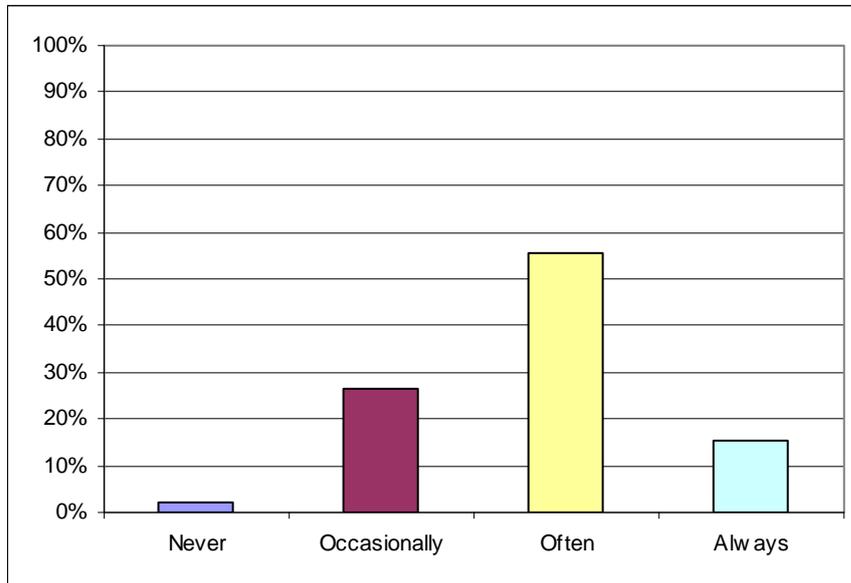


Figure 5A.137: Bar chart of Question 19c responses

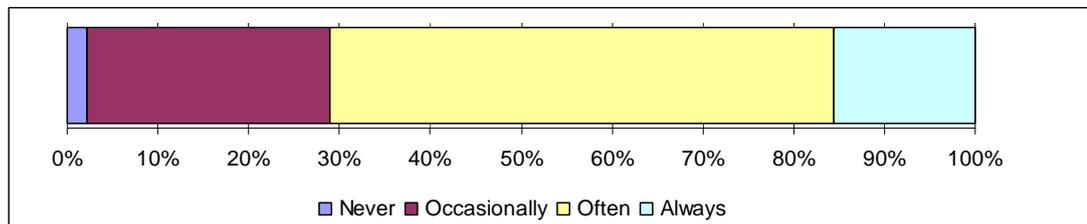


Figure 5A.138: Stacked bar chart of Question 19c responses

Appendix 5A.10.74: Responses to Question 19.d

Question 19.d: To prepare staff for future career advancement (future promotion).

Table 5A.167: Responses to Question 19d.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|-------------|--------|
| No. of Responses | 3 | 12 | 19 | 10 |
| Percentage | 6.82% | 27.27% | 43.18% | 22.73% |
| No. of Respondents | 44 | | Mean R 2.82 | |

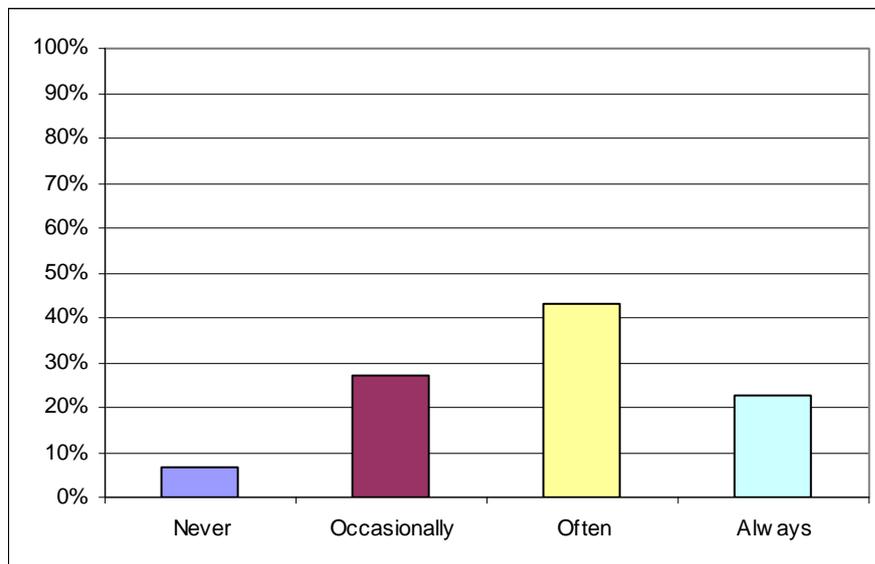


Figure 5A.139: Bar chart of Question 19d responses

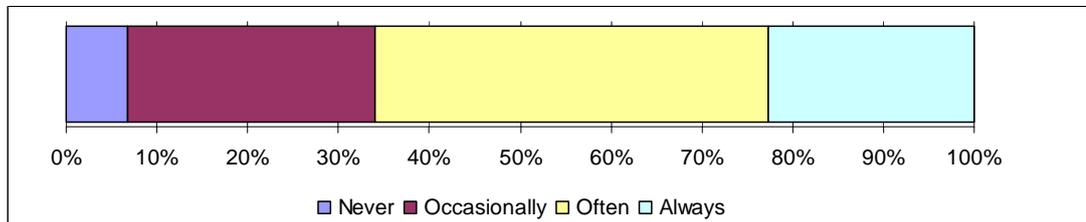


Figure 5A.140: Stacked bar chart of Question 19d responses

Appendix 5A.10.75: Responses to Question 19.e

Question 19.e: To enable staff to become effective in new roles (newly promoted).

Table 5A.168: Responses to Question 19.e.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 1 | 14 | 21 | 9 |
| Percentage | 2.22% | 31.11% | 46.67% | 20.00% |
| No. of Respondents | 45 | | Mean R | 2.84 |

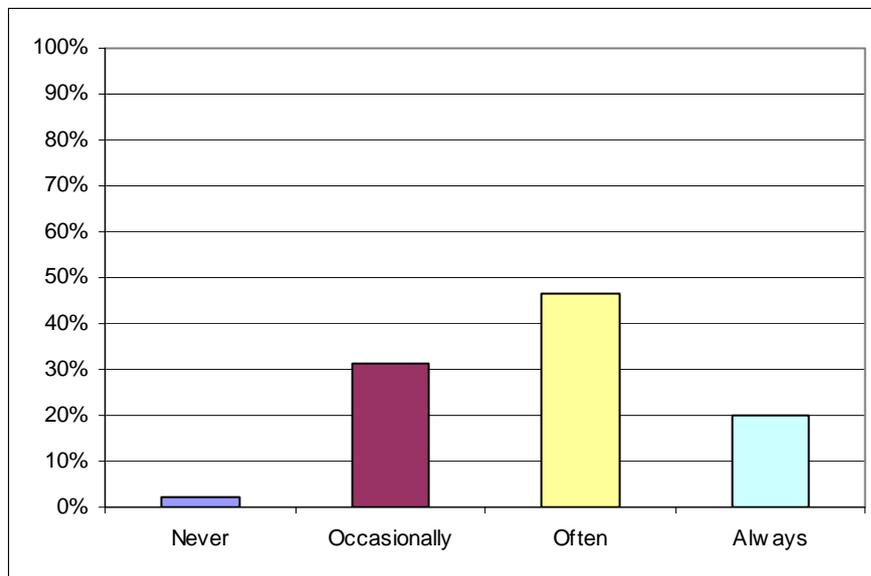


Figure 5A.141: Bar chart of Question 19e responses

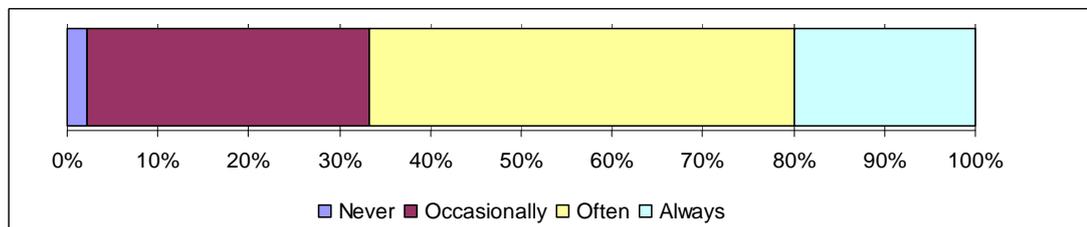


Figure 5A.142: Stacked bar chart of Question 19e responses

Appendix 5A.10.76: Responses to Question 19.f

Question 19.f: To widen staff skills/knowledge in existing roles.

Table 5A.169: Responses to Question 19f.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 1 | 10 | 29 | 3 |
| Percentage | 2.33% | 23.26% | 67.44% | 6.98% |
| No. of Respondents | 43 | | Mean R | 2.79 |

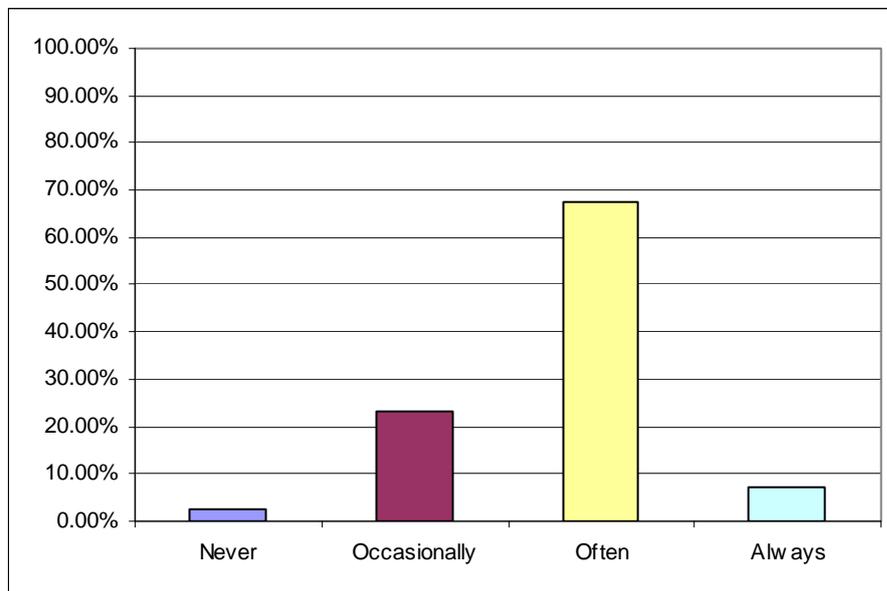


Figure 5A.143: Bar chart of Question 19f responses

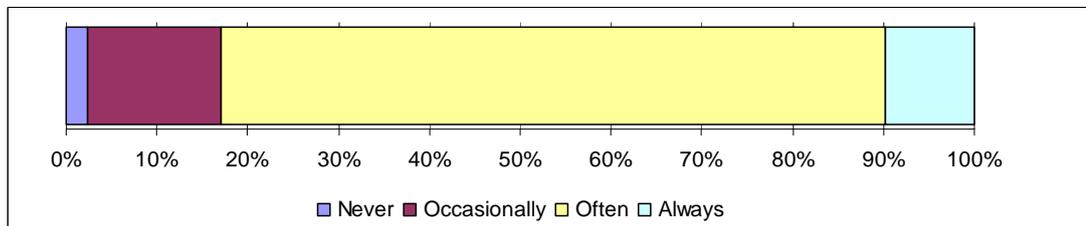


Figure 5A.144: Stacked bar chart of Question 19f responses

Appendix 5A.10.77: Responses to Question 19.g

Question 19.g: To enhance staff skills/knowledge in existing roles.

Table 5A.170: Responses to Question 19g.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 1 | 8 | 31 | 4 |
| Percentage | 2.27% | 18.18% | 70.45% | 9.09% |
| No. of Respondents | 44 | | Mean R | 2.86 |

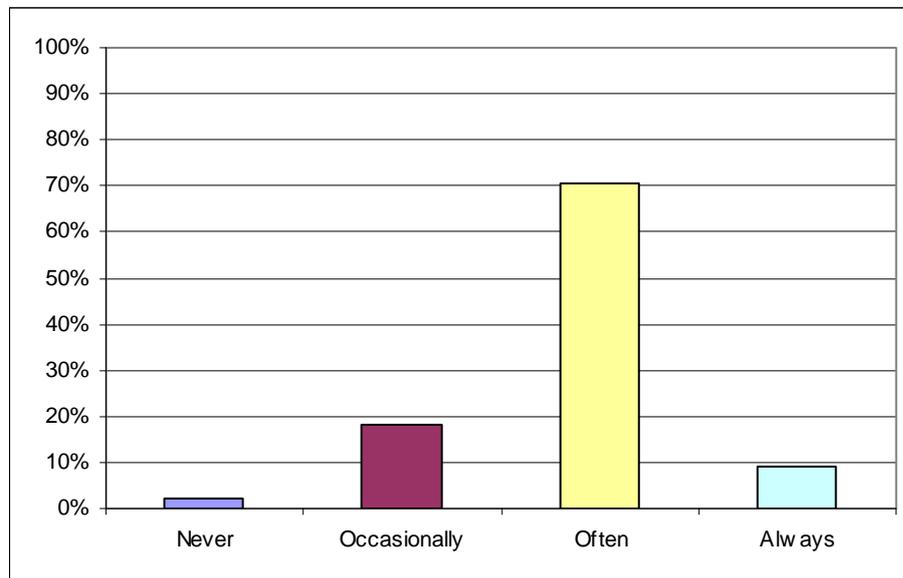


Figure 5A.145: Bar chart of Question 19g responses

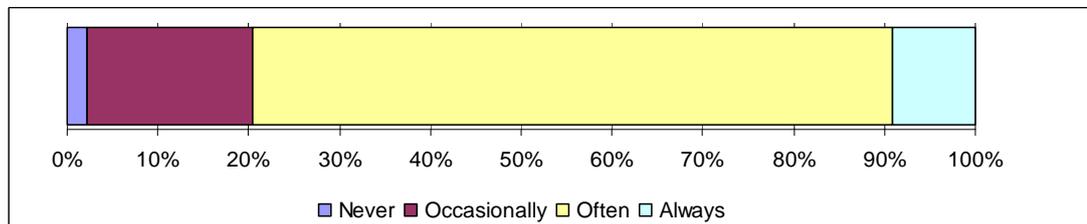


Figure 5A.146: Stacked bar chart of Question 19g responses

Appendix 5A.10.78: Responses to Question 19.h

Question 19.h: To maintain effectiveness of staff skills/knowledge in current roles.

Table 5A.171: Responses to Question 19h.

| | Never | Occasionally | Often | Always |
|--------------------|-------|--------------|--------|--------|
| No. of Responses | 0 | 11 | 27 | 6 |
| Percentage | 0.00% | 25.00% | 61.36% | 13.64% |
| No. of Respondents | 44 | | Mean R | 2.89 |

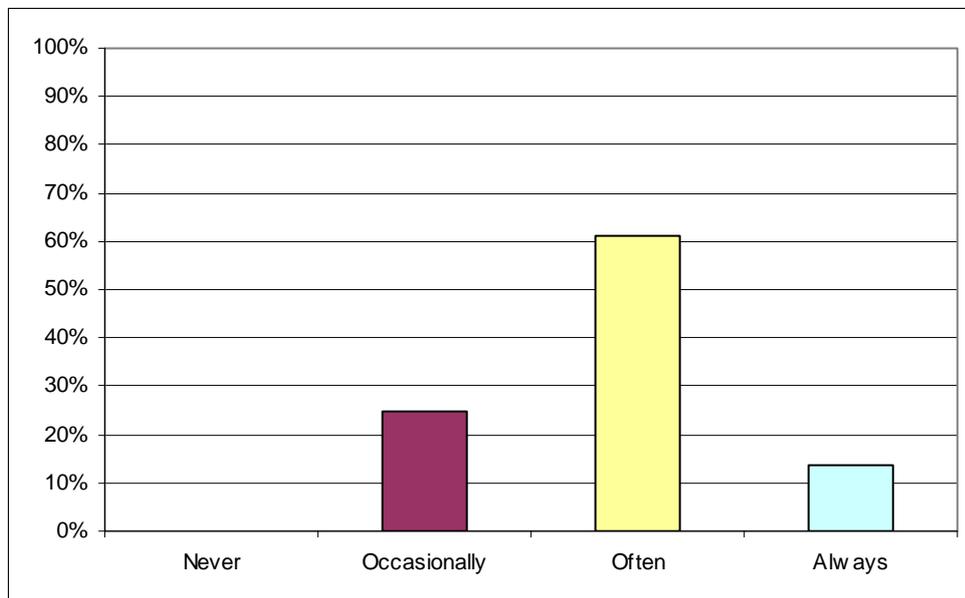


Figure 5A.147: Bar chart of Question 19h responses

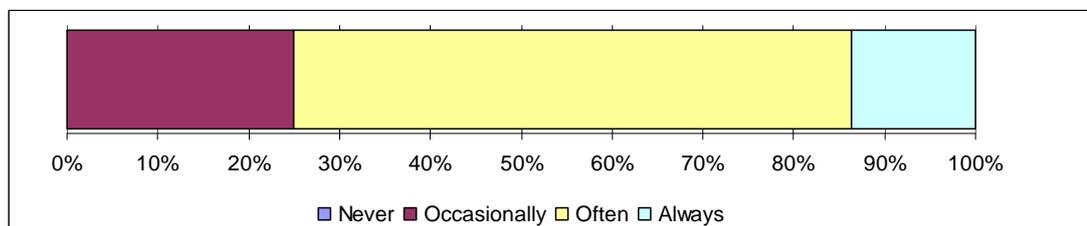


Figure 5A.148: Stacked bar chart of Question 19h responses

Appendix 5A.10.79: Responses to Question 20

Question 20: To what extent does your organisation believe that staff training and development activities should be linked to:

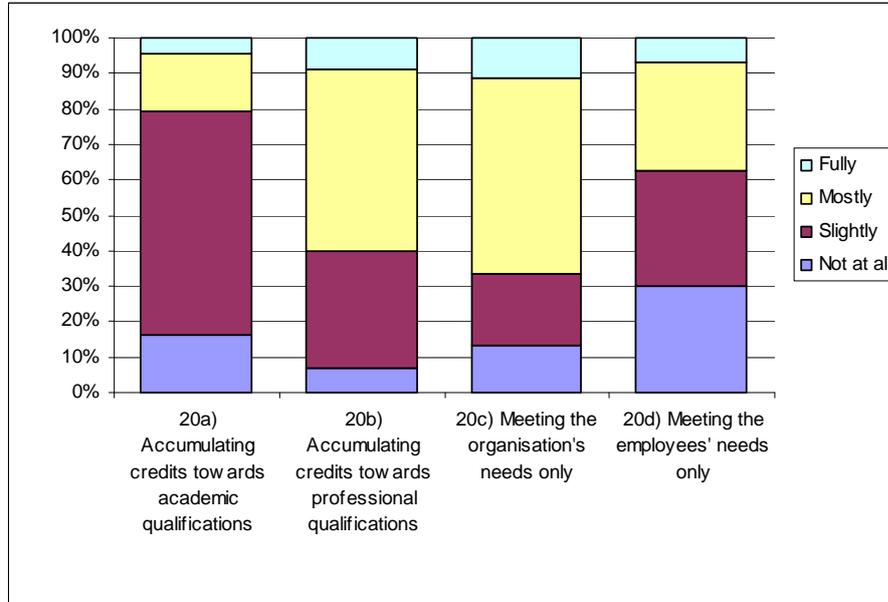


Figure 5A.149: Stacked Bar Chart for Responses to Question 20

Table 5A.172: Ranked Relative Importance Indices for Responses to Question 20

| Rank | To what extent does your organisation believe that staff training and development activities should be linked to | Relative Importance Index |
|------|--|---------------------------|
| 4 | 20a) Accumulating credits towards academic qualifications | 52.33 |
| 2 | 20b) Accumulating credits towards professional qualifications | 65.56 |
| 1 | 20c) Meeting the organisation's needs only | 66.11 |
| 3 | 20d) Meeting the employee's needs only | 53.49 |

Appendix 5A.10.80: Responses to Question 20.a**Question 20.a: Accumulating credits towards academic qualifications:**

Table 5A.173: Responses to Question 20a.

| | Not at all | Slightly | Mostly | Fully |
|--------------------|------------|----------|-------------|-------|
| No. of Responses | 7 | 27 | 7 | 2 |
| Percentage | 16.28% | 62.79% | 16.28% | 4.65% |
| No. of Respondents | 43 | | Mean R 2.09 | |

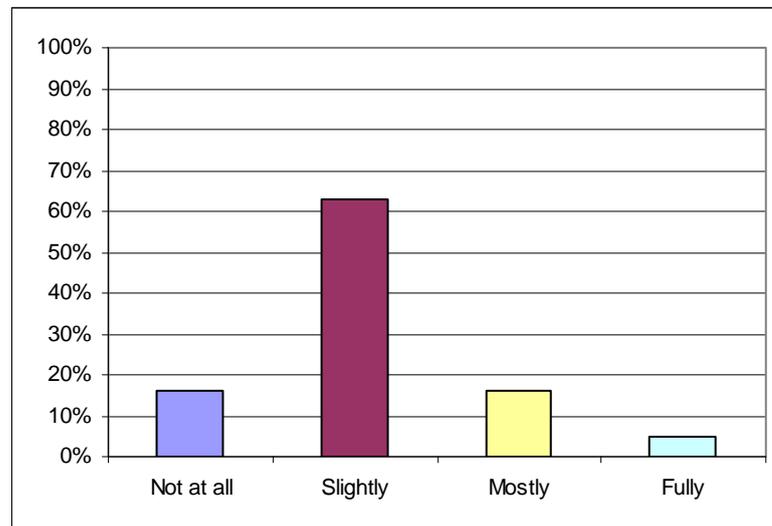


Figure 5A.150: Bar chart of Question 20a responses

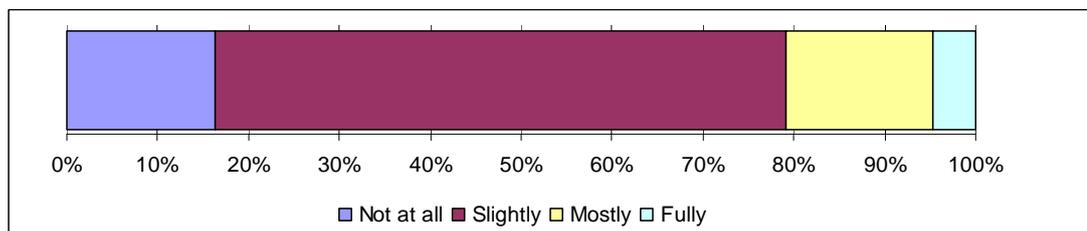


Figure 5A.151: Stacked bar chart of Question 20a responses

Appendix 5A.10.81: Responses to Question 20.b

Question 20.b: Accumulating credits towards professional qualifications:

Table 5A.174: Responses to Question 20b.

| | Not at all | Slightly | Mostly | Fully |
|--------------------|------------|----------|--------|-------|
| No. of Responses | 3 | 15 | 23 | 4 |
| Percentage | 6.67% | 33.33% | 51.11% | 8.89% |
| No. of Respondents | 45 | | Mean R | 2.62 |

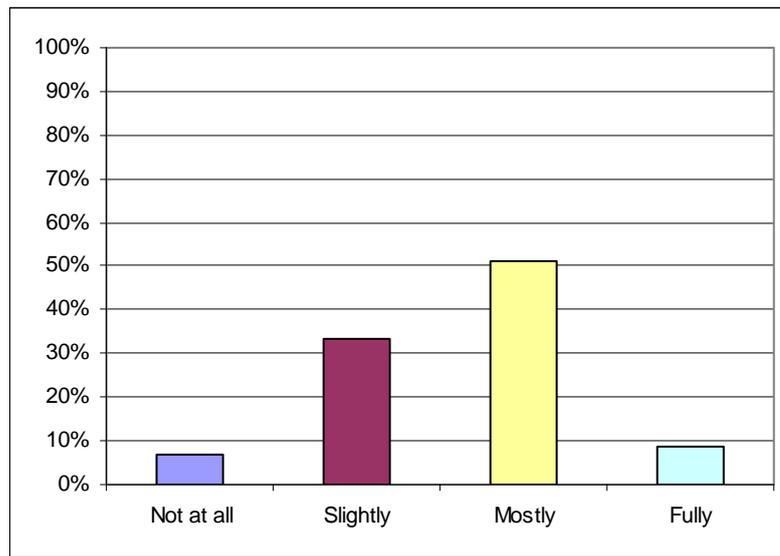


Figure 5A.152: Bar chart of Question 20b responses

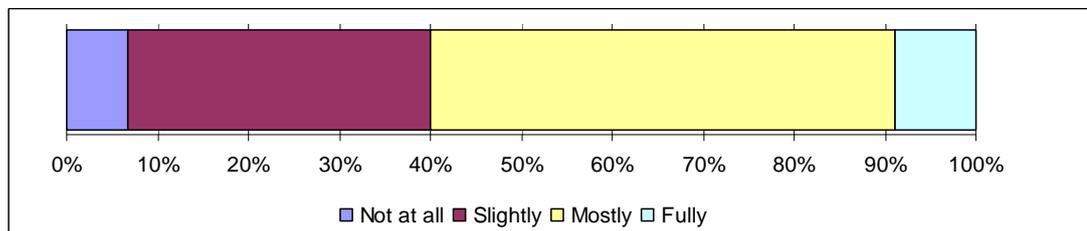


Figure 5A.153: Stacked bar chart of Question 20b responses

Appendix 5A.10.82: Responses to Question 20.c**Question 20.c: Meeting the organisation's needs only:**

Table 5A.175: Responses to Question 20c.

| | Not at all | Slightly | Mostly | Fully |
|--------------------|------------|----------|--------|--------|
| No. of Responses | 6 | 9 | 25 | 5 |
| Percentage | 13.33% | 20.00% | 55.56% | 11.11% |
| No. of Respondents | 45 | | Mean R | 2.64 |

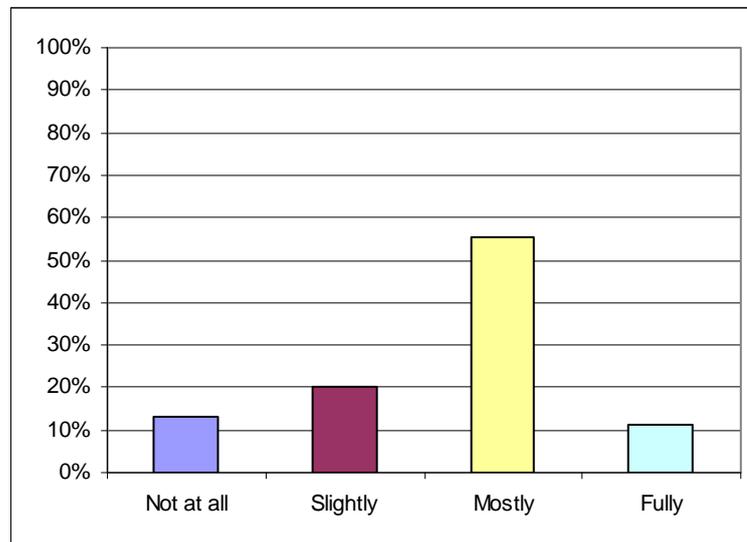


Figure 5A.154: Bar chart of Question 20c responses

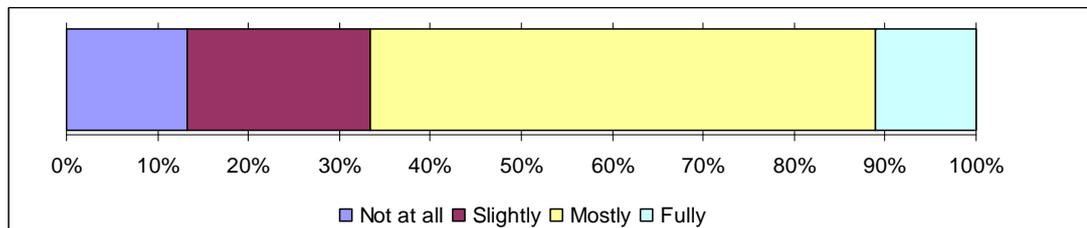


Figure 5A.155: Stacked bar chart of Question 20c responses

Appendix 5A.10.83: Responses to Question 20.d

Question 20.d: Meeting the employee’s needs only:

Table 5A.176: Responses to Question 20d.

| | Not at all | Slightly | Mostly | Fully |
|--------------------|------------|----------|-------------|-------|
| No. of Responses | 13 | 14 | 13 | 3 |
| Percentage | 30.23% | 32.56% | 30.23% | 6.98% |
| No. of Respondents | 43 | | Mean R 2.14 | |

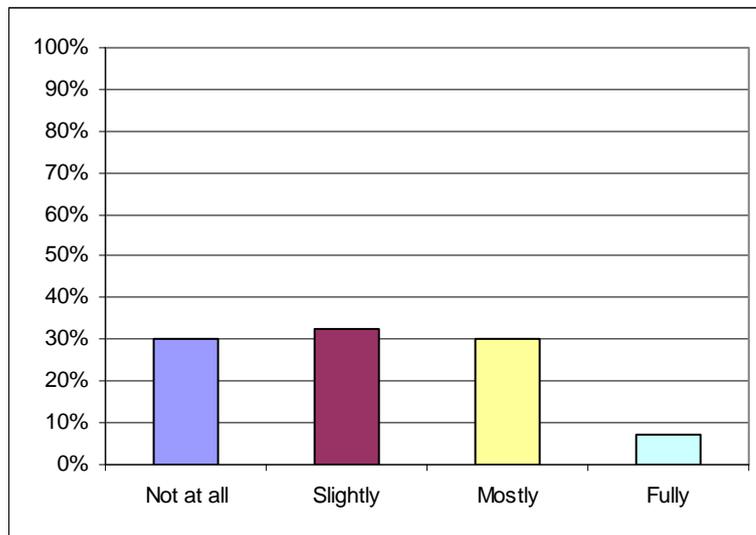


Figure 5A.156: Bar chart of Question 20d responses

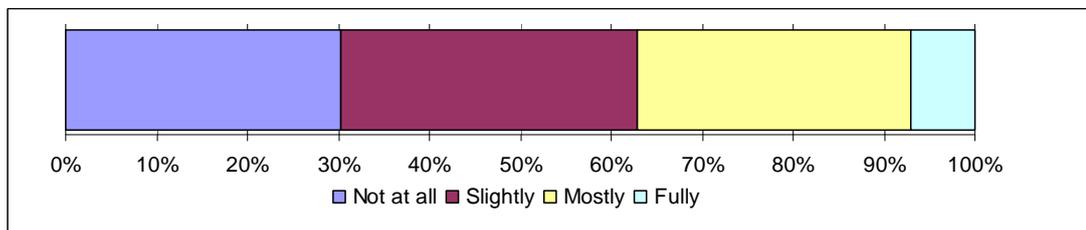


Figure 5A.157: Stacked bar chart of Question 20d responses

Appendix 5A.10.84: Responses to Question 21

Question 21: Does your organisation have a formal policy about the use of computers and internet access?

Table 5A.177: Responses to Question 21.

| | No | Yes |
|--------------------|-------|--------|
| No. of Responses | 1 | 44 |
| Percentage | 2.22% | 97.78% |
| No. of Respondents | 45 | |

Appendix 5A.10.85: Responses to Question 22

Question 22 To what extent are your staff permitted to use the internet during working hours?

Table 5A.178: Responses to Question 22.

| | Not at all | Restricted | Few restrictions | Unrestricted |
|--------------------|------------|------------|------------------|--------------|
| No. of Responses | 0 | 21 | 17 | 7 |
| Percentage | 0.00% | 46.67% | 37.78% | 15.56% |
| No. of Respondents | 45 | | Mean R 2.69 | |

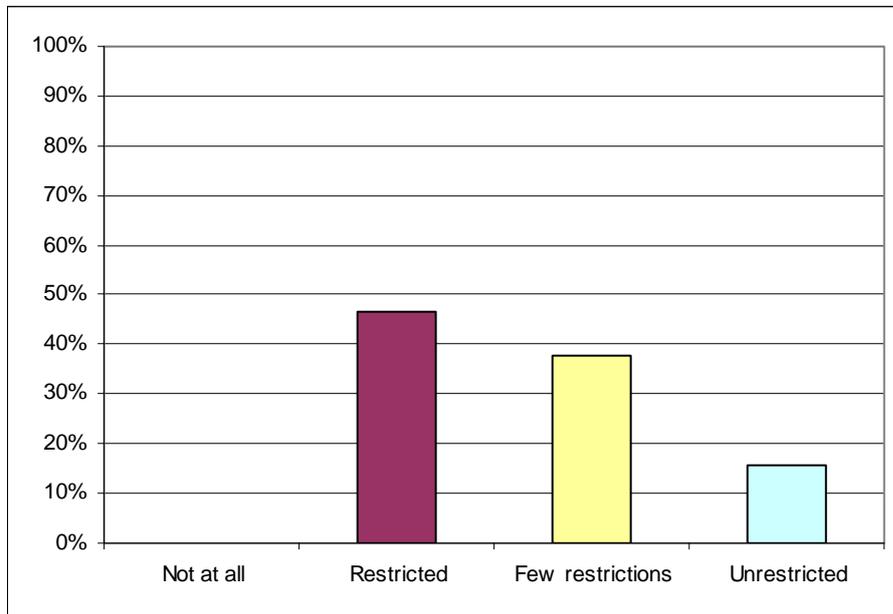


Figure 5A.158: Bar chart of Question 22 responses

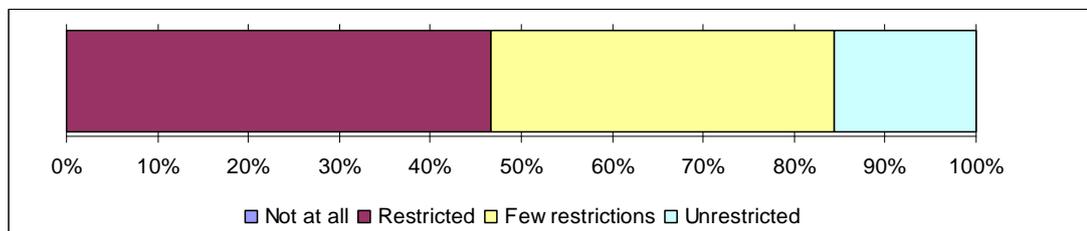


Figure 5A.159: Stacked bar chart of Question 22 responses

Appendix 5A.10.86: Responses to Question 23

Question 23: To what extent does your staff use the internet for work purposes?

Table 5A.179: Responses to Question 23.

| | Not at all | Restricted | Few restrictions | Unrestricted |
|--------------------|------------|------------|------------------|--------------|
| No. of Responses | 1 | 16 | 24 | 4 |
| Percentage | 2.22% | 35.56% | 53.33% | 8.89% |
| No. of Respondents | 45 | | Mean R 2.69 | |

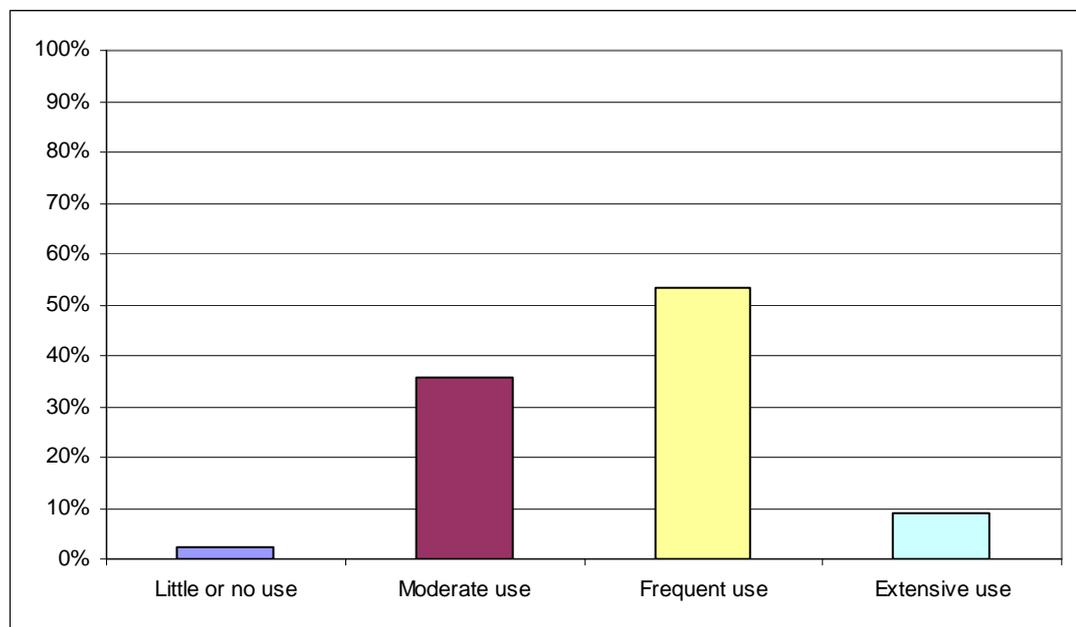


Figure 5A.160: Bar chart of Question 23 responses

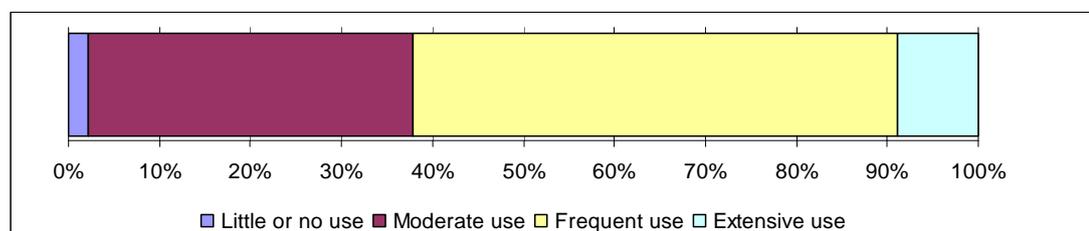


Figure 5A.161: Stacked bar chart of Question 23 responses

Appendix 5A.10.87: Cross-tabulations for Question 22 and Question 23

Table 5A.180: Four-by-Four Cell Contingency Table for Questions 22 and 23.

| | | Q22: To what extent is your staff permitted to use the internet during working hours? | | | |
|---|------------------|---|--------------|------------------|--------------|
| | | Not at all | Restricted | Few Restrictions | Unrestricted |
| Q23: To what extent does your staff use the internet for work purposes? | Extensive Use | 0 0.00% | 1 2.22% | 1 2.22% | 2 4.44% |
| | Frequent Use | 0 0.00% | 9 20.00% | 12 26.67% | 3 6.67% |
| | Moderate Use | 0 0.00% | 11 24.44% | 3 6.67% | 2 4.44% |
| | Little or No Use | 0 0.00% | 0 0.00% | 1 2.22% | 0 0.00% |

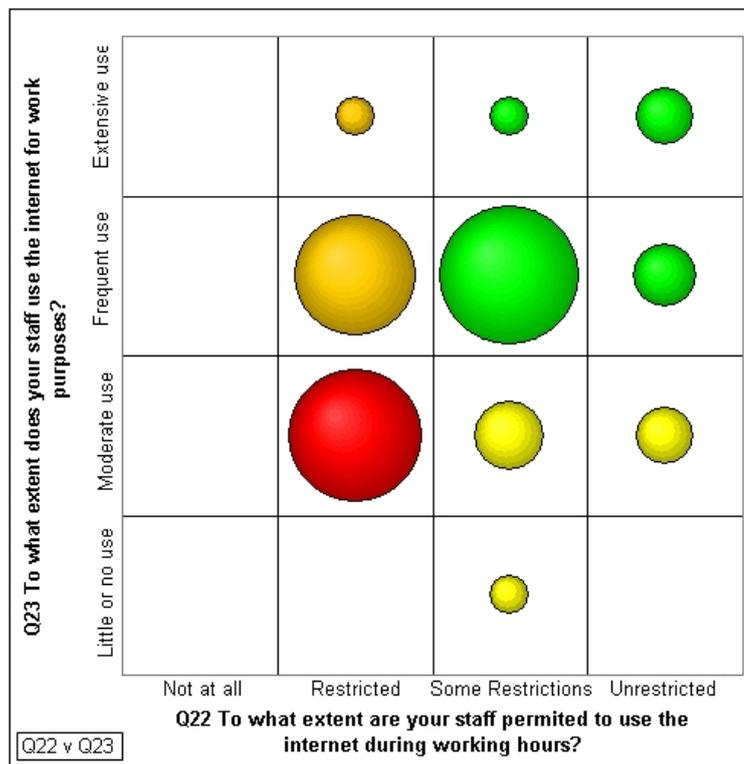


Figure 5A.162: Bubble Diagram for Questions 22 and 23, Four-by-Four Cell Comparison

Table 5A.181: Chi-Square Tests for Questions 22 and 23, Table 5A.180 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 10.100 ^(a) | 6 | .121 |
| Likelihood Ratio | 9.468 | 6 | .149 |
| Linear-by-Linear Association | 3.018 | 1 | .082 |
| N of Valid Cases | 45 | | |

(a) 8 cells (66.7%) have expected count less than 5. The minimum expected count is 0.16.

Table 5A.182: Consolidated Two-by-Two Cell Contingency Table for Questions 22 and 23.

| | | Q22: To what extent is your staff permitted to use the internet during working hours? | |
|---|----------------------------|---|---------------------|
| | | None/Restricted | Few/No Restrictions |
| Q23: To what extent does your staff use the internet for work purposes? | Frequent/Extensive Use | 10 22.22% | 18 40.00% |
| | No. Little or Moderate Use | 11 24.44% | 6 13.33% |

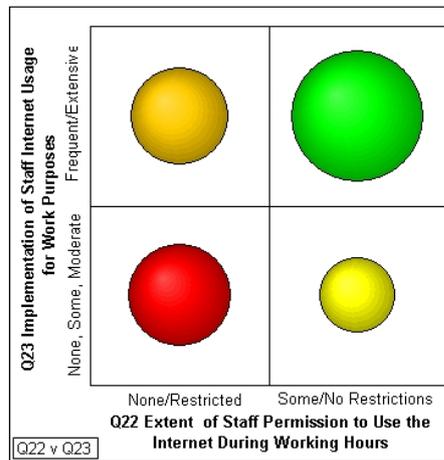


Figure 5A.163: Bubble Diagram for Questions 22 and 23, Two-by-Two Cell Comparison

Table 5A.183: SPSS Chi-Square Tests for Questions 22 and 23, Table 5A.182 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 3.572 ^(b) | 1 | 0.059 | | |
| Continuity Correction ^(a) | 2.502 | 1 | 0.114 | | |
| Likelihood Ratio | 3.610 | 1 | 0.057 | | |
| Fisher's Exact Test | | | | 0.073 | 0.057 |
| Linear-by-Linear Association | 3.493 | 1 | 0.062 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.93.

Table 5A.184: SPSS Symmetric Measures for Questions 22 and 23, Table 5A.182 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.282 | 0.059 |
| | Cramer's V | 0.282 | 0.059 |
| | Contingency Coefficient | 0.271 | 0.059 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.88: Responses to Question 24

Question 24: To what extent are your staff permitted to use the internet for non-work purposes?

Table 5A.185: Responses to Question 24.

| | Not at all | Restricted | Few restrictions | Unrestricted |
|--------------------|------------|------------|------------------|--------------|
| No. of Responses | 4 | 32 | 8 | 1 |
| Percentage | 8.89% | 71.11% | 17.78% | 2.22% |
| No. of Respondents | 45 | | Mean R 2.13 | |

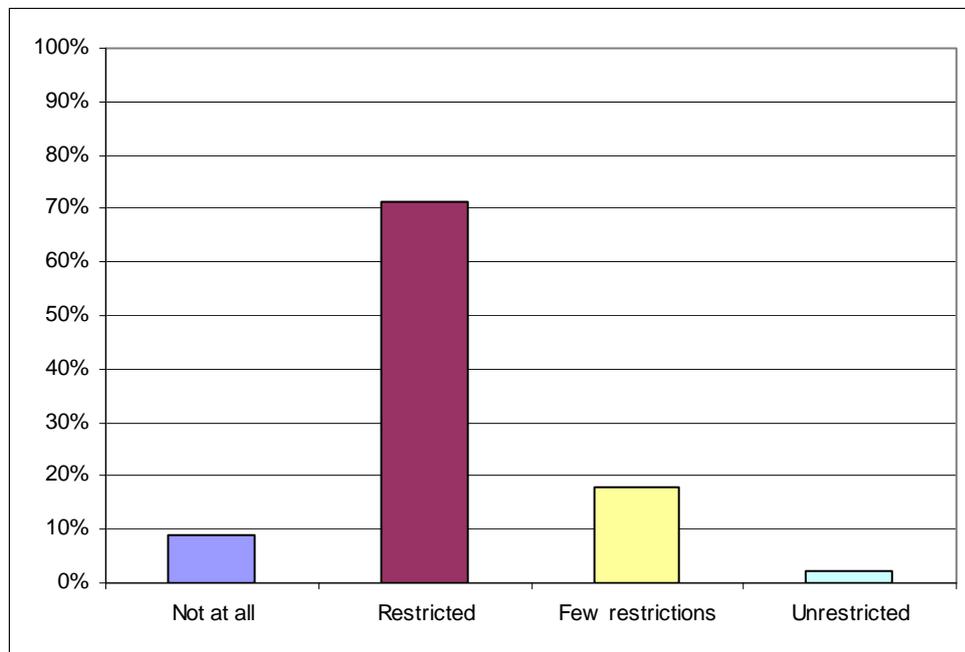


Figure 5A.164: Bar chart of Question 24 responses

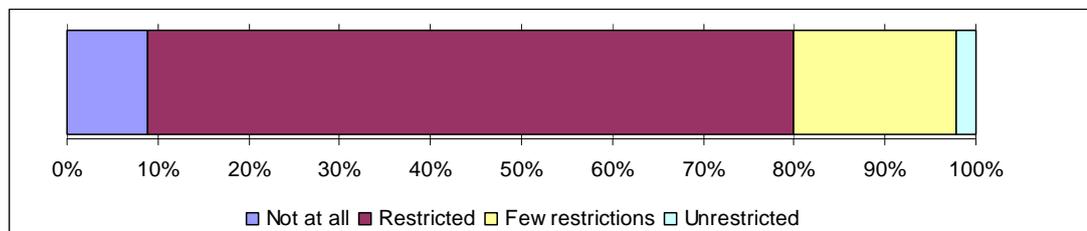


Figure 5A.165: Stacked bar chart of Question 24 responses

Appendix 5A.10.89: Responses to Question 25

Question 25: To what extent does your staff use the internet for non-work purposes?

Table 5A.186: Responses to Question 25.

| | Not at all | Restricted | Few restrictions | Unrestricted |
|--------------------|------------|------------|------------------|--------------|
| No. of Responses | 9 | 30 | 4 | 1 |
| Percentage | 20.45% | 68.18% | 9.09% | 2.27% |
| No. of Respondents | 44 | | Mean R 1.89 | |

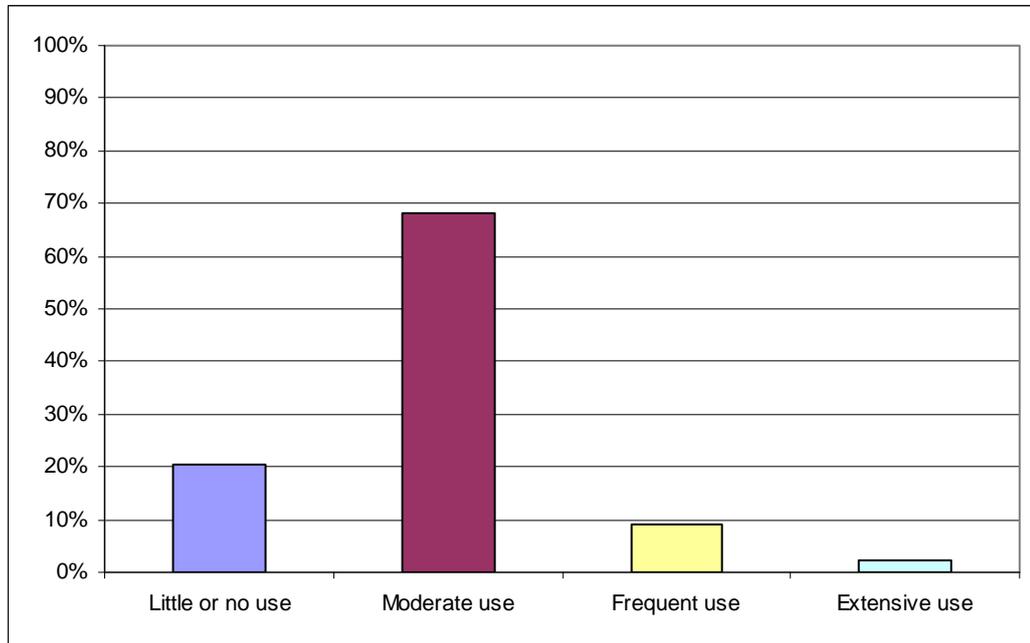


Figure 5A.166: Bar chart of Question 25 responses

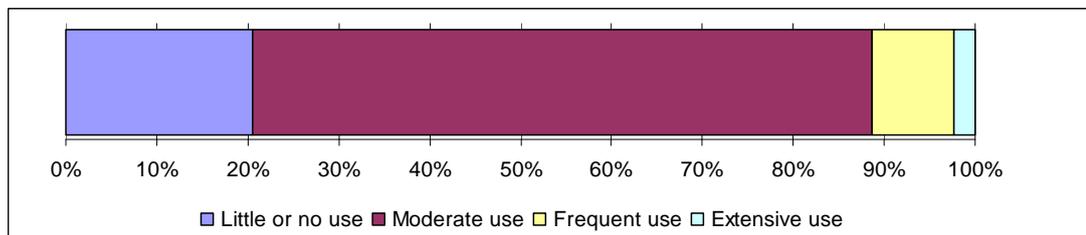


Figure 5A.167: Stacked bar chart of Question 25 responses

Appendix 5A.10.90: Cross-tabulations for Question 24 and Question 25

Table 5A.187: Four-by-Four Cell Contingency Table for Questions 24 and 25.

| | | Q24: To what extent are your staff permitted to use the internet for non-work purposes? | | | |
|---|------------------|---|----------------|------------------|--------------|
| | | Not at all | Restricted use | Few restrictions | Unrestricted |
| Q25: To what extent does your staff use the internet for non-work purposes? | Extensive Use | 0 0.00% | 0 0.00% | 1 2.27% | 0 0.00% |
| | Frequent Use | 0 0.00% | 3 6.82% | 1 2.27% | 0 0.00% |
| | Moderate Use | 1 2.27% | 23 52.27% | 5 11.36% | 1 2.27% |
| | Little or No Use | 3 6.82% | 5 11.36% | 1 2.27% | 0 0.00% |

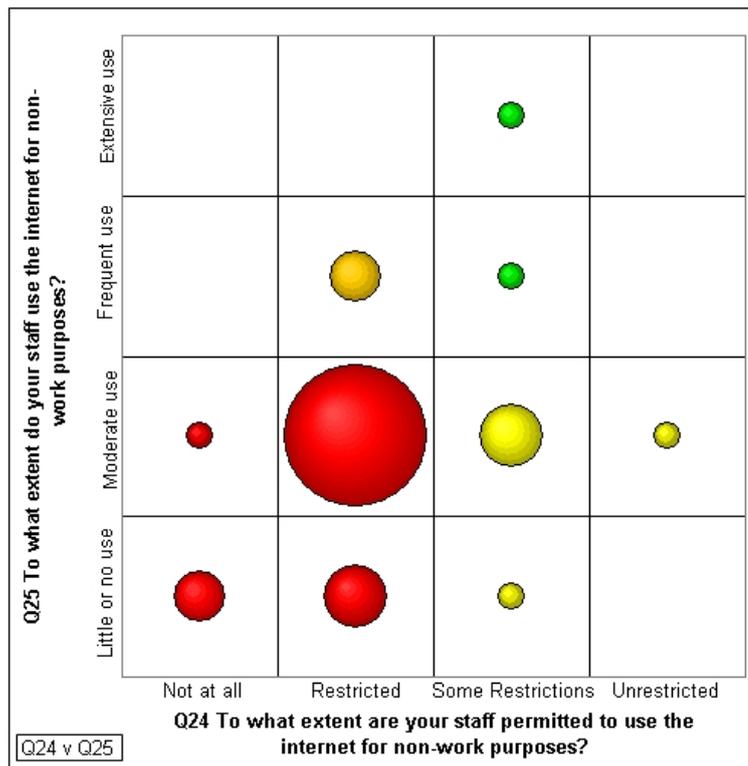


Figure 5A.168: Bubble Diagram for Questions 24 and 25, Four-by-Four Cell Comparison

Table 5A.188: Chi-Square Tests for Questions 24 and 25, Table 5A.187 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 10.227 ^(a) | 9 | 0.332 |
| Likelihood Ratio | 8.551 | 9 | 0.480 |
| Linear-by-Linear Association | 3.636 | 1 | 0.057 |
| N of Valid Cases | 45 | | |

(a) 13 cells (81.3%) have expected count less than 5. The minimum expected count is 0.04.

Table 5A.189: Consolidated Two-by-Two Cell Contingency Table for Questions 24 and 25.

| | | Q24: To what extent are your staff permitted to use the internet for non-work purposes? | |
|---|----------------------------|---|----------------------|
| | | None /Restricted Use | Few/ No restrictions |
| Q25: To what extent does your staff use the internet for non-work purposes? | Frequent/ Extensive Use | 3 6.82% | 2 4.55% |
| | No, Little or Moderate use | 32 72.73% | 7 15.91% |

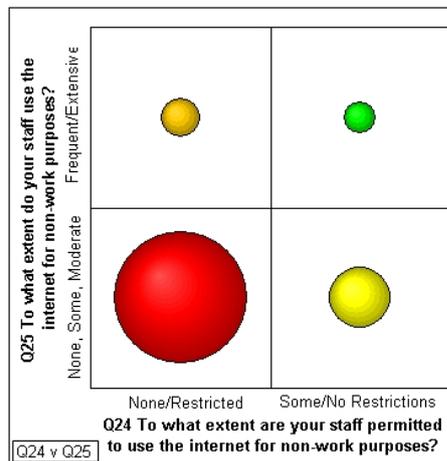


Figure 5A.169: Bubble Diagram for Questions 24 and 25, Two-by-Two Cell Comparison

Table 5A.190: SPSS Chi-Square Tests for Questions 24 and 25, Table 5A.189 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 0.769 ^(b) | 1 | 0.380 | | |
| Continuity Correction ^(a) | 0.108 | 1 | 0.742 | | |
| Likelihood Ratio | 0.690 | 1 | 0.406 | | |
| Fisher's Exact Test | | | | 0.583 | 0.344 |
| Linear-by-Linear Association | 0.752 | 1 | 0.386 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.20.

Table 5A.191: SPSS Symmetric Measures for Questions 24 and 25, Table 5A.189 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.131 | 0.380 |
| | Cramer's V | 0.131 | 0.380 |
| | Contingency Coefficient | 0.130 | 0.380 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.91: Responses to Question 26

Question 26: To what extent do you or would you encourage your staff to use the internet for staff development purposes?

Table 5A.192: Responses to Question 26.

| | Not at all | Restricted | Few restrictions | Unrestricted |
|--------------------|------------|------------|------------------|--------------|
| No. of Responses | 2 | 12 | 24 | 7 |
| Percentage | 4.44% | 26.67% | 53.33% | 15.56% |
| No. of Respondents | 45 | | Mean R | 2.80 |

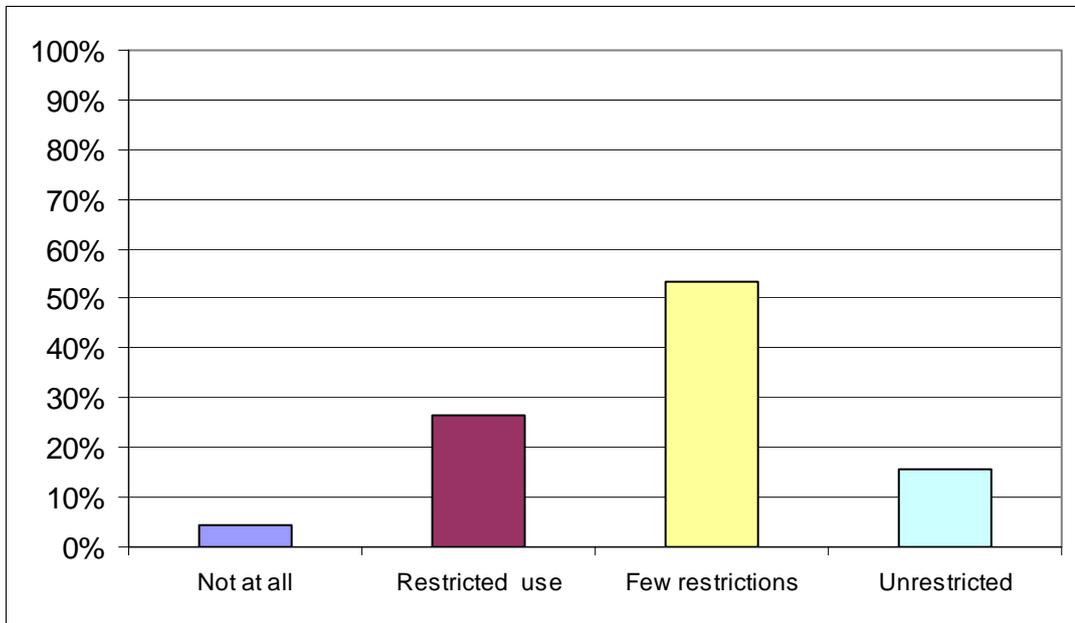


Figure 5A.170: Bar chart of Question 26 responses

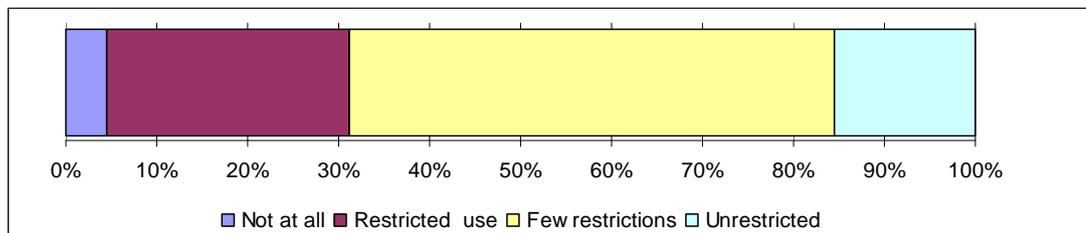


Figure 5A.171: Stacked bar chart of Question 26 responses

Appendix 5A.10.92: Cross-tabulations for Question 26 and Question 23

Table 5A.193: Four-by-Four Cell Contingency Table for Questions 26 and 23.

| | | Q26: To what extent do you or would you encourage staff to use the internet for staff development purposes? | | | |
|--|------------------|---|----------------|------------------|--------------|
| | | Little or No Use | Restricted Use | Few Restrictions | Unrestricted |
| Q23: To what extent does your staff use the internet for work? | Extensive Use | 0 | 1 | 0 | 3 |
| | | 0.00% | 2.22% | 0.00% | 6.67% |
| | Frequent Use | 1 | 4 | 18 | 1 |
| | | 2.22% | 8.89% | 40.00% | 2.22% |
| | Moderate Use | 0 | 7 | 6 | 3 |
| | | 0.00% | 15.56% | 13.33% | 6.67% |
| | Little or No Use | 1 | 0 | 0 | 0 |
| | | 2.22% | 0.00% | 0.00% | 0.00% |

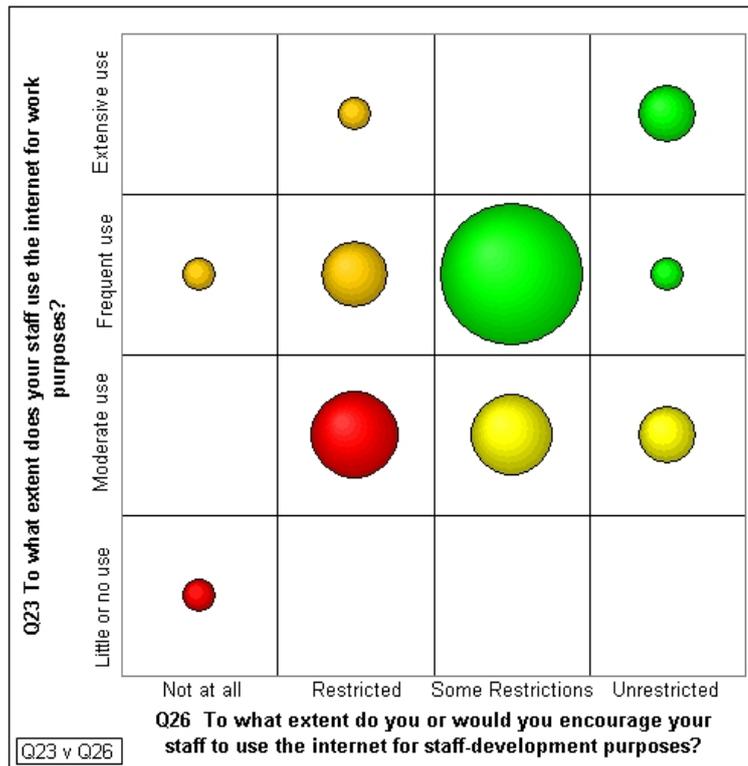


Figure 5A.172: Bubble Diagram for Questions 26 and 23, Four-by-Four Cell Comparison

Table 5A.194: Chi-Square Tests for Questions 22 and 23, Table 5A.192 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) |
|------------------------------|-----------------------|----|-----------------------|
| Pearson Chi-Square | 41.239 ^(a) | 9 | 0.000 |
| Likelihood Ratio | 25.111 | 9 | 0.003 |
| Linear-by-Linear Association | 4.608 | 1 | 0.032 |
| N of Valid Cases | 45 | | |

(a) 13 cells (81.3%) have expected count less than 5. The minimum expected count is 0.04.

Table 5A.195: Consolidated Two-by-Two Cell Contingency Table for Questions 26 and 23.

| | | Q26: To what extent do you or would you encourage staff to use the internet for staff development purposes? | |
|--|----------------------------|---|------------------------|
| | | No. Little or Restricted Use | Few or No Restrictions |
| Q23: To what extent does your staff use the internet for work? | Frequent or Extensive Use | 6 | 22 |
| | | 13.33% | 48.89% |
| | No, Little or Moderate Use | 8 | 9 |
| | | 17.78% | 20.00% |

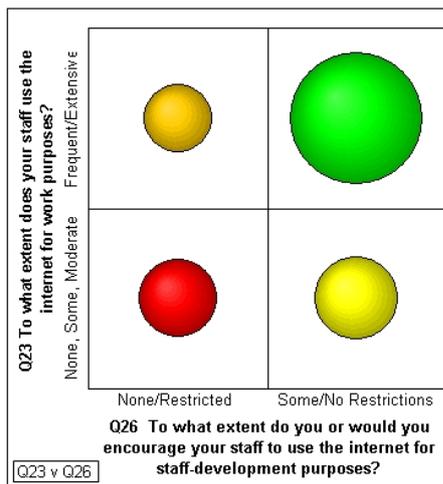


Figure 5A.173: Bubble Diagram for Questions 26 and 23, Two-by-Two Cell Comparison

Table 5A.196: SPSS Chi-Square Tests for Questions 26 and 23, Table 5A.194 above.

| Chi-Square Tests | Value | df | Asymp. Sig. (2-sided) | Exact Sig. (2-sided) | Exact Sig. (1-sided) |
|--------------------------------------|----------------------|----|-----------------------|----------------------|----------------------|
| Pearson Chi-Square | 3.242 ^(b) | 1 | 0.072 | | |
| Continuity Correction ^(a) | 2.157 | 1 | 0.142 | | |
| Likelihood Ratio | 3.194 | 1 | 0.074 | | |
| Fisher's Exact Test | | | | 0.101 | 0.072 |
| Linear-by-Linear Association | 3.170 | 1 | 0.075 | | |
| N of Valid Cases | 45 | | | | |

(a) Computed only for a 2x2 table

(b) 0 cells (0.0%) have expected count less than 5. The minimum expected count is 5.29.

Table 5A.197: SPSS Symmetric Measures for Questions 26 and 23, Table 5A.194 above.

| Symmetric Measures | | Value | Approx. Sig. |
|--------------------|-------------------------|-------|--------------|
| Nominal by Nominal | Phi | 0.268 | 0.072 |
| | Cramer's V | 0.268 | 0.072 |
| | Contingency Coefficient | 0.259 | 0.072 |
| N of Valid Cases | | 45 | |

(a) Not assuming the null hypothesis.

(b) Using the asymptotic standard error assuming the null hypothesis.

Appendix 5A.10.93: Responses to Question 27.a

Question 27: [What is] the level of access your staff has to computer facilities.

Question 27.a: Approximately what percentage of staff has exclusive access to/use of a personal computer (including laptops / notebooks)?

Table 5A.198: Responses to Question 27a.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|-------|-------|----------------|--------|-------|-------|--------|--------|--------|--------|-------|
| No. of Responses | 0 | 0 | 0 | 5 | 3 | 2 | 7 | 7 | 9 | 8 | 4 |
| Percentage | 0.00% | 0.00% | 0.00% | 11.11% | 6.67% | 4.44% | 15.56% | 15.56% | 20.00% | 17.78% | 8.89% |
| No. of Respondents | 45 | | Mean R 69.33%% | | | | | | | | |

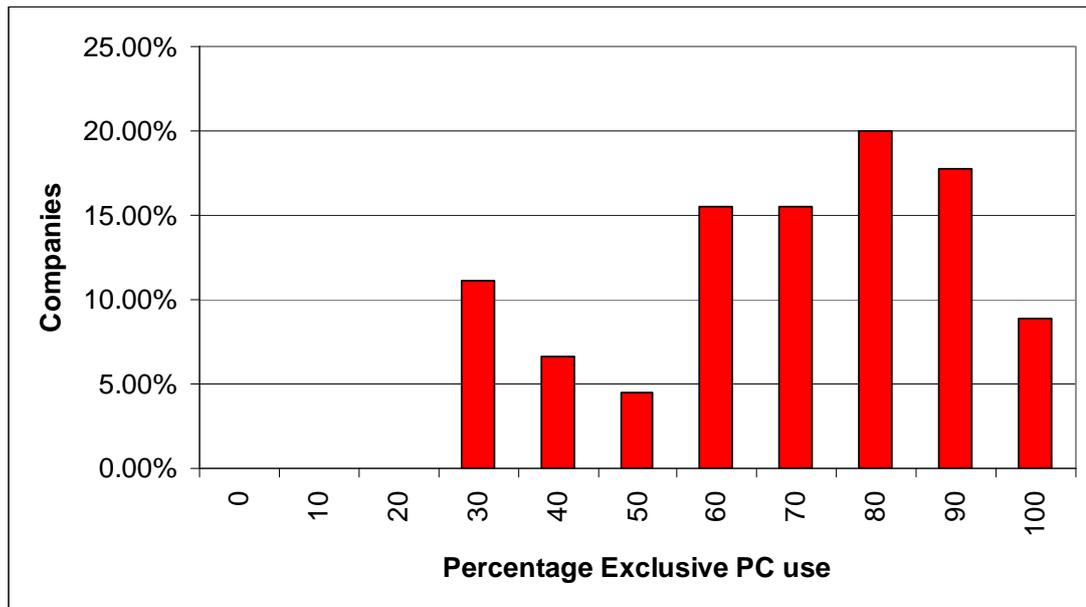


Figure 5A.174: Bar chart of Question 27a responses

Table 5A.199: Consolidated Responses to Question 27a

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 0 | 10 | 23 | 12 |
| 0.00% | 22.22% | 51.11% | 26.67% |

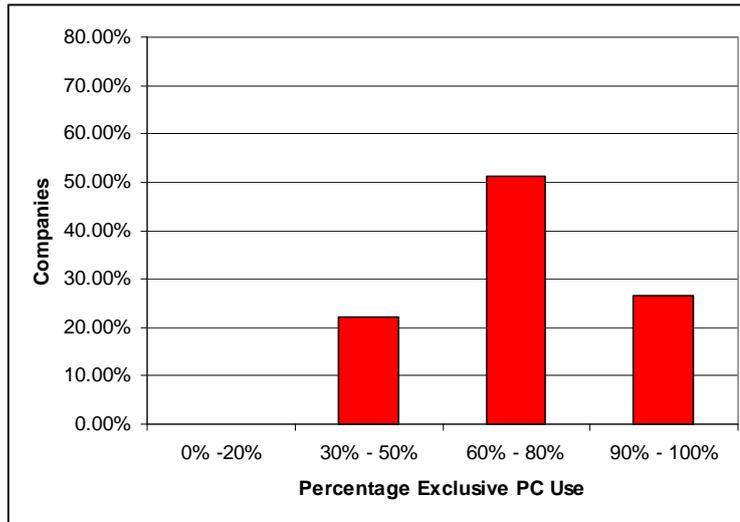


Figure 5A.175: Consolidated Bar chart of Question 27a responses

Appendix 5A.10.94: Responses to Question 27.b

Question 27.b: Approximately what percentage of staff have shared access to/use of a personal computer (including laptops / notebooks)?

Table 5A.200: Responses to Question 27b.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|----------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|-------|
| No. of Responses | 11 | 13 | 9 | 2 | 1 | 2 | 2 | 1 | 2 | 1 | 1 |
| Percentage | 24.44% | 28.89% | 20.00% | 4.44% | 2.22% | 4.44% | 4.44% | 2.22% | 4.44% | 2.22% | 2.22% |
| No. of Respondents | 45 | | | | | | | | | | |
| | Mean R: 23.33% | | | | | | | | | | |

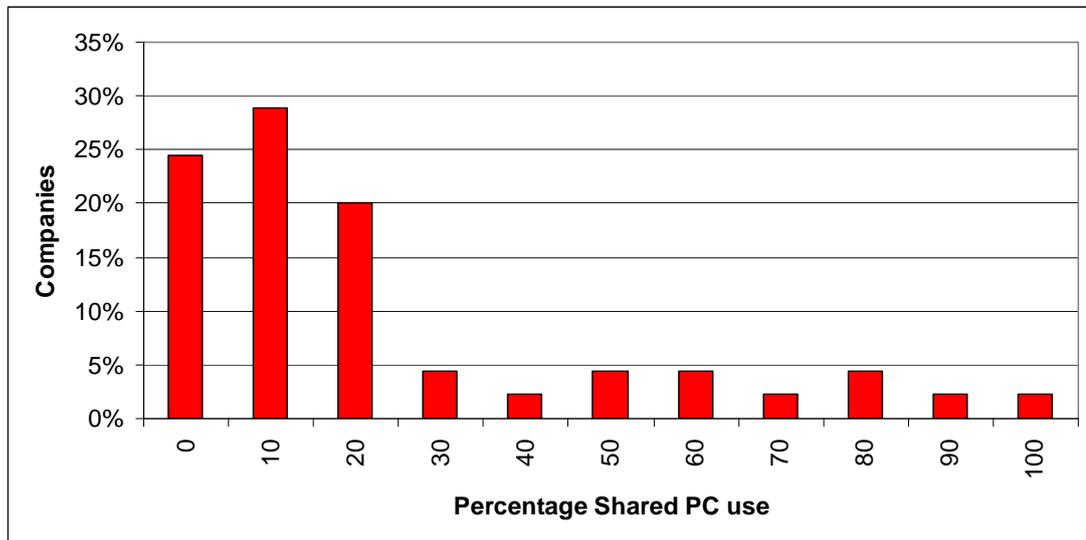


Figure 5A.176: Bar chart of Question 27b responses

Table 5A.201: Consolidated Responses to Question 27b.

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 33 | 5 | 5 | 2 |
| 73.33% | 11.11% | 11.11% | 4.44% |

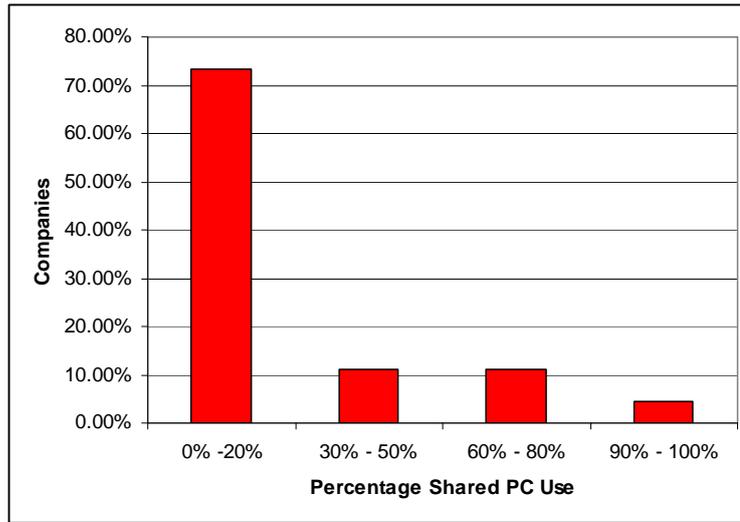


Figure 5A.177: Consolidated Bar chart of Question 27b responses

Appendix 5A.10.95: Responses to Question 27.c

Question 27.c: Approximately what percentage of staff do not have access to/use of a personal computer (including laptops / notebooks)?

Table 5A.202: Responses to Question 27c.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|--------|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|
| No. of Responses | 10 | 17 | 5 | 2 | 3 | 4 | 2 | 2 | 0 | 0 | 0 |
| Percentage | 22.22% | 37.78% | 11.11% | 4.44% | 6.67% | 8.89% | 4.44% | 4.44% | 0.00% | 0.00% | 0.00% |
| No. of Respondents | 45 | | Mean R | | 20.22% | | | | | | |

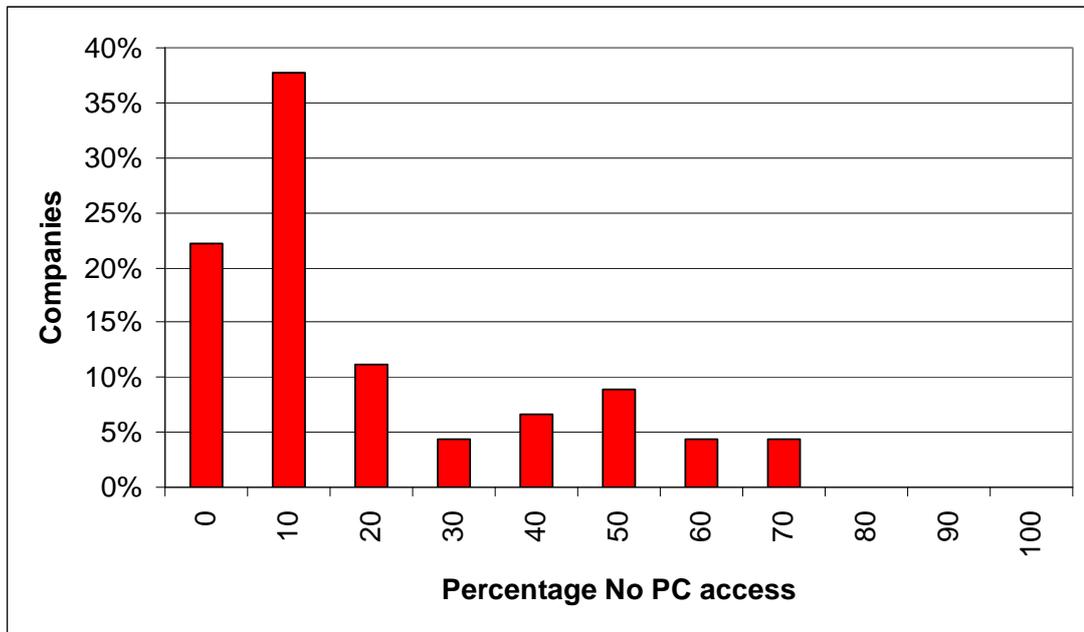


Figure 5A.178: Bar chart of Question 27c responses

Table 5A.203: Consolidated Responses to Question 27c.

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 32 | 9 | 4 | 0 |
| 71.11% | 20.00% | 8.89% | 0.00% |

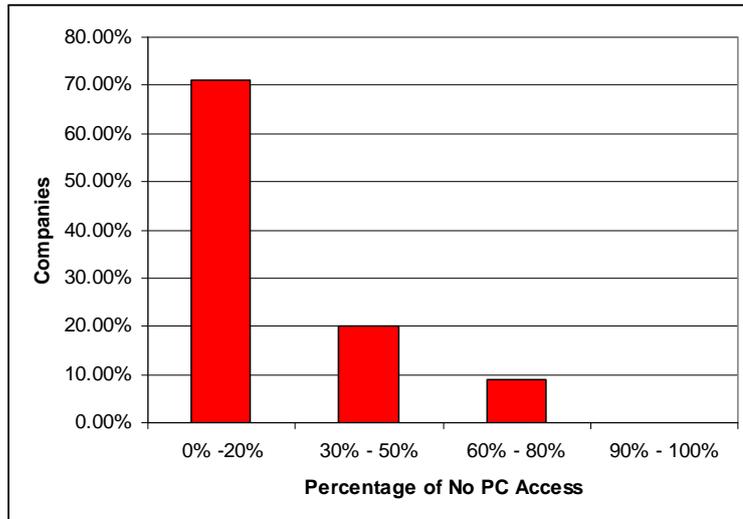


Figure 5A.179: Consolidated Bar chart of Question 27c responses

Appendix 5A.10.96: Responses to Question 28.a

Question 28: [What is] your organisation’s level of computer connectivity for construction sites.

Question 28.a: Approximately what percentage of construction sites have broadband connections?

Table 5A.204: Responses to Question 28a.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|--------|-------|--------|-------|--------|-------|--------|--------|--------|--------|-------|
| No. of Responses | 6 | 1 | 3 | 1 | 0 | 4 | 5 | 5 | 7 | 8 | 3 |
| Percentage | 13.33% | 2.22% | 6.67% | 2.22% | 0.00% | 8.89% | 11.11% | 11.11% | 15.56% | 17.78% | 6.67% |
| No. of Respondents | 43 | | Mean R | | 62.58% | | | | | | |

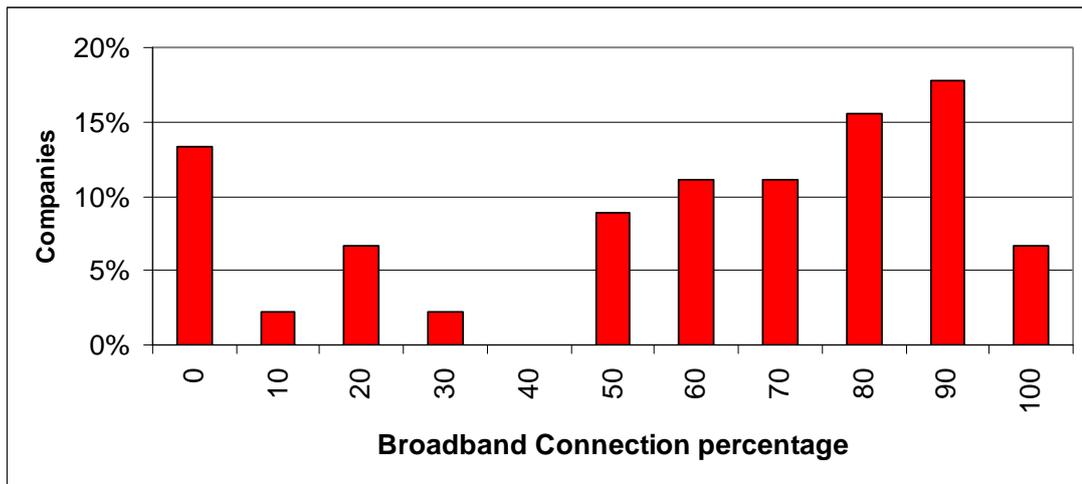


Figure 5A.180: Bar chart of Question 28a responses

Table 5A.205: Consolidated Responses to Question 28a.

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 10 | 5 | 17 | 11 |
| 22.22% | 11.11% | 37.78% | 24.44% |

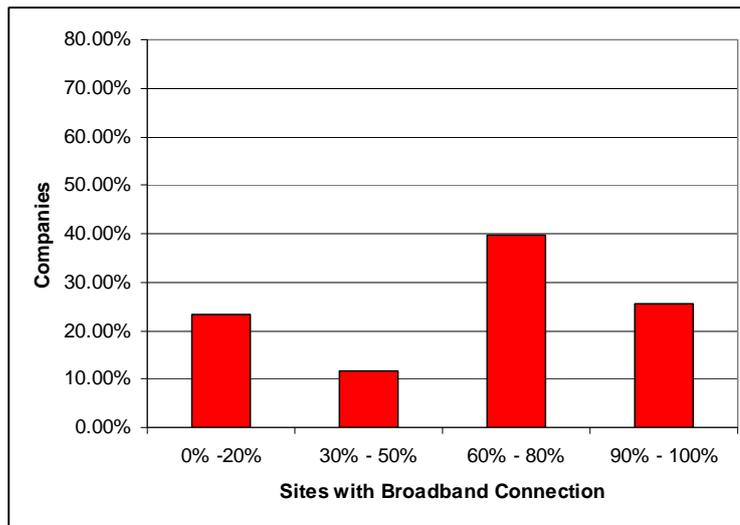


Figure 5A.181: Consolidated Bar chart of Question 28a responses

Appendix 5A.10.97: Responses to Question 28.b

Question 28.b: Approximately what percentage of construction sites have telephone based (modem) connections including ISDN?

Table 5A.206: Responses to Question 28b.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|--------|--------|--------|--------|--------|-------|-------|-------|-------|-------|-------|
| No. of Responses | 12 | 8 | 5 | 6 | 3 | 0 | 1 | 2 | 2 | 3 | 1 |
| Percentage | 26.67% | 17.78% | 11.11% | 13.33% | 6.67% | 0.00% | 2.22% | 4.44% | 4.44% | 6.67% | 2.22% |
| No. of Respondents | 43 | | Mean R | | 34.67% | | | | | | |

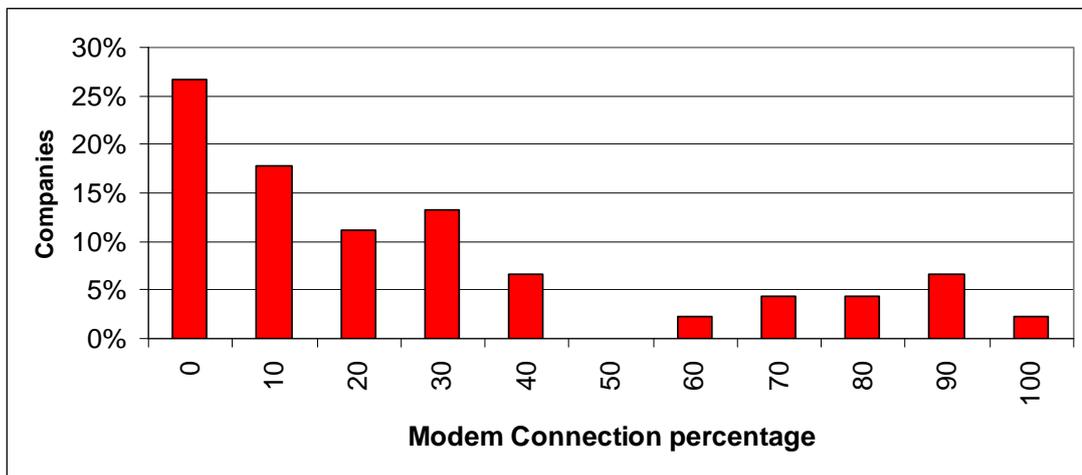


Figure 5A.182: Bar chart of Question 28b responses

Table 5A.207: Consolidated Responses to Question 28b.

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 25 | 9 | 5 | 4 |
| 55.56% | 20.00% | 11.11% | 8.89% |

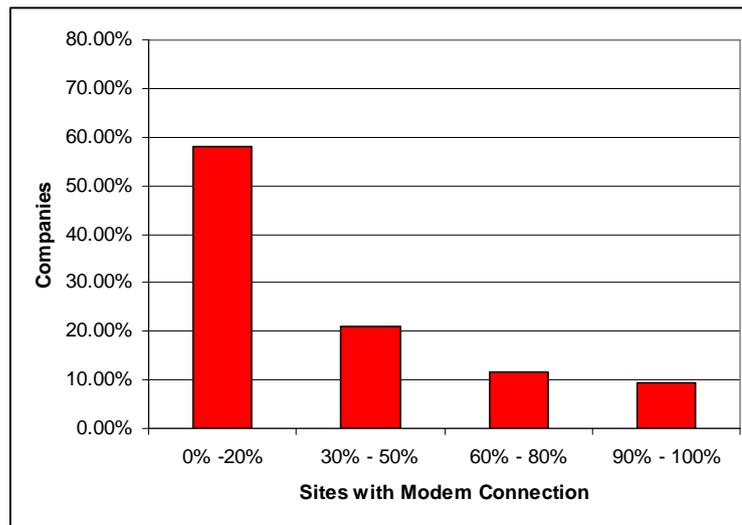


Figure 5A.183: Consolidated Bar chart of Question 28b responses

Appendix 5A.10.98: Responses to Question 28.c

Question 28.c: Approximately what percentage of construction sites does not have any form of connection?

Table 5A.208: Responses to Question 28c.

| | 0% | 10% | 20% | 30% | 40% | 50% | 60% | 70% | 80% | 90% | 100% |
|--------------------|--------|--------|--------|-------|--------|-------|-------|-------|-------|-------|-------|
| No. of Responses | 15 | 12 | 4 | 2 | 0 | 1 | 0 | 0 | 3 | 2 | 4 |
| Percentage | 33.33% | 26.67% | 8.89% | 4.44% | 0.00% | 2.22% | 0.00% | 0.00% | 6.67% | 4.44% | 8.89% |
| No. of Respondents | 43 | | Mean R | | 32.98% | | | | | | |

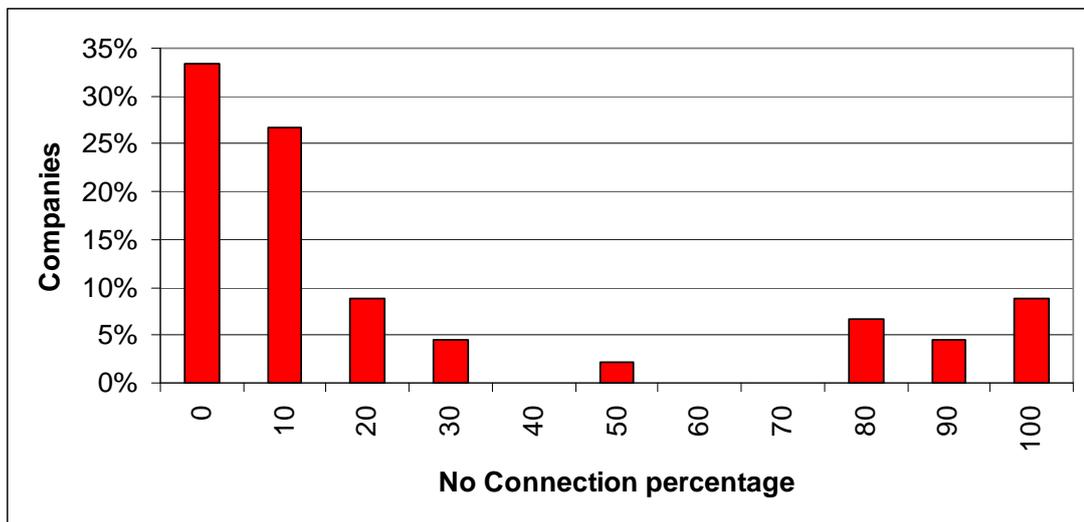


Figure 5A.184: Bar chart of Question 28c responses

Table 5A.209: Consolidated Responses to Question 28c.

| 0%~20% | 30%~50% | 60%~80% | 90%~100% |
|--------|---------|---------|----------|
| 31 | 3 | 3 | 6 |
| 68.89% | 6.67% | 6.67% | 13.33% |

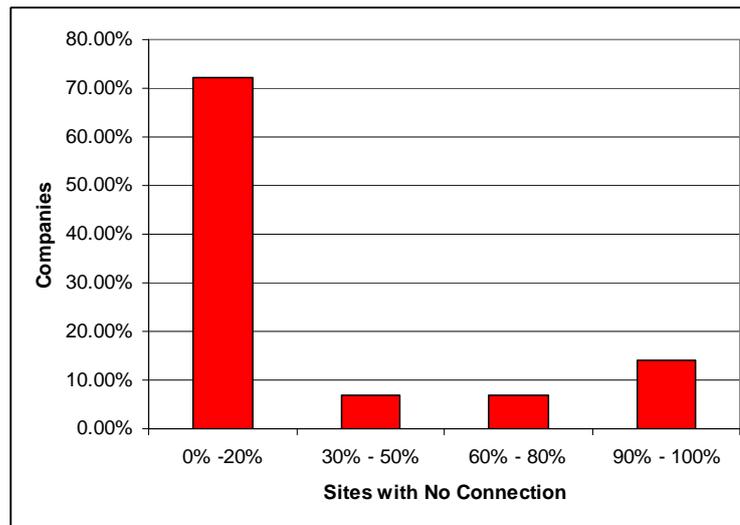


Figure 5A.185: Bar chart of Question 28c responses

Appendix 5A.11: Survey of the CPD requirements of the Principal Professional Institutions in the Construction Industry

Table 5A.210: Professional Institutions' Web addresses for CPD

| Institution | Web Address | Date Last Accessed |
|-------------|---|--------------------|
| ABE | http://www.abe.org.uk (No CPD page available. Restricted access to members only) | 04/01/2007 |
| BIFM | http://www.bifm.org.uk/bifm/careerdevelopment/personaldev | 04/01/2007 |
| CIAT | http://www.ciat.org.uk/membership/index.jsp?pid=79 | 02/10/2006 |
| CIBSE | http://www.cibse.org/index.cfm?go=home.show&pageid=69&topsecid=6 | 02/10/2006 |
| CIOB | http://www.ciob.org.uk/membership/continuingprofessionaldevelopment | 02/10/2006 |
| ICE | http://www.ice.org.uk/myice/myice_cpd.asp | 02/10/2006 |
| ICES | http://www.ices.org.uk/ices1000.htm | 02/10/2006 |
| ICWGB | http://icwgb.org/CPD1.htm | 01/01/2007 |
| IHIE | http://www.ihie.org.uk/index3.asp?cat=15&d=2&pageid=263745 | 03/01/2007 |
| IHT | http://www.iht.org/membership/professionaldev.asp | 03/01/2007 |
| IMBM | http://www.imbm.org.uk/ | 03/01/2007 |
| IPHE | http://www.iphe.org.uk/training/pd.html | 04/01/2007 |
| IStructE | http://www.istructe.org/membership/db/332.asp | 02/10/2006 |
| I-L | http://www.landscapeinstitute.org/ (No CPD page available. Restricted access to members only) | 04/01/2007 |
| RIBA | http://www.riba.org/go/RIBA/Member/CPD_495.html | 02/10/2006 |
| RICS | http://www.rics.org/Careerseducationandtraining/Lifelonglearning/Continuingprofessionaldevelopment/ | 02/10/2006 |
| RTPI | http://www.rtpi.org.uk/careers-and-membership/cpd/index.html | 01/01/2007 |

Table 5A.211: Miscellaneous Web addresses

| Institution | Web Address | Date Last Accessed |
|-------------|---|--------------------|
| APM | http://www.apm.org.uk/page.asp?categoryID=2&subCategoryID=20&pageID=0 | 15/01/2007 |
| ECUK | http://www.engc.org.uk/registration/professional_development/professional_development.aspx | 04/01/2007 |
| ICPD | http://www.cpdinstitute.org/ | 04/01/2007 |

Appendix 5A.11.1: Survey of the CPD requirements of the ABE

Table 5A.212: ABE CPD survey results

| | |
|--|--|
| Institution | ABE Association of Building Engineers  |
| No. of Members | 6,000 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | 35 hrs per year averaged over 3 years |
| CPD Requirement | <p>There are no limitations on the topics that can count for CPD other than that the subject should be related to:</p> <ul style="list-style-type: none"> - some part of the theory and practice of the member's professional discipline or - other aspect related to a member's current or potential employment or - personal or business skills designed to increase a member's management or business efficiency. <p>Anything which directly or indirectly assists you in ensuring that you give the best possible advice to your clients, provide the best technical or business support to your employer and become a better manager to your employees, will count.</p> <p>The Association does not validate courses. Whilst it issues CPD certificates for ABE events, the Association will not insist on them for proof of attendance.</p> |
| Recommended/ Acceptable CPD Activities | <p>How and Where</p> <p>On-the-job training is hard to beat given the right employer or range of practice. The boundary between normal work and structured private study may appear blurred. For instance, a detailed technical study carried out during normal work can qualify for CPD if structured to do so. However, the benefit to be derived from a combination of on and off the-job training has to be better than relying solely on one or the other.</p> <p>The following is an ideas list and is not considered to be exhaustive:-</p> <ul style="list-style-type: none"> Events - Lectures, seminars, conferences, technical visits. Courses - Short residential courses, evening courses, degree or diploma courses, etc. Distance Learning - CPD packages, correspondence courses, open university, open tech. etc. Personal Study - Properly directed aims with measurable outcomes, eg. learning a technique up to a specifiable standard; producing a book or technical article. Professional Affairs - Voluntary work for your profession. Participation in special working parties, reports, relevant committee meetings of professional bodies. Personal Development - Any activity which is intended to help the member to be a more effective person, eg. public speaking; "make the most of yourself" courses; interviewing skills; speed reading; leadership and offices held. |

| | |
|---|--|
| Formal Monitoring | Yes Random sample of 5% of membership |
| Sanctions for non-compliance | Yes: Disciplinary proceedings |
| Evidence of EISCCCIP compliance | No |
| Online CPD submission/recording | Yes |
| CPD Requirement information freely available | Some; Over-view only |
| CPD Documents, Guides, Templates, etc. freely available | No Access restricted to members only |
| Source | ABE website (2006) |

Appendix 5A.11.2: Survey of the CPD requirements of the BIFM

Table 5A.213: BIFM CPD survey results

| | | |
|---|--|---|
| Institution | BIFM British Institute of Facilities Management |  |
| No. of Members | 10,250 | |
| Formal CPD Requirement? | Yes | |
| Minimum Hour Requirement | No. | |
| CPD Requirement | Members can use the system to record their employment history, learning 'experiences' and create CPD certificates. A simple questionnaire allows you to rate yourself on the 20 BIFM competences and a plan shows areas where you might wish to improve your knowledge by undertaking further CPD and will also provide a link to BIFM CPD events that may be relevant. | |
| Recommended/ Acceptable CPD Activities | CPD such as attending BIFM Group events and short courses, reading journals, visiting exhibitions, and volunteering. Members will, also, have access to a wealth of development options within their own organisations and personal lives. Activities such as participating in company training programmes, mentoring or undertaking voluntary work can all help to build CVs and develop skills which are valued and respected in the workplace. | |
| Formal Monitoring | Only when applying for membership upgrade of corporate membership. | |
| Sanctions for non-compliance | No | |
| Evidence of EISCCCIP compliance | Yes – refers to CIC guidelines and has copies available on-line for members | |
| Online CPD submission/ recording | Yes | |
| CPD Requirement information freely available | Yes | |
| CPD Documents, Guides, Templates, etc. freely available | Yes Downloadable form website CPD guide On-line CPD recording facility CIC guidelines | |
| Source | BIFM website (2006) | |

Appendix 5A.11.3: Survey of the CPD requirements of the CIAT

Table 5A.214: CIAT CPD survey results

| | |
|--|---|
| Institution | CIAT Chartered Institute of Architectural Technicians  |
| No. of Members | c.7,500 |
| Formal CPD Requirement? | Yes Clause 8 of the Code of Conduct for Members |
| Minimum Hour Requirement | 35 hours annually. |
| CPD Requirement | <p>CPD needs are unique to each individual and the key words to be considered are 'personal professional development'. CPD is personal to you and should have relevance in your area of operation The following advice is offered for making the most of CPD opportunities:</p> <p>General You should:</p> <ul style="list-style-type: none"> • use CPD as a necessary (and stimulating) experience to develop new talents and skills • identify and honestly appraise personal shortcomings in your role as a professional in the field of Architectural Technology • consider interests and responsibilities • think about changes which affect you personally or the profession at large • appraise present tasks and performance • consider career development or transition to a new role • consider how you will develop corporate, personal, management and technical skills • define priorities; short, medium and long term needs • consider time and costs available • think laterally; CPD is not necessarily expensive • consider networking through CIAT and other professional meetings • find practical ways to meet your needs • expand on day-to-day maintenance of knowledge and skills • record and re-assess your CPD efforts on a regular basis • check progress and discuss with colleagues • modify and improve your plan as necessary • avoid down grading CPD to a hunt for CPD certificates |
| Recommended/ Acceptable CPD Activities | <p>Many members and their firms think that CPD can only be obtained by attendance at courses, this is a fallacy. For those members who are self-employed or work in small organisations, alternative forms of CPD are often preferable. CPD may be undertaken in a wide variety of ways. The following are some examples:</p> <ul style="list-style-type: none"> • employers' in-house discussions, research activities, inter-organisation studies, workplace training, systematic experimental learning • open distance learning (video packages, slide/tape packages, correspondence courses etc) • private study including systematic study of literature or even learning a relevant language • technical and professional conferences, lectures, seminars, workshops, study tours and short courses • courses leading to a professional qualification or academic award • preparing articles for publication • teaching (for those not in teaching posts) |

| | |
|---|---|
| | <ul style="list-style-type: none"> • practice (for those in teaching posts) • preparing papers and contributing to technical meetings and study groups • examining or tutoring |
| Formal Monitoring | Yes: Random sampling of members: 5% annually excluding students & retired members |
| Sanctions for non-compliance | Yes: Disciplinary proceedings. Monitor annually for next 5 years. If refuse to comply membership could be suspended for 1 year. |
| Evidence of EISCCCIP compliance | No |
| Online CPD submission/recording | No |
| CPD Requirement information freely available | Yes Institution website. |
| CPD Documents, Guides, Templates, etc. freely available | Yes: Downloadable from website: CPD record card CPD article. |
| Source | CIAT website (2006) |

Appendix 5A.11.4: Survey of the CPD requirements of the CIBSE

Table 5A.215: CIBSE CPD survey results

| | |
|--|--|
| Institution | CIBSE Chartered Institute of Building Services Engineers  |
| No. of Members | c.17,000 |
| Formal CPD Requirement? | Yes Code of Professional Conduct |
| Minimum Hour Requirement | No. Members to determine what is appropriate to their needs. |
| CPD Requirement | <p>The emergence of new demands and priorities in the profession – for example, using sustainable technologies – forces you to develop new professional competences. Changes in the law or Regulations mean not only updating yourself on what those changes are, but also understanding how they will impact on your practice.</p> <p>Equally, new challenges at work – a different type of client, unusual project specifications, an unfamiliar site – have the potential to broaden your experience and thus your professional effectiveness.</p> <p>Any organisational change, such as adopting a new IT system at work, entails training and learning for everyone and represents, at a personal level, important CPD.</p> <p>When you change job roles or move employers there is an even steeper learning curve. Often a new job brings increased responsibility for the work of others, and demands a rapid and systematic upgrading of your management skills. Increasing seniority will require leadership skills, as well as training, developing and mentoring others. All of these, if they are to be done well, demand new learning on your part.</p> <p>Aside from these external factors, your own decisions about career aims and aspirations will be decisive in shaping your CPD. Personal circumstances – where you live, and your family responsibilities, for example – will affect the pace and direction of your professional development.</p> <p>What you know about your own strengths and weaknesses will strongly influence the direction you take: sometimes an annual performance appraisal will prompt this kind of self-examination. It is a mistake to use CPD just to ‘fill the gaps’ in what you know and can do. Try to ensure that building on your strengths drives some of the development activities you choose</p> |
| Recommended/ Acceptable CPD Activities | <p>The following activities are a guide to what can be classified as CPD, but are not exhaustive:</p> <ul style="list-style-type: none"> A. On the job learning B. Private reading and study C. In-house conferences, etc D. CIBSE Regional or Group meetings E. CIBSE HQ technical meetings F. Academic studies including vocational qualifications, e.g. <i>technical; management; contract law; IT/computing; safety; languages</i> G. Professional institutional committee work H. Writing of papers and articles |

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| | <p>I. Occasional lecturing J. Distance learning K. Assisting and supporting others</p> <p>This guide reflects the new Engineering Council Code of Practice on CPD for registered engineers by which all registrants must abide. CIBSE members are obliged to maintain their technical and professional competence and support the development of others.</p> |
| Formal Monitoring | <p>Yes Random sampling of 100 members every 6 months.</p> |
| Sanctions for non-compliance | <p>No. But could affect applications for membership & changes of grades if CPD not undertaken and/or no records available. No other sanctions or disciplinary proceedings would be undertaken.</p> |
| Evidence of EISCCCIP compliance | <p>Yes</p> |
| Online CPD submission/recording | <p>No</p> |
| CPD Requirement information freely available | <p>Partly Institution website: Some access restricted to 'Members only'.</p> |
| CPD Documents, Guides, Templates, etc. freely available | <p>Yes: Downloadable from website CPD fact sheet CPD record sheet Member only access to website</p> |
| Source | <p>CIBSE website (2006)</p> |

Appendix 5A.11.5: Survey of the CPD requirements of the CIOB

Table 5A.216: CIOB CPD survey results

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|---|---|
| Institution | CIOB Chartered Institute of Building  |
| No. of Members | c.41,600 |
| Formal CPD Requirement? | Yes: Rule 13 of Rules of Professional Competence and Conduct |
| Minimum Hour Requirement | No. |
| CPD Requirement | All members are responsible for developing their own annual CPD plan, evaluating their CPD activities and keeping a record of the activities that they undertake. Compliance does not require a set number of hours. The amount of CPD you do will depend on your circumstances, and be appropriate for your responsibilities and ongoing development. |
| Recommended/Acceptable CPD Activities | Open distance learning (video packages, the internet, slide/tape packages, correspondence courses). Private study, including systematic study of appropriate literature or research, or even learning a relevant language. Technical and professional conferences, lectures, seminars, workshops, study tours, technical visits, and short courses. Courses leading to professional qualifications or academic awards. Writing articles for publication. Teaching (for those not in teaching posts). Practice (for those in teaching posts) Preparing papers and contributing to technical meetings and study groups. Examining, tutoring or mentoring. |
| Formal Monitoring | Yes: Random selection of members – 8% |
| Sanctions for non-compliance | Yes: Disciplinary proceedings, leading to suspension in non-compliance required. |
| Evidence of EISCCCIP compliance | Yes |
| Online CPD submission/recording | Yes |
| CPD Requirement information freely available | Yes Institution website |
| CPD Documents, Guides, Templates, etc. freely available | Yes. Downloadable from web-site: Action Plan Information Record template |
| Source | CIOB Website (2006) Telephone Conversation with Education Manager |

Appendix 5A.11.6: Survey of the CPD requirements of the ICE

Table 5A.217: ICE CPD survey results

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|--|--|
| Institution | ICE Institution of Civil Engineers  |
| No. of Members | c. 80,000 |
| Formal CPD Requirement? | Yes: Rule 5 of Rules of Professional Conduct |
| Minimum Hour Requirement | No. Formerly 5 days per annum. Now 'Enough to develop and maintain the professional knowledge, skills and competence that you need.' |
| CPD Requirement | At the heart of good CPD practice lies the truth that investment in your own learning and development is the most important investment you can make – so it is worth taking time out to make the best of it. How much CPD should you do? In the past, ICE indicated that five days per year was the requirement, and this is a good guide for those preparing for the Professional Review. But the profession has moved away from time-serving. For those who are qualified ICE members, a more mature answer is: ' <i>Enough to develop and maintain the professional knowledge, skills and competence that you need</i> '. |
| Recommended? Acceptable CPD Activities | The following activities may be recognised by the Institution of Civil Engineers as CPD activities. Please note that this list of activities is not exhaustive and other activities may be considered to be appropriate by the Institution when justified in development terms. <ul style="list-style-type: none"> • Learning on the job • Peer guidance and discussion • In house presentations • Attending trade exhibitions and systematically gathering information and knowledge to develop as an engineer • Structured reading (test your understanding of the reading material) • Work shadowing to add to your store of knowledge and expertise for routine tasks • Promoting engineering in primary and secondary schools • Technical presentations • Writing reports/writing for publication • Preparation of CPD presentations to colleagues and other professionals • Exposure to new situations at work which require action • Participating in careers conventions • Job secondment • Regional ICE events • Watching training videos and television programmes • Listening to training audio tapes and viewing CD-ROMs for research purposes and technical information • Participating in Institution activities such as acting as a Reviewer, a Student Liaison Officer or membership of Committees where new initiatives and ideas are discussed • Sharing knowledge and expertise with others • Attending allied professions events • Acting as a coach or mentor for a fellow professional • Lecturing at organised events • Research both on the job and for further qualification |

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| | <ul style="list-style-type: none"> • Teaching (for those not in teaching post) • Self-study through reading textbooks or study packs. • Personal learning from the internet • Validated and Accredited qualifications • Formal distance and open learning courses • Courses, conferences, seminars and workshops |
| Formal Monitoring | No. |
| Sanctions for non-compliance | None, but failure to undertake CPD would affect applications for membership & upgrading of membership which would be withheld until CPD satisfactorily undertaken. |
| Evidence of EISCCCIP compliance | Yes |
| Online CPD submission/recording | Not known |
| CPD Requirement information freely available | Institution website: Access restricted to 'Members only'. CPD guide (ICE 3006 - PDF) can be located by site search & downloaded. |
| CPD Documents, Guides, Templates, etc. freely available | No: Member only access to website |
| Source | ICE website (2006) |

Appendix 5A.11.7: Survey of the CPD requirements of the ICES

Table 5A.218: ICES CPD survey results

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| Institution | ICES Institution of Civil Engineering Surveyors  |
| No. of Members | c. 3,500 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | No. Up to individual member to decide what is relevant to their circumstances. |
| CPD Requirement | Members of the Institution have a professional duty to develop the skills and knowledge base of themselves and other practitioners within the profession. The Institution's definition of CPD is widely drawn and not prescriptive; so as to remain flexible enough to be relevant to all members at all career stages. It is, therefore, for individual members to choose an approach to CPD that will satisfy their own personal and professional needs and aspirations. Members should ensure that their CPD is managed in such a way as to be credible to other interested parties and will bring credit to the profession. |
| Recommended? Acceptable CPD Activities | <p>CPD activities may be structured, for example:</p> <ul style="list-style-type: none"> • In house courses and workshops. • External courses and workshops. • Vocational courses and workshops. • Seminars. • Conferences. • Distance and open learning qualifications. • Technical authorship. • Preparation of lectures for organised events. • Service on committees and technical panels. <p>CPD activities may be unstructured, for example:</p> <ul style="list-style-type: none"> • On the job research. • Experience of new and extended technologies. • Reading books, journals, professional magazines, technical papers and periodicals. • Browsing relevant industry websites and participating in e-learning activities and research. • Experience in the workplace, leading to a significant expansion of your knowledge base. <p>Members who are in countries or locations where structured CPD opportunities appear to be difficult to access are advised to take advantage of the wide range of unstructured CPD activities that are available to assist their professional development.</p> <p>You can participate in a wide range of CPD activities available through the Institution, including:</p> <ul style="list-style-type: none"> • Reading and/or preparation of a technical article in Civil Engineering Surveyor and other specialist publications. • Service on Institution committees and panels. • Attendance of national and regional Institution events. • Guest speaking at a national or regional Institution conference or seminar. • Attendance of an Institution training course or workshop. |
| Formal Monitoring | Yes: 100 members randomly selected every 6 months. Not eligible for reselection during next 3 years if selected. |

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| Sanctions for non-compliance | Yes Advice to comply with requirements, but not liable for suspension of membership. |
| Evidence of EISCCCIP compliance | Yes – Indirect PDP |
| Online CPD submission/recording | No |
| CPD Requirement information freely available | Yes Institution website: |
| CPD Documents, Guides, Templates, etc. freely available | Yes Institution website PDP forms |
| Source | ICES website (2006) Meeting with ICES Education, Training and Development Membership Officer (4/10/06). |

Appendix 5A.11.8: Survey of the CPD requirements of the ICWGB

Table 5A.219: ICWGB CPD survey results

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| Institution | ICWGB The Institute of Clerks of Works of Great Britain  |
| No. of Members | c. 2,200 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | None 'Quality is of far greater importance' |
| CPD Requirement | Almost anything that is of benefit to you professionally and, particularly, those matters that are an essential element of complying with the Institute's policy statement in relation to CPD. In order to remain credible and authoritative on site, all Clerks of Works must be fully conversant with the very latest materials, practices, statutory and other regulations, the Law, Health and Safety legislation and a whole host of other highly important topics. These elements are considered "essential" by ICW |
| Recommended/ Acceptable CPD Activities | Conference Seminars Workshops Technical Meetings Distance/Open Learning Videos Audio Tapes Private Study Including: Systematic Study of Literature Higher Degree Courses Preparing Articles for Publication Teaching, Lecturing, Tutoring Employers In-house Courses This list is only a guideline but any activity which contributes to increasing your professional knowledge, expertise and competence, will count towards CPD |
| Formal Monitoring | No |
| Sanctions for non-compliance | None |
| Evidence of EISCCCIP compliance | No |
| Online CPD submission/ recording | No |
| CPD Requirement information freely available | Yes: Institution website |
| CPD Requirement information freely available | Yes |
| Source | ICWGB website (2006) |

Appendix 5A.11.9: Survey of the CPD requirements of the IHIE

Table 5A.220: IHIE CPD survey results

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| Institution | IHIE Institute of Highway (Incorporated) Engineers  |
| No. of Members | c. 3,000 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | 10 days per 2 years |
| CPD Requirement | <p>During CPD days - which are compulsory for the IHIE Professional Review. You need to attend seven days of off-the-job education and training in the two years before sending your Incorporated Professional Review (IPR) submission. You need three CPD days for the Technician Professional Review (TPR). You are also expected to submit a Professional Development Plan for the review</p> |
| Recommended/ Acceptable CPD Activities | <ul style="list-style-type: none"> • Day to day resources in your ordinary work; colleagues, user groups, lunchtime seminars • Suppliers' promotional literature and seminars IHIE conferences and courses, with discounts for members • IHIE approved short courses and accredited providers • IHIE local branches; visits, meetings and seminars • Local college and university evening classes and short courses, which cover a wide range of topics • The Association of Planning Supervision and TTT offer planning supervision training • Technical press; "<i>Transportation Professional</i>" (formerly <i>H&T</i>) (ten times a year), <i>NCE</i> and <i>Surveyor</i> (both weekly), <i>Local Transportation Today</i> (every two weeks), <i>Traffic Engineering and Control</i> (monthly) • Royal Town Planning Institute's local branches publish CPD newsletters • DfT website for new codes and regulations • Institution of Civil Engineers website for details of local association meetings and courses • Thomas Telford Training (TTT) and PTRC have an extensive range of courses • City of Bath College Highways Open Tech offers specialist distance learning in EdExcel (BTEC) units and short courses • Open University provides materials in management and computing • Highways training centres in several counties offer maintenance, safety and management courses • OUVS provides NVQs in road safety, traffic engineering and systems management, transportation planning, transportation technical support, highway maintenance, management and technology management • EdExcel provides NVQs in design, planning supervision and site management • MANCAT, Manchester offers distance learning in road safety • The Television Education Network (TEN) Civil Engineering Programme; a subscription service for companies, offering videos and supporting packages |
| Formal Monitoring | Yes Random survey of 5% of membership |
| Sanctions for non-compliance | None CPD not obligatory other than for Professional review |
| Evidence of EISCCCIP compliance | Yes Personal development plan structure |
| Online CPD | No |

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| submission/ recording | Paper based survey only. |
| CPD Requirement information freely available | Yes Institution website |
| CPD Documents, Guides, Templates, etc. freely available | CPD Forms CPD Guides |
| Source | IHIE Website (2007) Telephone conversation with Membership manager (4/01/2007) |

Appendix 5A.11.10: Survey of the CPD requirements of the IHT

Table 5A.221: IHT CPD survey results

| | | |
|---|---|---|
| Institution | IHT Institute of Highways and Transportation |  THE INSTITUTION OF HIGHWAYS & TRANSPORTATION |
| No. of Members | c. 11,000 | |
| Formal CPD Requirement? | Yes | |
| Minimum Hour Requirement | At least 25 hours per year averaged over 3 years. | |
| CPD Requirement | <p>IHT recognises that individuals and employers are usually the best judge of their CPD needs and of the value of CPD activities they have undertaken. To this end, IHT stipulates quality and relevance as the key criteria for undertaking CPD, rather than mere quantity. Members are obliged to remain competent and up to date by undertaking whatever CPD activity best meets their development needs.</p> <p>IHT recognises that members may also participate in other professional bodies CPD schemes, and employer-run schemes. These are likely to meet IHT's CPD requirements. We will therefore include these within our monitoring process.</p> | |
| Recommended/ Acceptable CPD Activities | <ul style="list-style-type: none"> • courses leading to a relevant qualification e.g. NVQ; • attendance at relevant branch meetings; • distance learning packages; • structured (not routine) reading on particular themes or topics; • lecturing on topics that are relevant to your PDP objectives; • involvement in IHT's panels or acting as a consultant on topics of relevant professional interest; • secondment to a post which adds relevant knowledge and expertise; • giving presentations on CPD to colleagues; • giving careers presentations to educational establishments; • shadowing a colleague; and • taking an active part in IHT affairs as a member of a branch committee. | |
| Formal Monitoring | <p>Yes</p> <p>Random Sample of 10% membership annually</p> | |
| Sanctions for non-compliance | <p>Yes</p> <p>For members who are registered (ECUK) engineers. Could lead to suspension.</p> <p>No.</p> <p>For members who are not registered engineers. Would hope to persuade them to comply, but no formal sanctions would be taken.</p> | |
| Evidence of EISCCCIP compliance | <p>Limited;</p> <p>References to Personal Development Plans</p> | |
| Online CPD submission/recording | <p>No</p> <p>Will be joining ETB pilot scheme in near future.</p> | |
| CPD Requirement information freely available | <p>Yes:</p> <p>Institution website</p> | |
| CPD Documents, Guides, Templates, etc. freely available | <p>Some (limited)</p> <p>Institution website</p> <p>CPD record forms</p> | |
| Source | <p>Institution Website</p> <p>Telephone Conversation with Institute's Director of Education</p> | |

Appendix 5A.11.11: Survey of the CPD requirements of the IMBM

Table 5A.222: IMBM CPD survey results

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| Institution | IMBM Institute of Maintenance and Building Management  |
| No. of Members | c. 1,800 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | 20 hours per year |
| CPD Requirement | <p>The CPD requirement All members of the Institute will be expected to undertake and record twenty hours of CPD in any twelve month period. Individuals wishing to advance their level of membership will be required to provide a record or detailed resume of CPD activities undertaken in the previous twelve months. Those individuals holding Honorary, Retired and Affiliate member status are not subject to the Institute's CPD requirement.</p> <p>What is appropriate CPD? The appropriateness of any CPD activity will, in large part, be determined by the individual's particular learning needs, employment/industry role and career plans. In order to satisfy the Institute's CPD requirement any learning undertaken must align with the Institute's scope statement: "The scope of the Institute shall be those activities relating to the process of building maintenance, modification, conservation, restoration and repair including the associated engineering, building and support services"</p> |
| Recommended/ Acceptable CPD Activities | <p>Types of CPD Activity The Institute recognises two broad categories of CPD activity: Received CPD planned presentations, lectures, seminars, conferences etc. Initiated CPD planned research, reading, private study, preparing articles and papers for publication, preparing presentations</p> <p>Other forms of CPD include:</p> <ul style="list-style-type: none"> • Planned/structured visits to sites of interest where learning outcomes are relevant to the Institute's scope and are clearly identified e.g. historic buildings, renovation projects. • Structured debates, discussion evenings, forums, workshops etc. where the topic/content is appropriate to the Institute's scope and through participation relevant learning outcomes are clearly identified. <p>Education and Qualifications Individual's currently studying for qualifications which relate to the Institute's scope may record twenty hours of CPD in any twelve month period for the duration of their studies. Individuals currently working toward a National Vocational Qualification which relates to the Institute's scope may record twenty hours of CPD in any twelve month period for the duration of the assessment process. Qualifications which were completed more than twelve months ago will not be recognised as valid current CPD activity or achievement.</p> |
| Formal Monitoring | Yes Random selection of members 50% (carried at local branch level) |
| Sanctions for non-compliance | Not formally. Local branch to attempt to persuade member to comply. No formal disciplinary proceedings but Could not upgrade membership unless CPD requirement met. |
| Evidence of | No |

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| EISCCCIP compliance | |
| Online CPD submission/recording | No |
| CPD Requirement information freely available | Yes Institution website |
| CPD Documents, Guides, Templates, etc. freely available | Yes: Institution website: Guidance notes Recording sheets |
| Source | IMBM Website (2007) Telephone conversation with Education & Development Manager |

Appendix 5A.11.12: Survey of the CPD requirements of the IPHE

Table 5A.223: IPHE CPD survey results

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|--|---|
| Institution | <p>IPHE Institute of Plumbing and Heating Engineering</p>  |
| No. of Members | c. 12,000 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | 20 hrs minimum per annum |
| CPD Requirement | <p>The IPHE Professional Development Plan</p> <p>The IPHE Professional Development Plan (PDP) will help you achieve your work-related development aims in a systematic way. Refer to it throughout the year to see if you're meeting your plans and to update them as appropriate.</p> <ul style="list-style-type: none"> • Your PDP may reflect your individual professional development needs as a member of the plumbing profession and the business needs of your organisation. Here are some areas you may wish to pursue to meet your professional development needs: <ul style="list-style-type: none"> ○ Company awareness and/or networking with others ○ New technologies ○ The practicalities of running your business ○ Practical skills ○ The legal responsibilities of plumbers ○ Changes in the construction industry and the plumbing sector ○ Society's needs • If your circumstances change during the year, or you need to respond to a new project, amend your PDP accordingly. <p>Assessing your development aims</p> <p>In completing your PDP, you might also wish to consider:</p> <ul style="list-style-type: none"> ○ Career development needs ○ Job description, requirements and workload ○ Your long-term goals ○ Experience since qualification ○ Degree of specialisation ○ How much time you can devote to individual activities ○ Level of achievement you are aiming for ○ The most convenient and interesting learning formats for you |
| Recommended? Acceptable CPD Activities | <p>Formal PD General PD</p> <p>Examples: IPHE area or Branch events IPHE PD Providers Scheme events and materials Allied construction institutions' PD events PD clubs and self-help groups Teaching</p> |

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| | <p>Plumbing practice (for those normally in teaching) Courses, seminars, workshops and conferences In-house organised lectures, seminars or workshops Writing for commissioned publication</p> <p>General PD Examples: IPHE PD information in P&HE magazine and Distance Learning Partnership modules Informal in-house PD presentations Reading, taking reference notes and in-depth project research Training videos and television programmes unless connected to a course or seminar Committee meetings Shadowing and mentoring Manufacturers' technical presentations, or providers who are not included on the list of approved IPHE PD Providers' Scheme assessed materials Other Distance Learning programmes Study tours Visits to sites other than your own Visits to relevant exhibitions Outreach to schools</p> |
| Formal Monitoring | No |
| Sanctions for non-compliance | No |
| Evidence of EISCCCIP compliance | No |
| Online CPD submission/recording | No |
| CPD Requirement information freely available | Yes |
| CPD Documents, Guides, Templates, etc. freely available | Some: Institution website CPD record sheet |
| Source | IPHE website (2007) |

Appendix 5A.11.13: Survey of the CPD requirements of the IStructE

Table 5A.224: IStructE CPD survey results

| | |
|--|---|
| Institution | IStructE Institution of Structural Engineers  |
| No. of Members | c. 20,000 |
| Formal CPD Requirement? | Yes. Rules of Conduct |
| Minimum Hour Requirement | No. Recommendation of 20 hrs minimum per year. |
| CPD Requirement | Yes. All members requested to submit an annual return. Participation recommended but not mandatory. |
| Recommended? Acceptable CPD Activities | Learning should be an integral part of experience. Individuals need to use the demands and challenges of their job to improve and develop their skills and knowledge. Additional structured CPD is required to complement on-the-job learning. The amount of CPD which should be carried out by an individual engineer depends on a number of factors, these include: <ul style="list-style-type: none"> • The rate of change of the relevant technology • Changes in markets, legislation, etc • The specific requirements of his/her job • The career aspirations and age of the individual • Recommendations of professional institutions It is not sensible to lay down a prescribed target of CPD for all engineers. It is the responsibility of every individual to determine, in conjunction with his/her employer, the appropriate amount of CPD to be carried out. However, as a guide, 20 hours of CPD each year is the recommended minimum proposed by the Institution. |
| Formal Monitoring | Attending courses is only one of a number of ways of undertaking CPD. Although much value may be gained from investment in a tailored course based on organisation and business needs, there are other appropriate activities including: <ol style="list-style-type: none"> 1. In the course of professional activities <ul style="list-style-type: none"> • Work-based learning • Work shadowing • Preparation and delivery of presentations/lectures • Preparation of articles and refereed papers • Mentoring young engineers in your work place 2. Specific training activities <ul style="list-style-type: none"> • Post graduate programmes/qualifications • NVQ / SVQ. • Courses, conferences and seminars - the Institution's programme of courses, conferences and seminars provides one-day and half-day events covering technical, management and law topics • In-house training • Distance learning programmes - Einstein Network training video's are suitable for CPD according to the Institution's guidelines. For further details please phone 020 7693 7777 or log on to the website at www.thecivilengineerschannel.co.uk for a free trial. • Attendance at Institution meetings and events including Branch activities 3. Horizon broadening activities <ul style="list-style-type: none"> • Involvement in a Professional Institution committee (e.g. Branch and Institution |

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| | committees, informal study groups, Chartered Membership Examiner/Reviewer) <ul style="list-style-type: none"> • Community and public service involvement (e.g. careers talks to schools, involvement in community clubs) |
| Evidence of EISCCCIP compliance | Yes |
| Online CPD submission/recording | No |
| Sanctions for non-compliance | None |
| CPD Requirement information freely available | Yes. Institution website |
| CPD Documents, Guides, Templates, etc. freely available | Yes: Downloadable from website: Record forms Guidance notes Example forms (good & bad practice) |
| Source | IStructE website (2006) |

Appendix 5A.11.14: Survey of the CPD requirements of the L-I

Table 5A.225: L-I CPD survey results

| | |
|--|---|
| Institution | L-I Landscape Institute  |
| No. of Members | c. 5,000 |
| Formal CPD Requirement? | Yes |
| Minimum Hour Requirement | 20 hours |
| CPD Requirement | The Council believes that CPD is essential for compliance with the Institute's Code of Conduct and Royal Charter. (Full text of both can be found on the Institute's website at www.landscapeinstitute.org/aboutus) Council therefore asks every member to accept the obligation to carry out a minimum of 20 hours CPD per annum, in an organised and recorded format on the Personal Record Sheet in accordance with the guidelines printed on that document. If you are unemployed or not currently practising, you are still obliged to undertake a minimum of 20 hours of CPD per year. This will demonstrate your commitment to maintaining your professional competence and your continuing desire to play a role within the profession. |
| Recommended? Acceptable CPD Activities | CPD may take the following form: a. Attendance at conferences, workshops, seminars, lectures and the like organised by the Institute. The Council intends that a number of these should be arranged each year as a function of the Secretariat and its Committees, including Branches. It expects that a majority of Branch events would be CPD in character to include in the summer months guided visits. The Council will assist with advice and finance: branches must encourage as much participation and help with organisation by members as possible. b. Similar events and short courses, organised by academic bodies, other professional institutes and various organisations, official and voluntary, that have similar interests. Some of these are periodically noted in Landscape Institute publications, Landscape, Vista, E-Vista and on LI websites. c. Discussions, talks and visits organised by practices. Some already have well organised and regular events of this kind. All are encouraged to follow suit. Members of staff can share their experience and expertise. Office libraries can be made readily available for personal study and stocked to meet staff needs. Research and information gathering for the purpose of a particular job or to add to the office stock of expertise can count as CPD. d. Individual study, mainly by reading and by visits to sites. Both are more effective if analysed and recorded for future reference, to fill obvious gaps in knowledge, to develop new interests and to respond to the needs of current work. The Institute's extensive Library and Information Services (see website for details) exist to help this sort of activity; and the Council will extend and improve these in response to member's suggestions |
| Formal Monitoring | No |
| Sanctions for non-compliance | Not known |
| Evidence of EISCCCIP compliance | None |
| Online CPD submission/recording | No |
| CPD Requirement information | Yes |

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| freely available | |
| CPD Documents, Guides, Templates, etc. freely available | Yes - downloadable CPD guide CPD record sheets |
| Source | L-I website (2006) |

Appendix 5A.11.15: Survey of the CPD requirements of the RIBA

Table 5A.226: RIBA CPD survey results

| | | |
|--|---|---|
| Institution | RIBA Royal Institute of British Architects |  |
| No. of Members | c. 30,000 | |
| Formal CPD Requirement? | Yes. | |
| Minimum Hour Requirement | <p>Yes:</p> <p>A Minimum of 35 hours per year comprising:</p> <ul style="list-style-type: none"> • At least 17.5 hours per year from the RIBA's prescribed core curriculum for CPD • At least 2 hours per year from the Health and Safety CPD • At least 15.5 hours of professional development in other subjects relevant to your own CPD needs | |
| CPD Requirement | <p>All members to:</p> <ul style="list-style-type: none"> • Record activity via the RIBA's CPD record sheet (preferably online) • Plan CPD via the RIBA's professional development plan (preferably online). <p>Valid CPD is any learning activity that contributes to your ability to practice architecture or to competently manage your practice is valid CPD.</p> <p>You are required to do 19.5 hours each year in the RIBA's core curriculum for CPD, including a minimum of 2 hours from the Health and Safety CPD. However, the subjects of your remaining 15.5 hours of the yearly quota are entirely up to you, as long as they contribute to your abilities as an architect.</p> <p>We ask that wherever possible you aim for half as structured CPD. Structured CPD is generally anything course related.</p> <p>However, we recognise that fulfilling the requirement for structured CPD is not always possible – for example, if you are on maternity leave, sick for a long while, or working alone in a remote location. If this is the case, we would ask you inform us of your circumstances if you are chosen by random sample to supply evidence of CPD undertaken.</p> | |
| Recommended? Acceptable CPD Activities | <p>Types – some ways of doing CPD. You may think of others not on this list.</p> <p>Structured CPD Examples:</p> <ul style="list-style-type: none"> • RIBA regional or branch events • RIBA CPD Providers Network events and materials • Allied construction institutions' CPD events • CPD clubs and self-help groups • Teaching (for those normally in practice) • Practice (for those normally in teaching) • Courses, seminars, workshops and conferences • Online learning • Distance learning • Relevant second degrees • Courses leading to diplomas or certificates • In-house organised lectures, seminars or workshops • Writing for commissioned publication <p>General CPD Examples:</p> <ul style="list-style-type: none"> • RIBA CPD modules in RIBA Journal • Reading, taking reference notes and in-depth project research • Training videos and television programmes | |

| | |
|---|---|
| | <ul style="list-style-type: none"> • RIBA, BRE, BSI or similar committee meetings • Volunteering for Architecture Week, Architect in the House or CRASH • Shadowing and mentoring • Study tours • Visits to sites other than your own • Visits to relevant exhibitions • Outreach to schools |
| Formal Monitoring | Yes Random sample of 5% of membership. |
| Sanctions for non-compliance | Yes. Disciplinary proceedings. |
| Evidence of EISCCCIP compliance | Yes Personal development Plans |
| Online CPD submission/recording | Yes |
| CPD Requirement information freely available | Yes Institution website |
| CPD Documents, Guides, Templates, etc. freely available | Yes: Downloadable from website: Record forms (members only) |
| Source | RIBA website (2006) |

Appendix 5A.11.16: Survey of the CPD requirements of the RICS

Table 5A.227: RICS CPD survey results

| | |
|--|---|
| Institution | RICS Royal Institution of Chartered Surveyors  |
| No. of Members | c. 110,000 |
| Formal CPD Requirement? | Yes. Rules 35-40 of the Rules of Conduct 2004 |
| Minimum Hour Requirement | Yes: The obligation to undertake CPD or lifelong learning requires RICS members to achieve a minimum of 60 hours learning every three years, with at least ten hours completed each year |
| CPD Requirement | Yes In order to help you track your CPD, we recommend two ways to keep a well organized record. <ol style="list-style-type: none"> 1. Utilize the personal development plan (PDP) on the members only section of RICS.org. This allows you to look ahead and set out your objectives. It helps you realize the actions and activities you need to take to achieve them. 2. Maintain a record of your personal progress by recording all of your achievements. This should be a full record of the action and activities you have undertaken, together with their respective outcomes. Your record must demonstrate that you have thoroughly reflected on your accomplishments to date, carefully assessed your present situation and coherently planned your future professional development. Participating in continuing education is a commitment to being professional, keeping up-to-date and continuously seeking to improve your knowledge. It allows you to keep up with the latest professional standards and practices, while also keeping track of your own levels of skills. To maintain your credibility, as well as your RICS credentials, you must be able to evaluate your current knowledge, skills and experience, as well as assess your current capabilities and performance. The next step is to explore how best to overcome your limitations and improve your performance. With continued professional development (CPD), you start your own course and manage your own progress. Planning, recording and reflecting is the answer to a successful CPD. |
| Recommended? Acceptable CPD Activities | This section provides a checklist of some activities or events from which you may be able to obtain a learning outcome. These sources can be grouped into four main categories: <ol style="list-style-type: none"> 1. Professional work-based activities 2. Self-directed and informal learning 3. Personal activities outside work 4. Courses, seminars and conferences Work-based activities (on-the-job development) <ul style="list-style-type: none"> • business management skills • coaching/mentoring • personnel management skills • planning and running an in-house training event • internal discussion groups • adviser/consultancy positions • arbitrator/expert witness/adjudicator • professional interviews • voluntary (professional) work |

| | |
|---|--|
| | <ul style="list-style-type: none"> • special project work • staff training • study of a foreign language may be relevant if you work in an international context • information technology • secondment – transfer to another department <p>Professional Meetings, Panels and Working Groups</p> <ul style="list-style-type: none"> • faculty and forum work • course accreditation exercises • APC/ATC assessor preparation • NVQ assessor/internal verifier training • external examiner positions • regional officer ie organisational skills |
| Formal Monitoring | Yes Random sample aiming for 10% of membership annually. |
| Sanctions for non-compliance | Yes. Advice in first instance. Failure to comply could lead to disciplinary proceedings, ultimate sanction - suspension of membership. |
| Evidence of EISCCCIP compliance | Yes |
| Online CPD submission/recording | Yes |
| CPD Requirement information freely available | Yes Institution website |
| CPD Documents, Guides, Templates, etc. freely available | Yes: Downloadable from website: Personal Development Planner CPD online recording user guide |
| Source | RICS website (2006) |

Appendix 5A.11.17: Survey of the CPD requirements of the RTPI

Table 5A.228: RTPI CPD survey results

| | |
|--|---|
| Institution | RTPI Royal Town Planning Institute  |
| No. of Members | c. 19,700 |
| Formal CPD Requirement? | Yes Clause 1(a) of the Code of Professional Conduct |
| Minimum Hour Requirement | 50 hrs over 2-year period |
| CPD Requirement | <p>Every corporate member, Legal Associate, Technical Member and academically qualified Student shall, subject only to the exercise of the Council's discretion in exceptional cases:</p> <ul style="list-style-type: none"> (a) at least once a year prepare a professional development plan for the next two years identifying his or her personal professional development needs; (b) in any two year period undertake a minimum of 50 hours CPD activity related to the undertaking or managing of town planning; (c) maintain a written record of his or her CPD activity; (d) submit to the Institute on request and in such form as may be prescribed by the Institute: <ul style="list-style-type: none"> (i) a copy of his or her professional development plan or plans covering the previous two years; (ii) a written record of his or her CPD activity over the same period of two years, with an assessment of the value to him or her of each activity recorded and an explanation of the relationship between the CPD undertaken and the professional development plan or plans covering the period in question, taking into account any revisions to the plan made during the two year period; (iii) a copy of his or her current professional development plan, if not already submitted under (i) above. (iv) where appropriate, an explanation of his or her reasons for not having complied with any part of this regulation. |
| Recommended? Acceptable CPD Activities | <p>Members often think of CPD as being limited to seminars, conferences and courses. But there is a wide variety of ways of doing CPD, including:</p> <p>H* home-based learning such as distance learning packages, systematic study or structured reading on particular themes or topics (but not routine reading of the technical press, which the Institute considers should form part of members' everyday professional activities);</p> <p>A* action-based learning (there are various definitions of action-based learning. In this context it means a learning process involving a systematic, structured approach to the identification of problems in the work place and the search for solutions, with clear benefit to the individual member in terms of meeting the personal CPD needs identified in his or her PDP);</p> <p>M* the preparation of material for courses, technical meetings or publication in the technical press;</p> <p>R* supervised and academic research;</p> <p>W* background reading, research or preparation required in order to tackle a new area of work, such as teaching, for those in practice; practice, for those in teaching; or secondments and job exchanges (but not the day to day work in these new areas);</p> <p>P* RTPI activities of a technical or professional nature, e.g. involvement in specialist working parties or panels, planning aid work, or acting as a consultee on topics of professional interest (membership of a branch executive committee or of the Institute's Council would not normally count in themselves, but</p> |

| | |
|---|--|
| | <p>preparation of or participation in discussion of professional issues related to the needs identified in your PDP could do so);</p> <p>C* conferences, seminars, workshops and other technical and professional events and meetings, including in-house training;</p> <p>Q* courses leading to a qualification, including for example an N/SVQ.</p> <p>(*You are asked to use these codes on your CPD record to help the Institute identify the different modes of CPD which members are undertaking.)</p> <p>These different kinds of activity are all acceptable CPD, provided they are related to planning work, relevant to your needs and effective in making you more competent.</p> |
| Formal Monitoring | <p>Yes</p> <p>Random sampling of 2% of membership</p> |
| Sanctions for non-compliance | <p>Yes:</p> <p>Disciplinary action leading to suspension.</p> |
| Evidence of EISCCCIP compliance | <p>Yes – indirect</p> <p>PDP</p> |
| Online CPD submission/recording | <p>No</p> |
| CPD Requirement information freely available | <p>Yes</p> <p>Institution website</p> |
| CPD Documents, Guides, Templates, etc. freely available | <p>Yes:</p> <p>Institution website</p> <p>Professional Conduct Advice Note 1: Continuing Professional Development</p> |
| Source | <p>RTPI website (2007)</p> |

Appendix 5A.12: The Minerva Project

For the past thirteen years the author has been involved in running a unique Masters Degree programme, firstly as deputy course leader and latterly as course leader. The programme, originally entitled MSc in European Construction Management, recently changed to MSc in International Construction Management, had its origin in an Erasmus funded undergraduate student mobility programme of the 1980s and 1990s.

Under the Erasmus mobility programme four institutions, namely:

- Nottingham Polytechnic, UK (now Nottingham Trent University);
- Waterford Region Technical College, Ireland (now Waterford Institute of Technology);
- Universit  de Savoie, Chamb ry; France [withdrew from the programme in 2000]
- Fachhochschule Karlsruhe; Germany (now Hochschule Karlsruhe Technik und Wirtschaft).

ran an intensive exchange study week giving undergraduate students the opportunity not only to study the construction industry of other European countries in addition to their own, but also to work with construction management students from those countries, thus promoting the ideal of European integration and mobility. So successful was this exchange programme that it was kept going long after the original Erasmus funding ceased. The exchange programme finally ceased in 2001 when NTU could no longer afford to participate.

Out of this hugely popular and successful exchange programme came the idea for a joint Masters degree programme to enable practicing construction management professionals to both study in depth the construction industry of other European countries and to live in those countries, thus experiencing the language and culture of those countries, thus promoting the mobility of construction professionals within Europe. Students spent the first term of the course study and living in Nottingham, the second term was spent in Waterford, and for the third term students could either go to Chamb ry or to Karlsruhe. A fourth term was spent at an institution of the student's choice (where the language was not the native language of the student) to

complete a dissertation. This effectively meant that all students had to be at least bilingual. The first cohort of ten students graduated in 1993. Part of the original ethos of the course was that each partner would ideally recruit four or five students, mid-career professionals, to the course to give an equitable national and professional balance. This ideal was never achieved, with both British and Irish being particularly difficult to attract to the course due to the inherent lack of second language ability found in these nations, and also to the unwillingness or inability of mid-career professionals to take a one-year sabbatical from their employment to study.

The course did however attract a lot of interest from students, not only from within Europe but from around the world. It was found that most applicants were not mid-career professionals but recent graduates typically with two or three years industry experience looking to further their career prospects by gaining a higher degree. It was also noticed that as the course progressed that there was an increasing level of enquiry from potential applicants in industry wanting to undertake the course either part-time or preferably on a distance-learning basis. Thus a whole new market was beginning to appear.

In 2003 after a long period of discussion between the partners and feedback from graduates of the programme the course was re-specified to:

- make the English language the language of study for the course in all institutions;
- make provision for both part-time and distance learning pathways;
- provide postgraduate certificate and postgraduate diploma pathway options;
- comply with changes in NTU's postgraduate course regulations.

The change of course language to English in all institutions was made to make the course more attractive to overseas students whose first language was not one of those of the partner nations, but who already had English as a second language. This change had an immediate impact on the course as twenty-two students (the highest number ever) were recruited from around the world. However a cruel blow was struck in late October 2003 when new regulations in Ireland were introduced for

student visas. These regulations were to be effective immediately. Until this time the course had recruited students from around the world, and none had had any problems in obtaining a student visa for Ireland, as process that had normally taken around three weeks to complete. The new regulations effectively closed the door on non-EC students obtaining visas to study in Ireland, or having to wait up to two years for a visa to be granted. Seven of the twenty-two students who had made visa applications for Ireland found their applications affected by the new regulations and were either refused visas or received little or no information about their applications. By the end of the first term it became known that it would take at least twelve months to obtain a visa. Thus at the end of the first term seven students became 'stranded' in Nottingham, unable to continue with the course in Waterford.

As the new visa regulations had been introduced in Ireland without prior notice, and after the students had started the course in Nottingham the partners felt obliged to make what plans they could to accommodate the students and continue with the course in Nottingham until the students were able to rejoin the course in Karlsruhe for the third term. None of the seven students had any problems in obtaining visas to study in Germany. After a great deal of discussion and due to the immediacy of the problem it was decided to install a web-based video link between Waterford and Nottingham. Lectures in Waterford were delivered to Nottingham via a live web-cast (see appendix xx in document 1).

In parallel to the course developments the author, as course leader for the NTU component of the course, and the course leader of the WIT component of the course, John Wall, had a common interest in the development of e-learning and the use of ICT to support learning, local and distance, which it was believed would play a pivotal role in the delivery of the MScICM course by both part-time and distance learning pathways.

In 2002 a joint bid was submitted through WIT in 2002 for European funding under the Socrates-Minerva scheme to develop the course through a distance-learning and also to provide a CPD option. The bid made it through the selection processes the

final round, but was then rejected. The EU was supportive of the proposal and recommended that the bid be resubmitted in an amended format in line with their feedback and suggestions. The bid was amended in accordance with the advice and feedback about the application given by the EU, and resubmitted in 2003. The revised bid was rejected in the first round. In 2004 it was decided to make one last attempt to secure funding. Additional partners to the bid were recruited in the form of Istanbul Technical University (ITU), Turkey and Multimedia Instructional Design (MID), a specialist multi-media educational software provider based in Waterford, Ireland. In October 2005 the partners were notified that the bid had been successful, although full funding had not been obtained. In November 2005 the partners were notified that 75% funding for the bid had been approved amounting to €237,000, of which €78,000 would be contributed by the EU and the balance of €99,000 to be contributed by the partners. The inaugural meeting of project partners took place at the Institute of Irish Engineers in Dublin on Tuesday 29th November 2005, see Figure 5A.182 below.



Figure 5A.182: The Minerva Project Participants.
From Left to Right: Frank McNamee (MMID), Prof. Andreas Luckey (HS-KA), John Wall (WIT), Alan Hurst (NTU), Prof Harald Garrecht (HS-KA), Prof. Alaatin Konoglu (ITU)

For more information about the project visit the project web-site at:

<http://www.cpd-construction.com>

**Nottingham Trent University
The Nottingham Business School**

Doctor of Business Administration Programme

***Management Education, Training and
Development of Construction Managers -
Will They Ever Learn?***

Review

Document 6

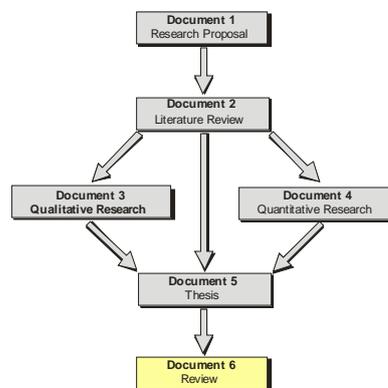
**A.G. Hurst
N0013040
October 2009**

**NOTTINGHAM
TRENT UNIVERSITY** 

This document is submitted in fulfilment of Document 6, being a partial fulfilment of the Doctor of Business Administration programme.

Document 6: Review

Title: Management Education, Training and Development of Construction Managers - Will They Ever Learn?



Supervisors: Professor Alistair Mutch
Professor Myra Hodgkinson

October 2009

A.G. Hurst MSc, MBA, MCIQB, MAPM, MCMI

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6.0.3 List of Acronyms and Abbreviations

| | |
|----------|--|
| ARCOM | Association of Researchers in Construction Management |
| BEECON | Built Environment Education Conference |
| BSc | Bachelor of Science |
| CIB | International Council for Research and Innovation in Building and Construction |
| CIB-TG62 | CIB Task Group 62: Complexity and the Built Environment |
| COBRA | Construction, Building and Real Estate Research Conference |
| DBA | Doctor of Business Administration |
| Gb | Gigabyte |
| GHz | GigaHertz |
| HDD | Hard Disk Drive |
| HEFCE | Higher Education Funding Council for England |
| HND | Higher National Diploma |
| IACR | International Association for Critical Realism |
| IJAEDM | International Journal of Architecture and Engineering Design Management |
| JCR | Journal of Critical Realism |
| KAI | Kirton's Adaptor-Innovator Inventory |
| LSQ | Learning Styles Questionnaire (Honey and Mumford) |
| Mb | Megabyte |
| MBA | Master of Business Administration |
| MBTI | Myers-Briggs Type Inventory |
| MSc | Master of Science |
| PC | Personal Computer |
| SPSS | Statistical Package for Social Sciences |
| UCAS | Universities Central Admission Service |
| USB | Universal Serial Bus |

6.0.4 Acknowledgement of Trademarks

| | |
|--------------|---|
| EndNote | is a registered trademark of Thompson Inc. |
| MS Access | is a registered trademark of Microsoft Corporation Inc. |
| MS Excel | is a registered trademark of Microsoft Corporation Inc. |
| MS Word | is a registered trademark of Microsoft Corporation Inc. |
| RefViz | is a registered trademark of Thompson Inc. |
| SPSS | is a registered trademark of SPSS Inc. |
| SyncToy | is a registered trademark of Microsoft Corporation Inc. |
| Visual Basic | is a registered trademark of Microsoft Corporation Inc. |

6.1 Introduction

This document is intended as a personal reflection on my journey through the DBA, a journey to realise an ambition that started many years ago.

Not having a first degree, my first introduction to the academic world of higher education was in 1983/84 when I undertook an MSc in Construction Management at Reading University. Here I was exposed to a whole new world of academic research, lecturers and researchers with international reputations, including Bill Biggs, Colin Grey, Roger Flannigan and Brian Atkin and a community of research assistants including Mike Bresnen and Stuart Green whose work I found fascinating. Many of them have gone on to establish international research reputations and now hold professorships at various institutions. It was here that I was also to meet Norman Fisher (now Professor of Construction Management) and later Bob Newcombe, both of whom had been lecturers at Guildford County College of Technology where I had completed my HND and Diploma studies in the 1970s.

In 1991, seven years after having gained my MSc, I decided to undertake an MBA with the Open University Open Business School with the eventual aim of moving from industry into academia. That move came much sooner than expected following redundancy in 1991, just after having started my MBA, due to the severe recession the construction industry. I was fortunate to obtain the position of Senior Lecturer in Construction Management what was then Nottingham Polytechnic, now Nottingham Trent University. Having completed my MBA in 1994, I was keen to continue the research I had undertaken for my MBA into ‘the culture of the UK construction industry’ as a PhD. Support for this was not forthcoming as at that time it was (allegedly) departmental policy only to support staff studying up to Masters level, together with an oft quoted edict of “academic staff are employed to teach, not carry out research - if research is required research assistants will be employed”. After three years of trying to obtain support to undertake a PhD and being refused, the effort was abandoned.

By chance, in 2001 our Faculty and the Business School shared the same post-graduate graduation ceremony. Here I witnessed one of the first cohorts of DBA students to graduate, including a colleague, David Flemming, from the Department of Surveying in our Faculty. Being unaware of existence of such a qualification I immediately investigated the DBA as a possible alternative to a PhD, and was immediately attracted to the course, as its structured nature was more appealing to me than the PhD route. A second piece of good fortune was that due to an impending internal reorganisation funding suddenly became available. Having discussed the course with both David Flemming and Colin Fisher (the DBA course leader) I approached the Dean of Faculty for support as our Head of Department had recently retired and a replacement had not at that time been appointed. I was surprised and delighted when the Dean said he would support me and that I would be fully funded for the programme, but no relief from teaching or other duties would be offered. He also advised that undertaking a doctorate on a part-time basis would be very hard work, and that the attrition rate for part-time doctorates was high.

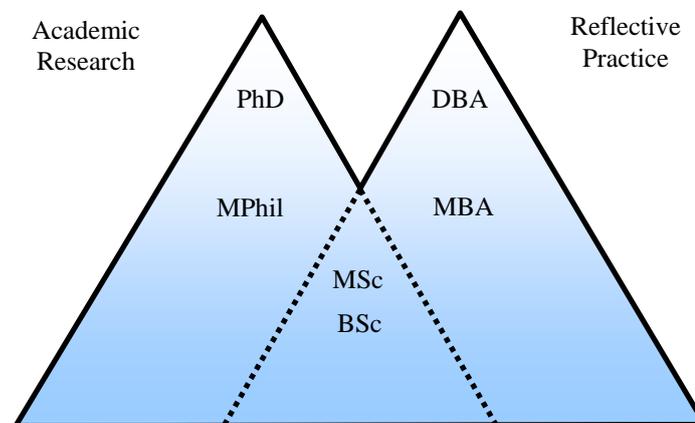


Figure 6.1: The 'Twin Peaks' of Academic Study
Source: Adapted from Lees, M. (2008: 143, Fig. 14.7: Twin Peaks)

I found the above illustration useful in understanding the difference in emphasis between PhD and DBA studies. Whilst it is tempting to use the above analogy, and to write this review as a travelogue of climbing the 'academic mountain', I will resist the temptation for fear of it being too clichéd. Instead, I will broadly follow the research process and discuss my experiences and lessons learned whilst undertaking this DBA project. The areas discussed in this document are:

Learning styles;
Literature reviews;
Research methodologies;
Research processes;
Research findings; and
Conclusions

Each of the areas comprises one of the chapters in the review. The next chapter, Chapter 6.2: Learning Styles discusses my learning styles preferences and how they my approach to the DBA.

Chapter 6.3: Literature Reviews discusses some of the issues encountered whilst undertaking the literature searches and reviews; and the use of bibliographic software.

Chapter 6.4: Research Methodologies discusses the issues and lessons learned from two aspects. Firstly, the use of the critical realist research philosophy; secondly, aspects of qualitative research; and thirdly, aspects of quantitative research.

Chapter 6.5: Research Processes discusses in more detail the use and application of the critical realist research philosophy in terms of the three research projects undertaken, the qualitative research project, the quantitative research project and the thesis. The chapter further considers the issues and lessons learned from using the critical realist approach.

Chapter 6.6: Research Findings discusses the outputs from the research undertaken, firstly, that concerned with the construction industry, and secondly, publications that have arisen from the research.

Chapter 6.7: Conclusions considers the overall DBA process and what is to be undertaken next.

6.2 Learning Styles

As the DBA would be an extended research project unlike any other academic project undertaken for either my MSc or MBA establishing my own preferred learning style might reveal to me ways that might enhance my ability to study and learn. Thus, I could establish where my strengths might lay that might be effectively utilised, and where my weaknesses might lay in order that they might be either avoided or strengthened.

Honey and Mumford's (2000) 'Learning Styles Questionnaire' (LSQ) was adopted in order for me to determine my optimum learning style might be as it was designed for practicing managers, i.e. with an androgogical perspective, rather a pedagogical perspective (Honey and Mumford, 1992, 2000). This would enable a comparison, based on the distribution of preferences, as shown in Figure 6.2 below, for each learning style preference identified, and for a comparison to be made against the overall sample mean, and the sample mean for males.

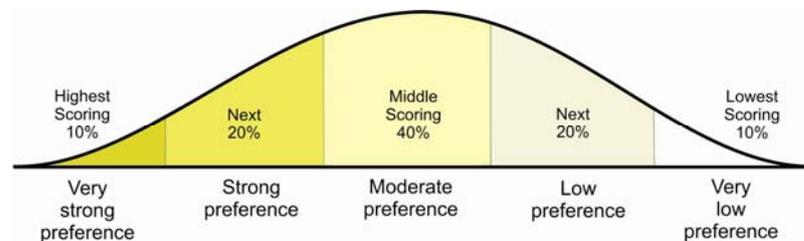


Figure 6.2: Learning preference distribution
Source: Based on Honey, M. and Mumford A. (1992: 10)

Table 6.1: Learning Preference Scores and Norms

Source: Adapted from Honey and Mumford (1992, 2000)

| Style | Me | Sample Mean: All (general) | Sample Mean: Males |
|------------|----|-------------------------------|-----------------------|
| Activist | 8 | 9.3 | 9.0 |
| Reflector | 15 | 13.6 | 12.9 |
| Theorist | 12 | 12.5 | 12.5 |
| Pragmatist | 15 | 13.7 | 13.6 |

Using Honey and Mumford's self-assessment LSQ revealed that I had two strong learning style preferences (see Table 6.1 above), those of Pragmatist and Reflector, and moderate preferences for Theorist and Activist when compared to the general

norms for the sample, as shown in Figure 6.3 below. Thus compared to the sample norm I have a greater preference for the Pragmatist and Reflector learning styles, but lesser preference for the Activist learning style. There was little difference in the Theorist learning style preference.

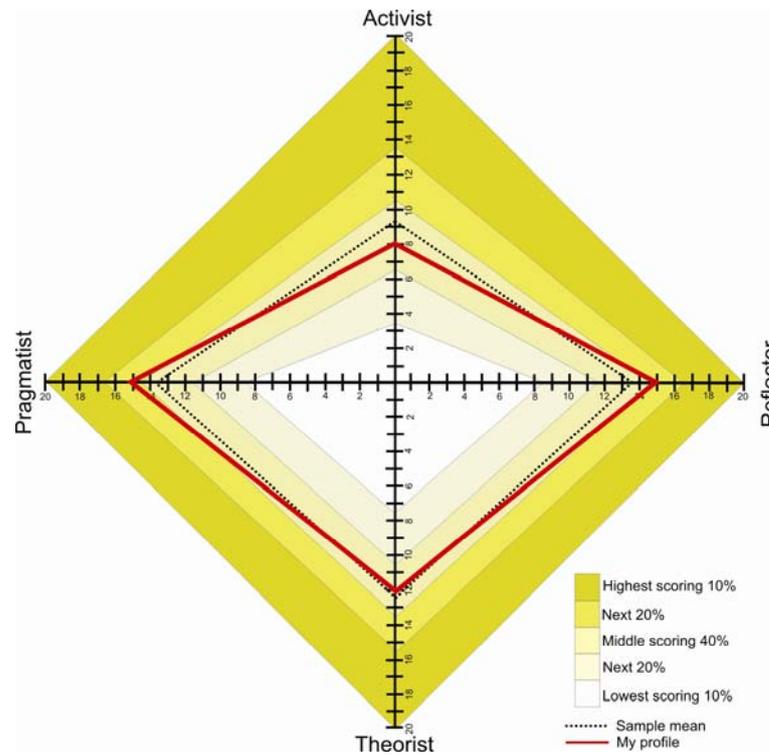


Figure 6.3: Learning preference distribution - all
Source: Adapted from Honey, M. and Mumford A. (1992: 12)

However, when the comparison was made against the norm for males (see Figure 6.4 overleaf) I found that I had a moderate preference for all learning styles, but again slightly higher than the norm for both Pragmatist and Reflector, and lower for Activist. Thus, my learning styles profile is a much closer fit to the norms for males than it is for the norms for the entire sample. Honey and Mumford (2000, 12-13) state that:

Reflectors like to think about things in detail before taking action. They take a thoughtful approach. They are good listeners and prefer to adopt a low profile. They are prepared to read and re-read and will welcome the opportunity to repeat a piece of learning.

Pragmatists like to see how things work in practice. They enjoy experimenting with new ideas. They are practical, down to earth and like to solve problems. They appreciate the opportunity to try out what they have learned/are learning.

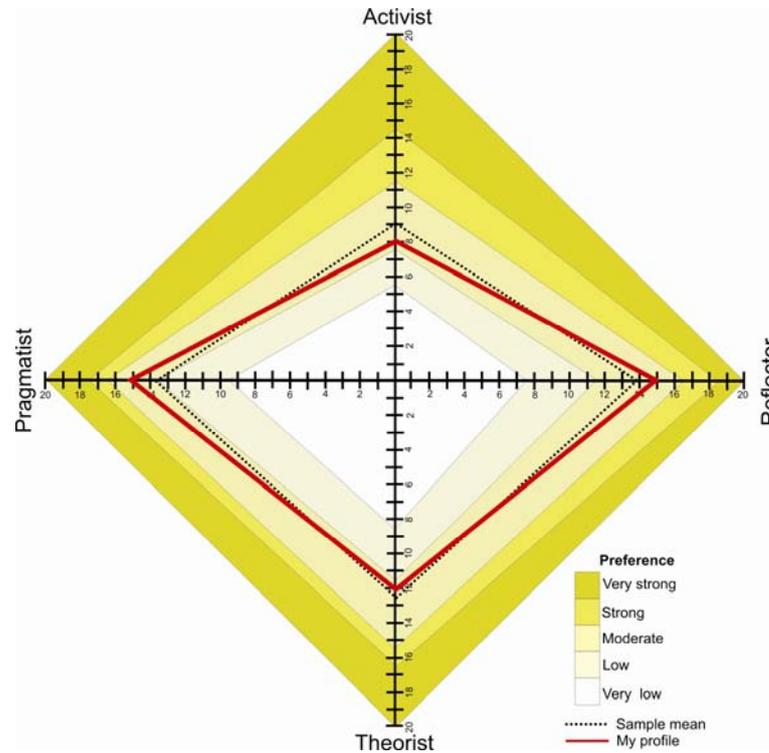


Figure 6.4: Learning preference distribution - males

Source: Adapted from Honey, M. and Mumford A. (1992: 12)

Looking at the ‘learn best’ and ‘learn least’ preferences for my characteristics (see Appendix 6A.1) the DBA programme provided many opportunities for me to maximise the situations where I might ‘learn best’ whilst being aware of situations where I might ‘learn least’. Thus, I needed to maximise potential ‘learn best’ options, particularly for the Pragmatist and Reflector learning preferences.

However, Honey and Mumford’s LSQ is not the only model available and as Sadler-Smith (1996) explains, there are many other preferences and cognitive styles models available. One of these that he draws attention to is Michael Kirton’s Adaptor-Innovator (KAI) Inventory of cognitive style (Kirton, 1994a). Having first been introduced to the KAI whilst undertaking my MBA, where I met Michael Kirton, a tutor at one of the summer schools, and undertook the KAI test. I was interested to find out how this related to my Learning Styles Inventory as I had a very high ‘Innovator’ score (within the top 5% of the sample population). The characteristics of Adaptors and Innovators are shown in Appendix 6A.2.

The KAI reveals many traits that I see in myself. In terms of learning styles and preferences, Kirton (1994b, 28-29) notes that:

Adaptors tend to prefer a 'reflective' learning style whereas innovators tend to favour an 'active' style. This means that adaptors learn in a more detailed, sequential, linear mode whereas innovators prefer the holistic 'here and now' approach which hands-on experience provides.

This suggest that my preferred learning style would be that of 'Activist' yet conversely it was my lowest preference, albeit only slightly below the mean for the male sample for the LSQ.

In addition to the KAI test I also took the Myers-Briggs Type Indicator (MBTI) test around the same time. Here my MBTI preference was revealed as 'INTP' (see Appendices 6A.2, 6A.3 and 6A.4) which has a number of similarities with both the LSQ and KAI preferences. Again, I was able to recognise many of the MBTI preferences and characteristics in myself. From the MBTI preferences I might have been expected the following in relation to studying for the DBA:

I – Introvert Types

Like quiet for concentration;
Can work on one project for a long time without interruption;
Are interested in the idea behind the job;
Dislike ... interruptions;
Work alone contentedly; and
May prefer to learn by reading rather than talking or experiencing.

N - Intuitive Types

Are aware of new challenges and possibilities;
Focus on how things could be improved;
Dislike doing the same things repeatedly;
Enjoy learning new skills;
Work in bursts of energy powered by enthusiasm, with slack periods in between;
May leap to a conclusion quickly;
Follow their inspirations and hunches;
May get their facts a bit wrong;
Dislike taking time for precision;
Can over complexify a task; and
Ask why things are as they are.

T - Thinking Types

Are good at putting things in logical order;
Anticipate or predict logical outcomes of choices; and
Have a talent for analyzing a problem or situation.

P - Perceiving Types

Do not mind leaving things open for last-minute changes;
Adapt well to changing situations;
May have trouble making decisions, feeling like they never have enough information;
May start too many projects and have difficulty in finishing them;
Want to know all about a new job; and
Get a lot accomplished at the last minute under pressure of deadline.

Thus from the above abstracted characteristics there are preferences that are beneficial, and some that are not, particularly some of those classed as 'Intuitive' that I needed to pay attention to. It should, however, be remembered that these preferences represent the extremes of polar scales and there is a continuum between the extremes.

In the next chapter, issues that I encountered in undertaking the literature reviews and the lessons learned from them are discussed.

6.3 Literature Reviews

Literature reviews are essential to any research project, and as I have always found the pursuit of new knowledge and experiences a most intriguing and satisfying process I found the literature reviews a fascinating undertaking. Literature reviews can be both an end in themselves or a means to an end, whether they are carried out simply to establish what has been or is published on a particular topic, or to inform and underpin a particular research project.

For me undertaking a literature search and review always holds a fascination because of the new avenues of knowledge that are revealed, sometimes because of the ‘thrill of the chase’ during the literature search, trying to track down and acquire obscure and/or long out-of-print material, whilst at other times merely to satisfy intellectual curiosity. I find that undertaking the literature searches can be very much a journey into uncharted territory, and sometimes into the unknown, often frustrating from encounters with blind alleys, dead ends and other obstructions, whilst at other times delightful, full of pleasant revelations, wonders and surprises. As with all journeys, there is always a starting point but the destination may only be a notion and the route between to be determined en-route.

In undertaking the literature searches and reviews for my research many new ideas, concepts and fields of knowledge have been revealed to me. Not least of these is the critical realist research philosophy (discussed in the next chapter), as well as historical industrial reports and vast arrays of facts and figures in government reports about the construction industry. As with many researches, the more I researched and learned the more I found there was to learn and the knowledge horizon receded further and further into the distance with each new research.

One of the most notable differences I encountered between the literature searches for this research and those undertaken for earlier masters degrees was the overwhelming amount of literature available through electronic sources, e.g. on-line data-bases and publications, available from almost anywhere in the world via the internet. Often

this proved to be as much a curse as it did a blessing, not only because of potential information overload, but also because the difficulty of actually accessing much of the electronic material, especially where restricted access existed and/or exorbitant access fees were demanded by publishers. Never-the-less countless hours were saved by using electronic sources, rather than paper based, as usually these could be downloaded and stored, avoiding expensive photocopying costs and protracted delays in obtaining copies of paper-based publications. This does not mean that paper based resources were not used, far from it, particularly in the case of books and historic material not available in electronic formats, and ironically, much of the material downloaded electronically had to be printed out for review as I, like a great many people, prefer printed reading matter to electronic versions.

Another welcome development from my earlier researches is the advent of bibliographic software. Previously paper-based literature, indexes, etc., had to be manually searched, publications physically located and obtained, painstaking note-taking and indexing systems devised to manage the research notes and literature obtained, invariably requiring the use of boxes of index cards and note books. However, in tandem with the advent of electronic publications have come the development of electronic search engines, and bibliographic software such as EndNote[®] which I readily adopted as a way of managing the vast amounts of material obtained, both in electronic and paper formats.

It was at this point that I discovered that there was a serious compatibility problem between the latest version of EndNote[®] that I had purchased and the edition of MS Word that I was using (see appendix 6A.6). This compatibility problem was not resolved until a new version of EndNote[®] was released some considerable time later. Although my initial experience of EndNote[®] was far from satisfactory, it did give me an invaluable insight into how a bibliographic database could be structured, and this was put to good use in creating my own MS Access[®] bibliographic database. To bypass the problems with EndNote[®] I developed my own MS Access[®] database that not only helped me organise my research data, but also helped in developing my

knowledge and skills with MS Access® that I had not used since I had used it for processing the data obtained for my MBA research project many years earlier.

When I eventually obtained a new and much improved version of EndNote® I transferred all my data from my MS Access® database to the new EndNote®. Although this was a time consuming process it has proven to have been a very worthwhile and beneficial exercise as I have been able to manage literature collected in a far better manner than I could have otherwise have achieved, and I have continued to use EndNote® to this day for managing my research literature.

I also purchased EndNote's companion product RefViz® that provided a reference mapping and clustering facility. It was also able to search literature titles, keywords, and abstracts using single or multiple keywords and provide a visual 'mapping' of the closeness of fit of literature to specified keywords. This I found to be an invaluable search tool as clusters of articles could be located and explored by drilling down to individual articles, as shown in Figure 6.2 and Figure 6.3 overleaf.

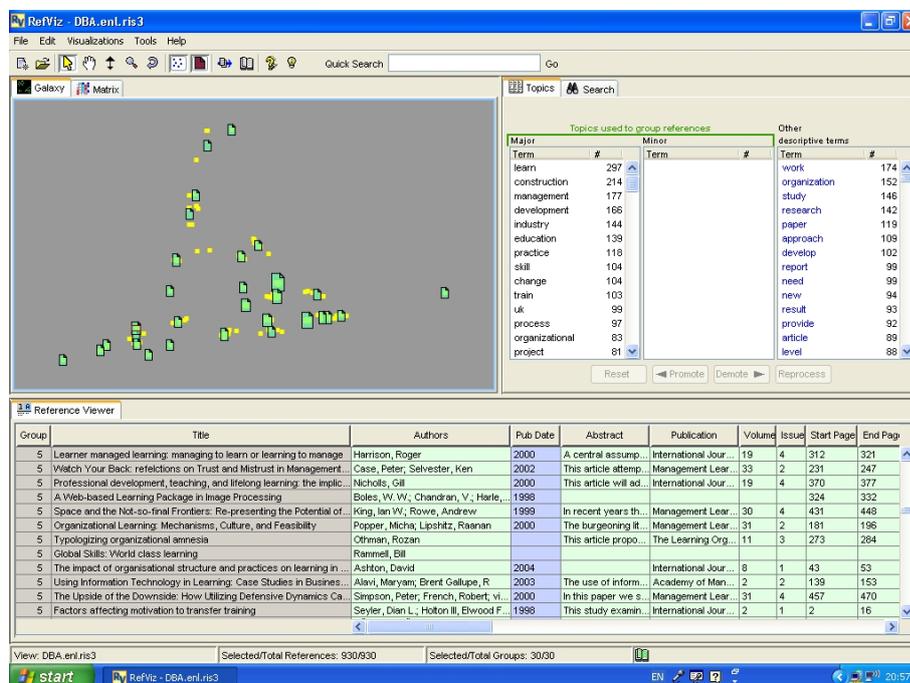


Figure 6.5: RefViz – Screen image of reference mapping of EndNote XI reference library

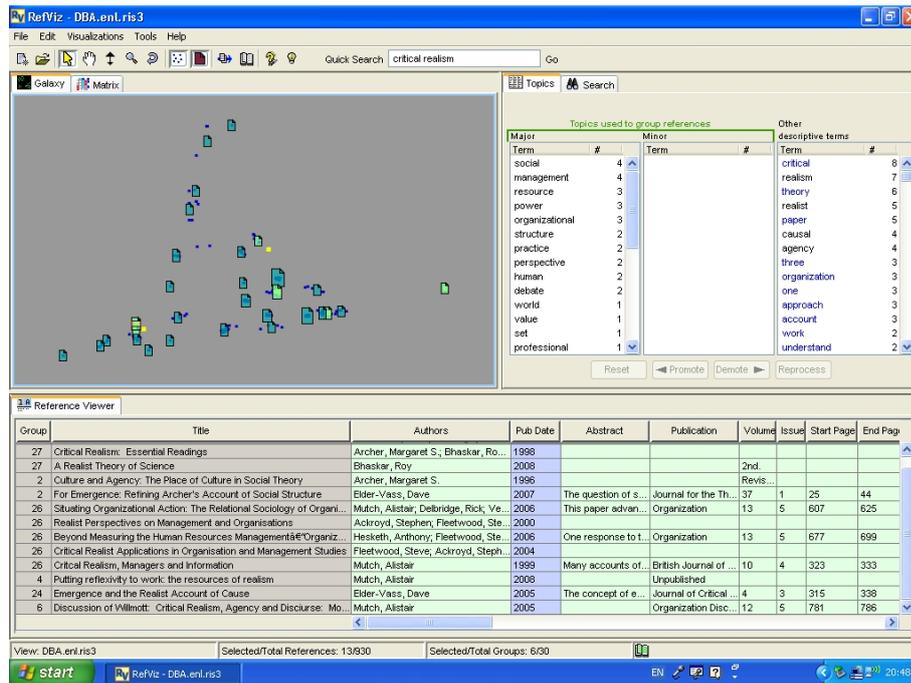


Figure 6.6: RefViz – Screen image of reference mapping of EndNote XI reference library showing location grouping of articles containing ‘critical realism’

The use of RefViz® also helped reveal new patterns of information and clusters of literature that might otherwise have been missed. It also assisted me identify key areas of literature around particular topics that could be aligned with the critical realist research model.

The next chapter discusses the next stage of the research process, research methodology, and some of my experiences and lessons learned from it.

6.4 Research Methodology

This chapter discusses three aspects of the research methods encountered. The first of these is the use of the developing research philosophy of critical realism; the second is the qualitative analysis employed with some of the research data; and the third is that of quantitative analysis.

6.4.1 Critical Realism

The studies I undertook for my MSc in the early 1980s and for my MBA in the early 1990s introduced a range of research techniques, primarily those concentrated around various techniques, such as interviewing, questionnaires, and statistical analysis of data needed to complete a thesis or project, but did not cover the aspects of research philosophies. Indeed many text books of research methods and techniques, for example, Fellows and Lui (1997), Hair *et al* (2007), Jankowicz (2007) and Naoum (2007) and follow a similar approach in making little or no reference to research philosophy, whilst others, for example, Saunders, Lewis and Thornhill (2003), and Bryman and Bell (2003, 2007) introduce the concepts, but not in any depth. It is interesting to note the expansion and development of Saunders, Lewis and Thornhill's 'Research Onion' between the 1st and 2nd editions of their book in recognition of the growing importance attached to research philosophy and the recognition of the possibilities of different research choices such as mono, mixed and multi method research, as shown in Figure 6.7 below, and Figure 6.8 overleaf.

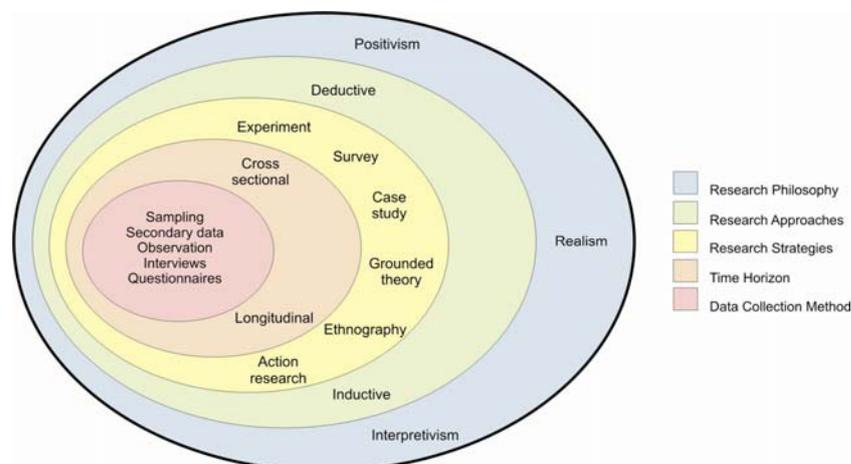


Figure 6.7: The 2003 Research 'Onion'
Source: Saunders, Lewis and Thornhill (2003: 83, Figure 4.1)

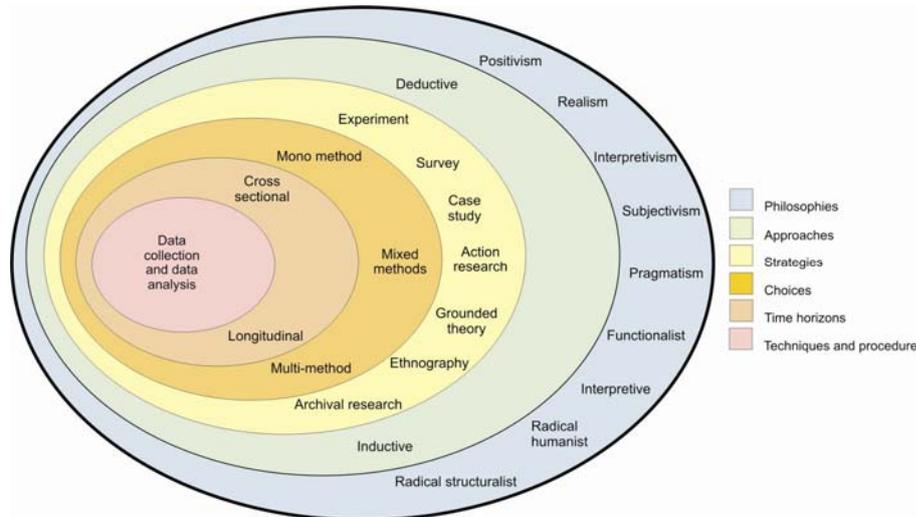


Figure 6.8: The 2007 Research 'Onion'

Source: Saunders, Lewis and Thornhill (2007: 132, Figure 5.1)

Thus, it was a new departure for me to be introduced to the concepts of research philosophies. My technological/natural science background in the construction industry where I was immersed in complex technical information that was both highly structured and often codified, and in the execution of construction works that required very detailed systematic and logical planning and execution, led to an affinity with the positive approach. However, as Bryman and Bell (2007:17) note, 'it is a mistake to treat positivism as synonymous with science and the scientific'.

In my discussions with my supervisors early in the project, Professor Alistair Mutch recommended that the nature of my proposed study of the construction industry might be best undertaken from a critical realist perspective. Until this meeting critical realism had not been presented as a research philosophy, and the only research methods text-book encountered at that time to actually name the philosophy was Bryman and Bell (2003), but even then only mentioned in two short paragraphs.

Recommended references for critical realism were followed up (Sayer, 1992, 2000; and Collier, 1994) and the texts obtained and read with interest. Not having a background in either social science or philosophy, I found the concepts of critical realism somewhat difficult to comprehend at first, although it was clear from the

texts that critical realism could be applied equally to both quantitative and qualitative research, as confirmed by Ackroyd (2004).

One of the criticisms levelled critical realism it is that the works of authors such as Bhaskar and Archer, a key exponent of Bhaskar's work, are difficult to read and understand as they couch their arguments and debates in complex academic philosophical language making the concepts inaccessible to the wider audience (Hartwig, 2007). In an attempt to make critical realism more accessible Hartwig's (2007) 'Dictionary of Critical Realism' attempts to provide more straightforward explanations of critical realism concepts and terminology. It does not itself provide a more accessible interpretation of critical realism. However, I found Danermark *et al* (2002) and Cruickshank (2003) provided excellent and comprehensible introductions to critical realism as a tool for understanding business and organisations.

It is pleasing to note that during the duration of this project the number of publications, both in books and journal articles about critical realism and its use in understanding management and organisational studies has steadily increased as the philosophy is becoming more widely established and accepted. Examples of this are Ackroyd and Fleetwood (2000) and Fleetwood and Ackroyd (2007). Evidence of the expansion and acceptance of critical realism can be found in the International Association for Critical Realism¹ (IACR) which was founded in 1997, and its *Journal of Critical Realism*² (JCR) which was first published in 2002, although prior to this the IACR published its journal under the title of *Alethia* from 1998 to 2002.

Critical realism, despite its initial criticisms, has been found to be a most valuable and insightful research philosophy as it has enabled me to gain a much deeper understanding of the construction industry through being able to expose its many agential factors and causal mechanisms at work, both within the industry and the construction companies themselves, and through external agencies such as the professional bodies.

¹ IACR can be located at <http://www.criticalrealism.demon.co.uk> (Last accessed 04/04/2008)

² JCR can be located at <http://www.equinoxjournals.com/ojs/index.php/JCR/index> (Last accessed 04/04/2008)

Looking back over Documents 3, 4 and 5, the recommendation to approach my research from critical realist perspective has embedded a deeper and more comprehensive understanding of the construction industry and the complex issues surrounding it than perhaps might have otherwise have achieved with a different philosophical approach.

I have always been an advocate of systems theory, and in particular open-systems theory since undertaking my MSc during which I was first introduced to it. I find it a very powerful and adaptable concept to be able to deconstruct complex organisational mechanisms such as the construction industry, invariably comprising of other more complex systems within systems, and how the systems and subsystems interact with one another and their environments. The critical realist philosophy fits comfortably with open-systems theory as both adopt the approach of seeking to identify the actors, agencies and emergent properties that exist within and between an entity and its environment, and indeed both the open systems model and Sayer's critical realist research model (Sayer, 2000) are not too dissimilar in their arrangements as shown in Figure 6.9 and Figure 6.10 below.

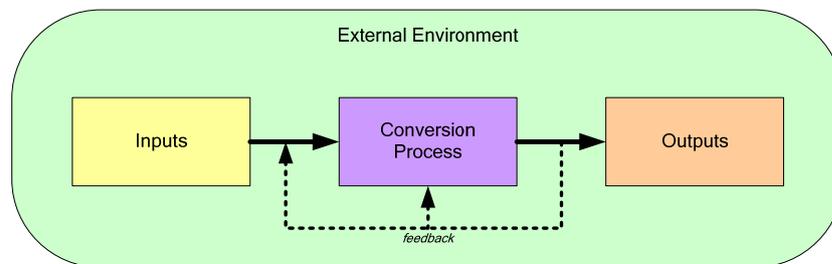


Figure 6.9: Generic Open Systems model

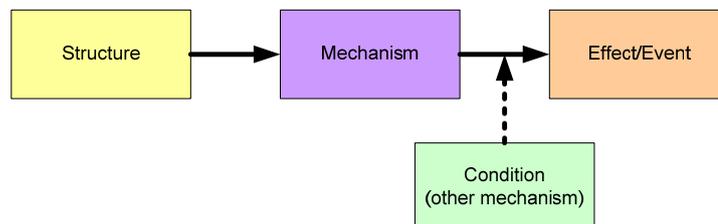


Figure 6.10: Critical Realist Research Model
Source: Adapted from Sayer (2000: 15, Fig. 1.2)

One of the problems with systems theory is its rigidity and inability to take into account such issues as human action and behaviour, needs and aspirations, ethics and human freedom (Stacey, 2003; Loosemore, Dainty and Lingard, 2003). Critical realism is, however, able to embrace such issues as the critical realist approach allows a much richer exploration of a system (Mingers, 2004; Potamäki, 2004) going beyond mere identification of a system's components and their basic interaction to expose, question and consider issues such as how and why the components are as they are. Thus critical realism seeks to expose the generative mechanisms behind the system and how these mechanisms behave. However, as Loosemore, Dainty and Lingard (2003) note it is extremely difficult to model the interaction of humans with systems due to the irrationality of human behaviour.

These are issues that have always fascinated me about the construction industry throughout my entire working life in it, for example: how does the industry work?; why are things the way they are?; how did they come to be like that?. Whilst I have always appreciated that these are highly complex issues that do not have simple or straightforward answers, systems theory provided me with a good foundation upon which to ground any beliefs and characteristics about the industry. My curiosity about some of these issues was reflected in my MBA thesis which sought to examine organisational culture(s) existing within the industry. The critical realist approach has enabled me to extend my conceptualisation of the construction industry beyond a systems-approach, particularly with those aspects of an abstract nature that cannot in themselves be observed.

6.4.2 Qualitative Analysis

As already noted, critical realism accommodates both qualitative and quantitative analysis in various arrangements. Qualitative research has been carried out in both Document 3 and Document 5, using two different research strategies. Document 3 used interviews and mind-mapping to reveal patterns and themes of causal mechanisms and emergent properties within the data. Document 5 used a survey of web-sites to produce a collection of qualitative data to establish patterns of

conditions required by professional bodies on their members in the construction industry, i.e. a part of the construction industry's environment.

The nature of my research and my position external to the construction companies I was studying, but internal to the construction industry environment itself, imposed some constraints in the types of qualitative research I could undertake. However, qualitative research proved invaluable in identifying opinions and Approaches behind the various aspects of the construction companies and the industry, and helped identify some of the 'why's and 'how's, i.e. the agential factors and causal mechanisms that can be subsequently examined through qualitative analysis.

I have always found qualitative analysis techniques interesting, perhaps because they are the antithesis of my technical/natural science background with its predominance of 'facts and figures', and perhaps also because of my natural curiosity about the 'softer' sides of organisations and human behaviour. Qualitative analysis was used to help understand those aspects of the construction industry that cannot easily be reduced to numerical analysis, particularly those where aspects of organisational and human behaviour are involved including culture, attitudes and emotions, where a great deal of subjective opinion can be present. This was particularly important in the interviews undertaken in Document 3 where much of the data collected from unstructured interviews was qualitative in nature and contained much subjective opinion about the construction industry and its environment that could not have been obtained through other (quantitative) means. These aspects are discussed further in the next chapter.

6.4.3 Quantitative Analysis

One of the aspects of which it was necessary for me to gain an understanding was that of the use of statistical techniques needed for the analysis of the data I had obtained for both Document 4 and Document 5.

Having missed the DBA workshops on statistics, including the use of SPSS, through having been in hospital for an operation meant I had to resort to books on

quantitative analysis such as Miles and Huberman (1994) and Curwin and Slater (2002) to determine the correct techniques to apply to the various types of statistical data I possessed. Similarly in order to gain an understanding of SPSS[®], a statistical analysis software program that I had not used before I had to resort to books such as Brace, Kemp and Snelgar (2003), Field (2000, 2005) and Kinnear and Gray (2006) which provide instruction not only in the use of the software, but also explanations of the relevant statistical techniques.

I found myself at ease in exploring the SPSS[®] software package and understanding the statistical analysis of my data, although from time-to-time I did find it necessary to consult books on more advanced statistics theory in order to gain a more in-depth of some of the statistical analysis techniques I was using. The textbooks I was using did not necessarily cover the issues involved, for example, worked examples in text books always use data that conveniently gives clear-cut answers to illustrate the issue in topic under discussion. However, 'real-life' data is not always so accommodating and conveniently arranged, and did not necessarily yield clear-cut results, hence requiring a greater degree of understanding to obtain the correct interpretation. I found this to be particularly important in understanding the output from SPSS[®], where it is reasonably easy to enter data and analysis it, but not always easy to understand the extensive output that can be obtained.

As befits my LSQ preferences I found the statistical analysis work particularly enjoyable and satisfying. I learned much about the use and application of statistical techniques as well as the use of SPSS, all of which will stand me in good stead for future research work.

6.5 Research Process

The critical realist approach that has been used throughout the DBA has allowed various structural aspects of the construction industry and industry mechanisms such as education, training and development of construction managers to be investigated with an emphasis on ‘discovering patterns of events that reveal the presence of underlying structure’ (Mingers, 2004: 189). That the critical realist approach also facilitates multi-mode and mixed-mode research to be undertaken also sits comfortably with the overall processes of the DBA, allowing the qualitative research project (Document 3), the quantitative research project (Document 4) and the thesis (Document 5) to consider particular aspects of the education, training and development of construction managers in terms of identifying through the use of different research choices (Saunders, Lewis and Thornhill, 2007) various mechanisms, structures and agencies within the construction industry pertinent to the research topics.

The documents also reflect my developing knowledge and understanding of critical realism from my first introduction to it through the Literature Review (Document 2) progressively through to the Thesis (Document 5). Throughout this time my knowledge and understanding of critical realism has developed at two levels, firstly thorough my use of it as the underlying philosophical approach to my research, and secondly, in support of the first, the growth and development of critical realist literature. During the life-time of my research I have seen critical realism develop and move progressively from a purely philosophical position through the works of, for example, Bhaskar (1975)³, Sayer (1992), Collier (1994) and Archer (1995, 1996) to a more widely accepted and applied philosophical perspective, particular in the field of management related studies and research thorough the works, for example, of Ackroyd and Fleetwood (2000), Danermark *et al* (2002), Cruickshank (2003), and Fleetwood and Ackroyd (2004).

³ See Bhaskar (2008).

6.5.1 Document 3: Qualitative Research Report

Document 3 was my first application of the critical realist approach to qualitative research. Here I was able to explore a wide range of issues affecting the construction industry through the use of unstructured interviews with training and development managers of four of the UK's largest construction companies, and one for a comparative stance, from one of the UK's largest aeronautical engineers.

During this process of interviews my knowledge and understanding of the critical realist approach was developing and enabling me to explore and uncover aspects of agencies, causal factors and emergent properties that a structured or even semi-structured interview might otherwise have failed to reveal. Not only did the process provide invaluable research data for Document 3, but also help expand a range of valuable contacts for use in later phases of the research and also for sources of material for teaching.

In order to begin to understand the complex interrelationships of mechanisms revealed in the interview an attempt was made to illustrate the relationships by using mind-mapping, a technique I had used many times before, but this was the first time that I had used it for interview analysis as attempts to use Nvivo[®] had failed (see Document 3). I found this to be an intriguing process and one that was much more difficult than anticipated as the mind-maps of the relationships had to be presented in a two-dimensional format (on paper) that ideally required three-dimensional representation.

It was observed that many of the issues revealed by the interviews were concerned not only with internal structures and mechanisms of the construction companies, but also revealed many external environmental issues (conditions/other mechanisms) that affect construction companies and the construction industry at large. Some of the external issues revealed such as, for example, industry image and reputation have not been explored further in the research projects whilst others such as, for example, the drivers for subcontracting have been explored in depth due to their impact upon the structure of the construction industry and many of its working practices. Another

area revealed and one that has been considered, albeit in not such great detail, is that of work-life balance and its impact upon education, training and development in an industry notorious for its long-hours culture – an area of which I have had many years experience. No extensive and/or in-depth research appears to have been carried out on this area in the UK although some research has been carried out in Australia by Lingard and Francis (2004, 2005a, 2005b, 2006, 2009). This, from a critical realist perspective, can be regarded as one of the ‘conditions/other mechanism’ at work that affects not only the workers’ performance but industry performance as well. It is a subject well worthy of extensive further research in the UK.

6.5.2 Document 4: Quantitative Research Report

For me this was a more comfortable area of research, as having a technical background, I was more ‘at home’ with facts and figures. Yet at the same time it was the first piece of extensive quantitative research I have undertaken. Critical realism’s acceptance of mixed methods of research as equally and readily permits qualitative research as it does quantitative research, indeed as Mingers (2004: 189) noted quantitative research is a useful tool in exposing ‘patterns of events that reveal the presence of underlying structures’. Both the longitudinal and cross-sectional desk-top studies of the construction industry revealed many underlying structures that exist within the industry.

Whilst it would be untrue to say that I was unaware of some of these structures, critical realism has provided me with a much greater depth of knowledge and understanding of the composition and mechanisms of the construction industry. Some of this research initially built upon earlier *ad-hoc* research conducted out of my own interest in the structure and composition of the construction industry that has been used to inform my teaching. The research carried out for this project has enabled this aspect of my teaching to be greatly enhanced, and extended into my masters level teaching as well, using a more developed and analytical approach.

Much of the quantitative research undertaken was dependent upon various packages such as SPSS[®] for statistical analysis of the data, and MS Excel[®] for logging and organising data from the questionnaires prior to analysis by SPSS[®]. In so doing I was able to learn and apply new skills as I had not used SPSS[®] before, and to gain new knowledge and understanding of statistical techniques such as those of Pearson and Tau for correlation analysis. Whilst I might have studied these techniques many years ago as a part of my HND or MSc studies I had no recollection of these techniques and so I had to learn them afresh. Since then the this knowledge and experience have proven useful in being able advise and guide students undertaking correlation analysis of research data for both undergraduate and postgraduate dissertations.

More importantly perhaps, from a critical realist perspective, is that the application of statistical analysis can help identify (or otherwise) the existence of relationships between various mechanisms at work in the industry and/or its environment. In the case of the quantitative research project I was able to use it to establish that changes that occurred in the structure of construction industry (employment levels) in response to changes in the industry's environment were also reflected a number of years later in changes to the level of recruitment to construction industry related courses in higher education. Thus changes in the levels of employment in the construction might be used as an indicator to possible trends and potential changes in future recruitment levels to these courses, i.e. for strategic planning in higher education (Hurst, 2006; Hurst, Hodgkinson and Mutch, 2007c).

My learning was not strictly limited to the project itself as incidental knowledge and experience also occurred that in itself has also proven useful in advising and guiding students at all levels of study about the use and reliance on computers. I learned a number of salutary lessons during this period when my research data, recorded on very large spreadsheets, became corrupted and, even though I believed I was following best practice by keeping multiple back-up copies, these too had become corrupted (see Appendix 6A.6). Consequently many weeks work was lost and had to recreated, but the lessons learned have proven invaluable in protecting my work for

the main thesis, which is discussed in the next section, and this document as no further losses of data have been encountered.

6.5.3 Document 5: Thesis

In the thesis the critical realist approach was really to come into its own and provide a very solid theoretical foundation for the work. The knowledge and experience gained undertaking the qualitative and quantitative research projects from a critical realist perspective enabled me to use the two research approaches in a mixed-method mode to undertake the thesis. Sayer's (2002) critical realist research model also provided a sound theoretical research framework around which the various components of the thesis were constructed.

Building upon the literature review in Document 2, and those carried in the qualitative research project in Document 3 and the quantitative research project in Document 4, a further literature review was undertaken to identify the various literatures concerning agential factors, causal mechanisms and emergent properties that result in poor performance in the construction industry. However, the literature review identified a wide range of topics, so these were limited to those that the most influential and relevant to the topic of the thesis, i.e. education, training and development of construction managers. I found Sayer's (2002) model of critical realist research an extremely useful concept for grouping literatures into appropriate topic areas. It was also useful for giving the literature and thesis itself an appropriate structure. This would also provide me with areas of research that can be focussed on in the future.

Thus I was able to establish that the first component of the research would be a desk-top qualitative study analysing published government statistics in order to reveal various strata, both in terms of a longitudinal and a cross-sectional study. I have also been able to use much of the data gathered and the results from its analysis to inform teaching, particularly for new undergraduates in helping them gain an understanding of the complex structure and composition of the UK construction industry. In

addition it has also proven useful as an introduction to over-seas students on post-graduate construction programmes to help them gain an understanding of the UK construction industry.

The second component of the research was revealed as the need to establish the internal mechanisms of construction companies with regard to their current strategic position and approaches to education, training and development of construction managers. This I concluded was best undertaken by means of a survey of the UK's largest and most influential construction companies, including those I had interviewed for Document 3. However, it was interesting to note, but not unexpected that, in this phase of my research, all but one of those interviewed in construction companies for Document 3 had 'moved on'. Thus confirming and reinforcing much anecdotal evidence gained from undergraduate placement visits, other industrial contacts and my own experience in industry, that those engaged in education, training and development in construction companies seem to have a somewhat precarious existence and short tenure of office. This also confirmed research findings that education, training and development is still regarded in the industry very much as a cost rather than an investment. Also when industry conditions become difficult then education, training and development is one of the first areas to be cut back on or even entirely eliminated (other than where a statutory requirement exists). Yet this is part of the agential mechanisms that affects both structure and culture within the industry, and also contributes to both cause and effect over time.

Here I was again able to use the statistical knowledge, skills and understanding gained during the quantitative research project and to extend them further through the introduction of new statistical analysis techniques for cross-tabulation of various questionnaire responses. This also enabled me to extend my knowledge of both SPSS[®] and MS Excel[®] to collate and analyse the data gathered from the questionnaires, although this was not without its problems that also provided a valuable learning experience (see Appendix 6A.6). Not only has this area of research been used to inform teaching, but also as the basis of a number of successful

conference papers (Hurst, 2006, 2009; Hurst, Hodgkinson and Mutch, 2007a, 2007b, 2007d). It will also be used to inform future research projects.

The third component of research required me to conduct another desk-top survey. This time both qualitative and quantitative research and analysis was conducted of an important condition in the external environment of construction companies and their construction managers, that of the principal professional bodies in the construction industry. Whilst the data analysis was primarily data abstraction and collation from various websites it never-the-less provided further valuable data that I have again been able to use to inform teaching, and also a basis for conference papers (Hurst, 2006, 2009; Hurst, Hodgkinson and Mutch, 2007a, 2007b).

In the thesis, and in the overall research project my knowledge and understanding of the critical research philosophy, of which I knew nothing at the start of the research, has developed progressively and substantially throughout the lifespan of my research. With this development has come a far greater and deeper understanding of the construction industry and the enormous complexity of its structures, mechanisms and properties that might not otherwise have occurred had a different research philosophy been employed. My knowledge and understanding is still developing as more publications appear using critical realism as a basis for business research.

The next chapter discusses the research outputs that achieved from this research project.

6.6 Research Outputs

This chapter discusses two aspects of the research output from the project, firstly, knowledge gained about the construction industry, and secondly, research publications.

6.6.1 The Construction Industry

Having always worked either directly in the construction industry or in higher education lecturing on construction management and other construction industry related courses, this research project has enabled me to extend and develop my understanding of the construction industry in a number of ways. These include:

- contemporary construction industry issues of employment, self-employment and agency working (Documents 3 and 5) and problems in recruitment (Document 3);
- the relationship between employment levels in the construction industry and recruitment to higher education construction industry related courses (Document 4); and
- continuing education, training and development of construction managers (Document 5) which will help develop future courses for construction managers.

In addition, a number of valuable contacts have been established with education and training managers in some of the UK's top construction companies.

Much of the output from the construction industry studies is being, or will be, used to underpin and inform teaching on both undergraduate and postgraduate construction management and other construction industry related courses. These include, for example, 'introduction to the UK construction industry' lectures to first-year undergraduate students, through to 'management education and development' lectures to postgraduate students. Additionally a number of research papers emanating from the research have been published. These are discussed in the next section.

6.6.2 Publications

The research that completed in this project has, to date, resulted in the presentation of five conference papers based around different areas of the research. These have either been from completed research sections from Document 3 and Document 4, or have reported interim findings from the research carried out for Document 5.

Conferences at which refereed papers have been presented are:

- ARCOM, Birmingham, September 2006, (Hurst, Mutch and Hodgkinson, 2006);
- BEAR, Salford, March 2007 (Hurst, Mutch and Hodgkinson, 2007a);
- CIB-TG62, Cape Town, South Africa, May 2007 (Hurst, Mutch and Hodgkinson, 2007b, 2007c)
- BEECON, London, September 2007. (Hurst, Mutch and Hodgkinson, 2007d)
- ARCOM, Nottingham, September 2009. (Hurst, 2009)

The papers presented produced considerable interest and debate around the subject matter, some of which provided valuable feedback, insights and alternative perspective on issues that were useful in producing Document 5. One of the papers presented at CIB-TG62 (Hurst, Mutch and Hodgkinson, 2007c) was selected for publication in a special edition of the International Journal of Architecture and Engineering Design Management (IJAEDM). Sadly, the original e-mail invitation was either never received or filtered out as junk mail and missed as the first indication of the invitation was a reminder spotted in the filtered-out junk-mail file that the completed journal article had to be submitted within the next twenty-four hours in order to meet the publication deadline. The original invitation had apparently been issued three months earlier. As it was not possible to produce a journal article from the conference paper at such short notice, the opportunity was lost. Never-the-less there will be other opportunities in the future, and it is encouraging to know that the research being carried out is considered worthy for publication in an international journal.

Most of the annual conferences relating to construction research and education such as ARCOM, BEECON and COBRA take place in September each year, but (assuming the abstracts have been accepted) usually require completed papers to be submitted during the pre-Easter period (February-March). In order not to detract from the completion of the Document 5 and this document I decided not to submit any abstracts, thus papers, for conferences until after this project has been completed. As the majority of conferences are annual events there will be many future opportunities, and once this project is completed and submitted there may be more time available for the preparation and submission of papers. There are also a number of international conferences in the field of construction management research and education held in late autumn and early spring, so abstracts will be prepared and submitted to these as opportunities arise as the deadlines for abstracts and papers are not until after the submission of this project.

More importantly a number of journal articles are proposed from the completed research and from future research that are identified in Document 5 areas that will continue from this research project.

The next, and final, chapter in this review concludes this research project and considers what might be undertaken next.

6.7 Conclusions

It always difficult at the end of undertaking such as this project to know what will be next. Emotions at this stage are always mixed: trepidation that the work will yield the desired result, a doctorate; exhaustion from all the hard work and long days and late nights to get it finished; anticlimax and relief that it is (almost) over. There is also the sense of relief that perhaps the conservatory table might at last reappear from under the inevitable heaps of books, reports and papers; the floor will be cleared of boxes of reports and papers, and the thirty feet of bookcase shelving can be removed.

Undertaking the DBA has opened up a whole raft of new raft of opportunities in continuing and extending the research already undertaken. Some of the work already undertaken, such as the longitudinal and cross-sectional studies of the evolving structure of the construction industry in terms of its employment levels and distribution, numbers and sizes of construction companies and trades companies will continue due to my interest in the subject. Additionally, the research is used to underpin teaching at both undergraduate and postgraduate levels.

Other areas researched such as that undertaken in Document 4 linking employment levels in the UK construction industry to the levels of recruitment to construction related undergraduate degree programs has attracted both national and international interest. The research completed will be the subject of further conference papers and, hopefully, journal articles as the research continues. This research can continue because little or no research funding is required as it is based on annual reports published by the Government, UCAS and HEFCE that are freely available and downloadable. However, abstracting the required data and undertaking the statistical analysis on an annual basis is extremely time-consuming, so time will need to found for this work.

The research completed in Document 5 has been the subject of a number of conference papers for conferences in late 2008 and 2009, and will be the subject for a

number of conference papers in 2010. In addition, a number of journal articles are to be prepared for future publication.

On the personal front the research I have undertaken has enabled me to gain not only new knowledge, skills and understanding of a variety of complex issues, but also qualitative and quantitative research skills that I have been able to use to inform students at both undergraduate and postgraduate levels, and will also be able to utilised for further research opportunities that will arise out of my DBA studies.

The DBA has given me the ability and confidence to contribute to academic debate and to participate in the presentation and defence of academic papers from my research work to some of the world's leading academics in the construction arena at world class conferences both a home and abroad. In addition aspects of my research have also contributed to two successful E.U. funded multi-national research projects⁴ and is helping to establish and enhance my reputation in the international academic world of construction.

The adoption of the critical realist philosophy for my DBA has provided me with a unique insight into, and help me gain a deep understanding of, the complex structures and workings of the construction industry, far beyond that I possessed before the start of the DBA, and which would not have been gained through other philosophical approaches. Most importantly it has given me a significantly clearer view and better understanding of the construction industry and the world in which it operates. Additionally I have gained a substantive understanding that its problems are not easily resolved as they are products of complex, powerful inter-related actors and causal mechanisms. I have come to understand that the effects of change can never be fully understood as the process of change itself is a part of the system and can be altered by the system it is attempting to change in unpredictable and sometimes inexplicable ways.

⁴ These do not form a part of the DBA project.

Similarly undertaking the DBA has produced changes in me both as a researcher and as a person. Some of those changes I am able to identify within myself, such as new knowledge, skills, confidence, etc., whilst others may only be recognised by others, such as changes in attitude and approaches, temperament or personality. Many of these changes may not be immediately discernable as they comprise a myriad of minute changes that occur throughout, and as a result of, the DBA process itself. This in effect may constitute an evolutionary process that has been set in motion by and determined by the DBA, and will continue long after it, rather than abrupt shifts, i.e. evolutionary changes rather than revolutionary changes.

What I am confident of is the fact that the DBA process has changed me in many small incremental ways, rather than a few significant ways, and that many of those changes that have occurred have yet to fully manifest themselves in me, as many are also embedded in the uncertainty that exists from the DBA still to be achieved. Notwithstanding this I am still confident that it has been a worthwhile process.

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6A Appendices

6A.1 Honey and Mumford's Learning Styles Preferences

Table 6A.1: Honey and Mumford's Learning Styles Preferences

Source: Honey and Mumford (1992: 22-26).

| Activists | |
|---|--|
| Learn best from activities where: | Learn least from, and may react against, activities where: |
| <ul style="list-style-type: none"> • There are new experiences/problems/ opportunities from which to learn. • They can engross themselves in short 'here and now' activities such as business games, competitive teamwork tasks, role-playing exercises. • There is excitement/drama/crisis and things chop and change with a range of diverse activities to tackle. • They have a lot of the limelight/high visibility, i.e. they can 'chair' meetings, lead discussions, give presentations. • They are allowed to generate ideas without constraints of policy or structure of feasibility. • They are thrown in at the deep end with a task they think is difficult, i.e. when a set a challenge with inadequate resources and adverse conditions. • They are involved with other people, i.e. bouncing ideas off them, solving problems as part of a team. • It is appropriate to 'have a go'. | <ul style="list-style-type: none"> • Learning involves a passive role, i.e. listening to lectures, monologues, explanations, statements of how things should be done, reading, watching. • They are asked to stand back and not be involved. • They are required to assimilate, analyse and interpret lots of 'messy' data. • They are required to engage in solitary work, i.e. reading, writing, thinking on their own. • They are asked to assess beforehand what they will learn, and to appraise afterwards what they have learned. • They are offered statements they see as 'theoretical', i.e. explanation of cause or background. • They are asked to repeat essentially the same activity over and over again, i.e. when practicing. • They have precise instructions to follow with little room for manoeuvre. • They are asked to do a thorough job, i.e. attend to detail, tie up loose ends, dot the is, and cross ts |

| Reflectors | |
|--|---|
| Learn best from activities where: | Learn least from, and may react against, activities where: |
| <ul style="list-style-type: none"> • They are allowed or encouraged to watch/think/ ponder over activities • They are able to stand back from events and listen/observe, i.e. observing a group at work, taking a back seat in a meeting, watching a film or video. • They are allowed to think before acting, to assimilate before commenting, i.e. time to prepare, a chance to read in advance a brief giving background data. • They can carry out some painstaking research, i.e. investigate, assemble information, probe to get to the bottom of things. • They have the opportunity to review what has happened, what they have learned. • They are asked to produce carefully considered analyses and reports. • They are helped to exchange views with other people without danger, i.e. by prior agreement, within a structured learning experience. • They can reach a decision in their own time without pressure and tight decision. | <ul style="list-style-type: none"> • They are 'forced' into the limelight, i.e. to act as leader/chairperson, to role-play in front of on-lookers. • They are involved in situations which require action without planning. • They are pitched into doing something without warning, i.e. to produce an instant reaction, to produce off-the-top-of-the-head ideas. • They are given insufficient data on which to base a conclusion. • They are given cut and dried instructions of how things should be done. • They are worried by time pressures or rushed away from one activity to another. • In the interests of expediency they have to make short cuts or do a superficial job. |

| Theorist | |
|---|--|
| Learn best from activities where: | Learn least from, and may react against, activities where: |
| <ul style="list-style-type: none"> • What is being offered is part of a system, model, concept, theory. • They have time to explore methodically, assumptions or logic behind something, i.e. by taking part in a question and answer session, by checking a paper for inconsistencies. • They are intellectually stretched, i.e. by analysing a complex situation, being tested in a tutorial session, by checking a paper for inconsistencies. • They are in structured situations with a clear purpose. • They can listen to or read about ideas and concepts that emphasise rationality or logic and are well argued/elegant/watertight. • They can analyse and then generalise the reasons for success or failure. • They are offered interesting ideas and concepts even though they are not immediately relevant. • They are required to understand and participate in complex situations. | <ul style="list-style-type: none"> • They are pitchforked into doing something without a context or apparent purpose. • They have to participate in situations emphasising emotions and feelings. • They are involved in unstructured activities where ambiguity and uncertainty are high, i.e. with opened-ended problems, or sensitivity training. • They are asked to act or decide without a basis in policy, principle or concept. • They are faced with a hotchpotch of alternative/contradictory techniques/methods without exploring any in depth, i.e. as a 'once over lightly' course. • They doubt that the subject matter platitudinous, shallow or gimmicky. • They feel themselves out of tune with other participants, i.e. when with lots of other Activists or people of lower intellectual calibre. |

| Pragmatists | |
|---|---|
| Learn best from activities where: | Learn least from, and may react against, activities where: |
| <ul style="list-style-type: none"> • There is an obvious link between the subject matter and a problem or opportunity on the job. • They are shown techniques for doing things with obvious practical advantages, i.e. how to save time, how to make a good first impression, how to deal with awkward people. • They have the chance to try out and practice techniques with coaching/feedback from a credible expert, i.e. someone who is successful and can do the techniques themselves. • They are exposed to a model they can emulate, i.e. a respected boss, a demonstration from someone with a proven track record, lots of examples/anecdotes, a film showing how its done. • They are given techniques currently applicable to their own job. • They are given immediate opportunities to implement what they have learned. • There is a high face validity in the learning activity, i.e. a good simulation, 'real' problems. • They can concentrate on practical issues, i.e. drawing up action plans with an obvious end product, suggesting short cuts, giving tips. | <ul style="list-style-type: none"> • The learning is not related to an immediate need they recognise, i.e. they cannot see an immediate relevance/practical benefit. • Organisers of the learning, or the event itself, seems distant from reality, i.e. 'ivory towered', all theory and general principles, pure 'chalk and talk'. • There is no practice or clear guidance on how to do it. • They feel that people are going round in circles and not getting anywhere fast enough. • There are political, managerial or personal obstacles to implementation. • There is no apparent reward from the learning activity, i.e. more sales, shorter meetings, higher bonus, promotion. |

6A.2 Characteristics of Adaptors and Innovators.

Table 6A.2: Characteristics of Adaptors and Innovators.

Source: Kirton (1994: 10-11, Table 1)

| The Adaptor | The Innovator |
|--|---|
| <ul style="list-style-type: none"> • Characterised by precision, reliability, efficiency, methodicalness, prudence, discipline, conformity. • Concerned with resolving residual problems thrown up by the current paradigm. • Seeks solutions to problems in tried and understood ways. • Reduces problems by improvement and greater efficiency, with maximum of continuity and stability. • Seen as sound, conforming, safe, dependable. • Liable to make goals of means. • Seems impervious to boredom, seems able to maintain high accuracy in long spells of detailed work. • Is an authority within given structures. • Challenges rules rarely, cautiously, when assured of strong support. • Tends to high self-doubt. Reacts to criticism by closer outward conformity. Vulnerable to social pressure and authority; compliant. • Is essential to the functioning of the institution all the time, but occasionally needs to be 'dug out' of his system. | <ul style="list-style-type: none"> • Seen as undisciplined, thinking tangentially approaching tasks from unsuspected angles. • Could be said to search for problems and alternative avenues of solution, cutting across current paradigms. • Queries problem's concomitant assumptions: manipulates problems. • Is catalyst to settled groups; irreverent of their consensual views; seen as abrasive, creating dissonance. • Seen as unsound, impractical; often shocks opposite. • In pursuit of goals treats accepted means with little regard. • Capable of detailed routine (system-maintenance) work for only short bursts. • Tends to take control in unstructured situations. • Often challenges rules, has little respect for past custom. • Appears to have low self-doubt when generating ideas, not needing consensus to maintain certitude in the face of opposition. • In the institution is ideal in unscheduled crisis, or better still in helping to avoid them, if he can be controlled. |
| When collaborating with innovators: | When collaborating with adaptors: |
| <ul style="list-style-type: none"> • Supplies stability, order and continuity to the partnership.. • Is sensitive to people, maintains group cohesion and co-operation. • Provides a safe base for the innovator's riskier operations. | <ul style="list-style-type: none"> • Supplies the task orientations, the break with the past and accepted theory. • Appears insensitive to people, often threatens group cohesion and co-operation. • Provides the dynamics to bring about radical change, without which institutions tend to ossify. |

6A.3 MBTI Definitions of Preferences

Table 6A.3: MBTI Definitions of Preferences

Source: Myers and Myers (1987: 2-3)

| <i>Where do you prefer to focus your attention? The EI scale</i> | |
|--|---|
| E – Extraversion | I - Introversion |
| People who prefer Extroversion tend to focus on the outer world of people and things. When you are extraverting, you are energized by what goes on in the outer world, and this is where you tend to direct your own energy. Extraverts usually prefer to communicate more by talking and writing. They need to experience the world in order to understand it and thus tend to like action and variety. | People who prefer Introversion focus more on their inner world. When you are introverting, you are energized by what goes on in your inner world, and this is where you tend to direct your own energy. Introverts tend to be more interested and comfortable when they can work quietly without interruption. They like to understand the world before experiencing it, and so need time to reflect before acting. |
| <i>How do you acquire information, or find out about things? The SN scale</i> | |
| S – Sensing | N - Intuition |
| Sensing focuses on the realities of a situation. Sensing types tend to accept and work with what is ‘given’ in the here-and-now, and thus become realistic and practical. They are good at remembering and working with a great number of facts. They prefer to use proven procedures and are careful with detail. | Intuition shows you the meanings, relationships, and possibilities that go beyond the information from your senses. Intuitive types look at the big picture and try to grasp the overall patterns. They grow expert at seeing new possibilities and they value imagination and inspiration. |
| <i>How do you make decisions? The TF scale</i> | |
| T – Thinking | F- Feeling |
| Thinking types make decisions objectively, on the basis of cause and effect, by analysing and weighing the evidence. Thinking focuses on the logical consequences of any choice or action. Thinking types seek an objective standard of truth; they are good at analyzing what is wrong with something. | Feeling types make decisions based on person-centred values. When deciding, they consider how important the choices are to themselves and others. They like dealing with people and tend to become sympathetic, appreciative, and tactful. They value harmony and work to make it happen. |
| <i>How do you orient yourself toward the outer world? The JP scale</i> | |
| J – Judging | P - Perceiving |
| Those who prefer Judging like to live in a planned, orderly way, wanting to regulate life and control it. They want to make decisions, come to closure, and then carry on. They like to be structured and organised and want things settled. | Those who prefer Perceiving like to live in a flexible, spontaneous way, gathering information and keeping options open. They seek to understand life rather than control it. They prefer to stay open to experience, enjoying and trusting their ability to adapt to the moment. |

6A.4 MBTI Preferences in Work Situations

Table 6A.4: Effects of Each Preference in Work Situations

Source: Myers and Myers (1987: 6)

| | |
|--|---|
| <p>E – Extravert Types</p> <p>Like variety and action Are often good at greeting people Are sometimes impatient with long slow jobs Are interested in how others do their jobs Often enjoy talking on the phone Often act quickly, sometimes without thinking Like to have people around in the working environment May prefer to communicate by talking rather than writing Like to learn a new task by talking it through with someone.</p> | <p>I – Introvert Types</p> <p>Like quiet for concentration Have trouble remembering names and faces Can work on one project for a long time without interruption Are interested in the idea behind the job Dislike telephone interruptions Think before they act, sometimes without acting Work alone contentedly May prefer communications to be in writing May prefer to learn by reading rather than talking or experiencing.</p> |
| <p>S - Sensing Types</p> <p>Are aware of the uniqueness of each event Focus on what works now Like an established way of doing things Enjoy applying what they have already learned Work steadily, with a realistic idea of how long it will take Usually reach a conclusion step by step Are not often inspired, and may not trust the inspiration when they are Are careful about the facts Can oversimplify a task Accept current reality as a given to work with</p> | <p>N - Intuitive Types</p> <p>Are aware of new challenges and possibilities Focus on how things could be improved Dislike doing the same things repeatedly Enjoy learning new skills Work in bursts of energy powered by enthusiasm, with slack periods in between May leap to a conclusion quickly Follow their inspirations and hunches May get their facts a bit wrong Dislike taking time for precision Can overcomplexify a task Ask why things are as they are</p> |
| <p>T - Thinking Types</p> <p>Are good at putting things in logical order Respond more to people’s ideas than their feelings Anticipate or predict logical outcomes of choices Need to be treated fairly Tend to be firm and tough-minded Are able to reprimand or fire people when necessary May hurt people’s feelings without knowing it Have a talent for analyzing a problem or situation</p> | <p>F - Feeling Types</p> <p>Like harmony and will work to make it happen Respond to people’s values as much as to their thoughts Are good at seeing the effects of choices on people Need occasional praise Tend to be sympathetic Dislike telling people unpleasant things Enjoying pleasing people Take an interest in the person behind the job or idea</p> |
| <p>J - Judging Types</p> <p>Work best when they can plan their work and follow the plan Like to get things settled and finished May decide things too quickly May dislike to interrupt the project they are on for a more urgent one Tend to be satisfied once they reach a judgement on a thing, situation, or person Want only the essentials needed to begin their work Schedule projects so that each step gets done on time Use lists as agendas for action</p> | <p>P - Perceiving Types</p> <p>Do not mind leaving things open for last-minute changes Adapt well to changing situations May have trouble making decisions, feeling like they never have enough information May start too many projects and have difficulty in finishing them May postpone unpleasant jobs Want to know all about a new job Get a lot accomplished at the last minute under pressure of deadline Use lists as reminders of all the things they have to do someday</p> |

6A.5 MBTI Characteristics Frequently Associated with Each Type

Table 6A.5: MBTI Characteristics Frequently Associated with Each Type
Source: Myers and Myers (1987: 7)

| Sensing Types | | Intuitive Types | | | |
|---|--|---|--|--|--|
| | | Introverts | | Extraverts | |
| <p>ISTJ Serious, quiet, earn success by concentration and thoroughness. Practical, orderly, matter-of-fact, logical, realistic, and dependable. See to it that everything is well organized. Take responsibility. Make up their own minds as to what should be accomplished and work toward it steadily, regardless of protests or distractions.</p> | <p>ISFJ Quiet, friendly, responsible, and conscientious. Work to meet their obligations. Lend stability to any project or group. Thorough, painstaking, accurate. Their interests are usually not technical. Can be patient with necessary details. Loyal, considerate, perceptive concerned with how other people feel.</p> | <p>INTJ Usually have original minds and great drive for their own ideas and purposes. In fields that appeal to them, they have a fine power to organize a job and carry it through with or without help. Sceptical, critical, independent, determined, sometimes stubborn. Must learn to yield less important points in order to win the most important.</p> | <p>INTP Quiet and reserved. Especially enjoy theoretical or scientific pursuits. Like solving problems with logic and analysis. Usually interested in mainly ideas, with little liking for parties or small talk. Tend to have sharply defined interests. Need careers where some strong interest can be used and useful.</p> | <p>ENTP Quick, ingenious, good at many things. Stimulating company, alert and outspoken. May argue for fun on either side of a question. Resourceful in solving new and challenging problems, but may neglect routine assignments. Apt to turn one new interest after another. Skilful in finding logical reasons for what they want.</p> | <p>ENTJ Hearty, frank, decisive, leaders in activities. Usually good in anything that requires reasoning and intelligent talk, such as public speaking. Are usually well informed and enjoy adding to their fund of knowledge. May sometimes appear more than positive and confident than their experience in an area warrants.</p> |
| <p>ISTP Cool onlookers – quiet reserved, observing and analysing life with detached curiosity and unexpected flashes of original humour. Usually interested in cause and effect, how and why mechanical things work, and in organizing facts using logical principles.</p> | <p>ISFP Retiring, quietly friendly, sensitive, kind, modest about their abilities. Shun disagreements, do not force their opinions or values on others. Usually do not care to lead but are often loyal followers. Often relaxed about getting things done because they enjoy the present moment and do not want to spoil it by undue haste or exertion.</p> | <p>INFJ Succeed by perseverance, originality, and desire to do whatever is needed or wanted. Put their best efforts into their work. Quietly forceful, conscientious, concerned for others. Respected for their firm principles. Likely to be honoured and followed for their clear convictions as to how best swerve the common good.</p> | <p>INFP Full of enthusiasms and loyalties, but seldom talk of these until they know you well. Care about learning, ideas, language, and independent projects of their own. Tend to undertake too much, then somehow get it done. Friendly but often too absorbed in what they are doing to be sociable. Little concerned with possessions or physical surroundings.</p> | <p>ENFP Warmly enthusiastic, high spirited, ingenious, imaginative. Able to do almost anything that interests them. Quick with a solution for any difficulty and ready to help anyone with a problem. Often rely on their ability to improvise instead of preparing in advance. Can usually find compelling reasons for whatever they want.</p> | <p>ENFJ Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.</p> |
| <p>ESTP Good at on-the-spot problem solving. Do not worry, enjoy whatever comes along. Tend to like mechanical things and sports, with friends on the side. Adaptable, tolerant, generally conservative in values. Dislike long explanations. Are best with real things that can be worked, handled, taken apart, or put together.</p> | <p>ESFP Outgoing, easygoing, accepting, friendly, enjoy everything and make things more fun for others by their enjoyment. Like sports and making things happen. Know what's going on and join in eagerly. Find remembering facts easier than mastering theories. Are best in situations that need sound common sense and practical ability with people as well as with things.</p> | <p>ENFJ Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.</p> | <p>ENFP Warmly enthusiastic, high spirited, ingenious, imaginative. Able to do almost anything that interests them. Quick with a solution for any difficulty and ready to help anyone with a problem. Often rely on their ability to improvise instead of preparing in advance. Can usually find compelling reasons for whatever they want.</p> | <p>ENFJ Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.</p> | <p>ESFJ Warm-hearted, talkative, popular, conscientious, born co-operators, active committee members. Need harmony and may be good at creating it. Always doing something nice for someone. Work best with encouragement and praise. Main interest is in things that directly and visibly affect people's lives.</p> |
| <p>ESTJ Practical, realistic, matter-of-fact, with a natural head for business or mechanics. Not interested in subjects they see no use for, but can apply themselves when necessary. Like to organize and run activities. May make good administrators, especially if they remember to consider others' feelings and points of view.</p> | <p>ESFJ Warm-hearted, talkative, popular, conscientious, born co-operators, active committee members. Need harmony and may be good at creating it. Always doing something nice for someone. Work best with encouragement and praise. Main interest is in things that directly and visibly affect people's lives.</p> | <p>ENFJ Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.</p> | <p>ENFP Warmly enthusiastic, high spirited, ingenious, imaginative. Able to do almost anything that interests them. Quick with a solution for any difficulty and ready to help anyone with a problem. Often rely on their ability to improvise instead of preparing in advance. Can usually find compelling reasons for whatever they want.</p> | <p>ENFJ Responsive and responsible. Generally feel real concern for what others think or want, and try to handle things with due regard for the other person's feelings. Can present a proposal or lead a group discussion with ease and tact. Sociable, popular, sympathetic. Responsive to praise and criticism.</p> | <p>ESFJ Warm-hearted, talkative, popular, conscientious, born co-operators, active committee members. Need harmony and may be good at creating it. Always doing something nice for someone. Work best with encouragement and praise. Main interest is in things that directly and visibly affect people's lives.</p> |

6A.6 The Problem with Computers ...

This appendix discusses three issues incidental to the research processes undertaken for this project from which lessons can be learned. Firstly, the use of bibliographic software; secondly, managing the large amount of research data that this project generated; and thirdly, the problems encountered when a major part of the research data became corrupted. Lessons are drawn from these issues and solutions and preventative measures suggested.

6A.6.1 EndNote® Bibliographic Software

During the first module we were introduced to the EndNote® bibliographic software. A package that would, we were assured by the demonstrator, solve our problems managing our literature searches and reviews, embed references directly into Word® and even connect directly via the internet to a whole host of useful and interesting library resources. A review of the product's website and specification did indeed suggest that this was the indispensable 'must-have' product for supporting research work. It was even available at a heavily discounted price for students. So it was that I invested in a copy of EndNote®. The software arrived and with eager anticipation and I installed it on my PCs both at work and at home.

After a few days of trials and tests to familiarise myself with the software, including transferring the database files backwards and forwards between home and work PCs all seemed well, and the task of entering all the bibliographic references gathered commenced.

This quickly amassed to eighty-five publications; all seemed well and it all seemed so easy and ideal.

At this point, writing up the research proposal started in earnest. The outline structure was completed and typing up of the text from longhand notes and sketches began. So far so good – two whole pages completed, and three references embedded via EndNote®. By half way through the third page it was noticeable that Word® was beginning to slow down. There was now a distinct time lag between a keystroke and

the text appearing on screen. By the bottom of the third page and a fourth reference embedded things were on a very distinct ‘go-slow’, with a delay of several seconds between the keystroke and on-screen text now occurring. Having paused to deal with a phone call it was found that, upon return, Word® had completely frozen. The PC was cursed, the network was cursed, Word® was cursed, the telephone caller was cursed and the PC rebooted. Typing continued but only very slowly as characters were taking many seconds to appear on screen after a keystroke, and subject to regular freezing of Word®. When ‘home time’ arrived, the file was e-mailed home so work could continue at home. At home, on a much more powerful PC, the exactly the same problems were encountered. After a period of experimentation with a number of trial documents, I observed that the problems only occurred when EndNote® was used to embed references in Word® documents. By now three weeks had elapsed since typing up of the research proposal had commenced and with only four pages typed I was getting behind schedule, and my patience beginning to wear a little thin.

I contacted the software suppliers, Adept Scientific®, about the problems being encountered. Their technical support department replied remarkable quickly: and yes they were aware of this problem as there was a “known issue” when using EndNote® in Word® /Office 2003®. They e-mailed a suggested ‘fix’, which might, only might, help resolve the problem. The suggested ‘fix’ consisted of four pages of instructions in 4-point text! Having restructured the text to something approaching readable, the ‘fix’ was undertaken. It didn’t work. Work was now almost five weeks behind schedule so I decided to abandon EndNote®. All EndNote® embedded references were stripped from the research proposal and re-entered manually. The EndNote® reference database was printed out for future referencing and then EndNote was uninstalled from both home and work PCs.

During the course of the next three years the Access® database was developed and expanded to log literature and keywords for searching, eventually containing references to almost eleven-hundred articles. Throughout this period I had been receiving product development circulars from the EndNote® distributors and

eventually when EndNote® version 10 was released, containing a number of new and useful features a trial version was downloaded and tested. This was an immediate success, as not only did it work faultlessly, it was much easier to search and recall references, as well as being able to create a PDF® based library of material, which being embodied in the EndNote® library files made transportation between home and work PCs very easy. A copy was purchased and put to immediate use. For ‘safety reasons’ for a while new material was recorded in both the Access® database and EndNote®, and after a few weeks new material was added to the EndNote® libraries only. References in the Access® database were not subject to a systematic transfer to EndNote as this, I decided, would take too much time, but as existing material was reviewed it was to the EndNote® library. Subsequently I upgraded to EndNote® XI when it was released as, having reviewed a trial version, I found this to be even easier and quicker to use, as well as introducing a new feature which enabled references to be added to ‘groups’, i.e. topics. This enabled all articles could be quickly filtered and displayed for a particular topics, for example, ‘CSCS’, ‘Critical Realism’, or ‘DTI reports’, etc., rather than using a key-word search facility. This also mirrored the way I stored articles and reports in magazine file-boxes according to subject, thus I initially used the groups feature to indicate which box an article was stored in.

I have found the use of bibliographic software to be an invaluable aid in managing the large collection of reports, journal articles and other literature collected during the course of the project. After a faltering start with EndNote I would now agree completely with our tutors that bibliographic software is indispensable in research projects of this magnitude. I now recommend all students, both at undergraduate and postgraduate level, to use bibliographic software for their research work as it is easy to use and the time saving potential is considerable. I do, however, add the caveat that, as with all software, care must be exercised to minimise the risk of loss of data.

6A.6.2 Data Management

One of the problems that inevitably occur with a project such as this is the large amount of data that is collected. This comes not only in the form of downloaded electronic copies of journal articles and reports from many sources, but also in the numerous files of support work that is undertaken. These come in the form of spreadsheets, database files, graphics files, statistical analysis output, and not least the many back-up copies of each chapters, chapter sections and appendices for each document generated during each ‘shift’ of working on the project. This presently stands at some 9,000 files, in 1,530 folders occupying almost 3.4Gb of storage hard-disk drive (HDD) space. In order to protect the data from either accidental loss, or theft of a computer, a hierarchical system of making and saving original and back-up files was developed and implemented as shown in Figure 6A.1 below.

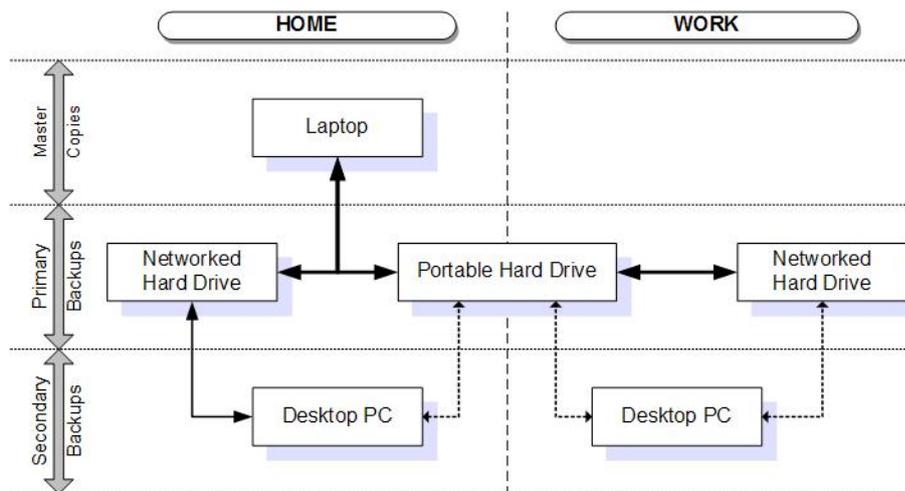


Figure 6A.1: Dataflow for backup copies

The original files were maintained on a laptop that was normally used for the DBA work, although occasionally either the home PC or work PC would be used. See Figure 6A.2 below. At the end of each session the original files on the laptop were backed up onto both a HDD connected to the home wireless network and onto a portable HDD. Each workday the portable HDD was taken to and from work, and the DBA files on the portable HDD were systematically backed onto my workspace on the University’s ‘home-directory’ facility which itself is back-up and protected by the University. This had the added bonus of being accessible from home via an internet connection should the need arise. An additional, secondary, backup would

also be made on the HDD on my work desk-top PC. At regular intervals, the files on the home network drive were also backed-up onto the home PC.

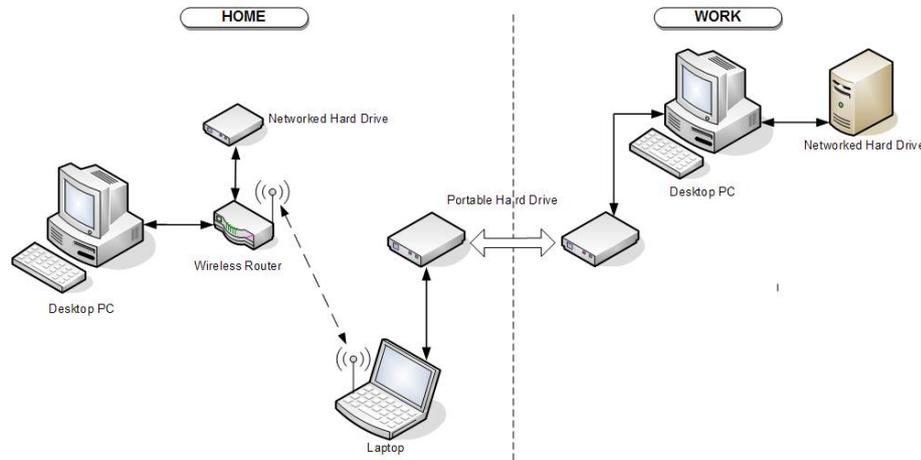


Figure 6A.2: Dataflow Working Arrangement

Thus three tiers of files were created, one original, three primary backups and two secondary backups in the hope and belief that by creating a number of backup copies on various PCs and HDDs in the event of loss or failure of laptop or HDD a backup copy would be readily retrievable from one or other of the other locations. The likelihood of losing the laptop, home PC, portable HDD, work PC and NTU's network drive system at the same time was considered negligible.

The backup procedure was a simple process using a utility program called 'SyncToy[®]', available as a free download from Microsoft[®]. SyncToy[®] enables the user to compare and synchronise any two storage devices, such as HDDs and USB memory sticks, and/or directories within them in a number of possible ways according to the user's needs, as shown in Figure 6A.3 below and Figure 6A.4 overleaf. As with any software utility of this type great care must be taken to ensure the correct form of synchronisation has been selected as it is only too easy to overwrite a new file with an older version, or delete a new file if the synchronisation process is run the 'wrong way round'. Being very much aware of this potential danger backups have only ever synchronised from original to primary backup, and from primary backup to secondary backup. No files been lost through incorrect synchronisation; yet!!

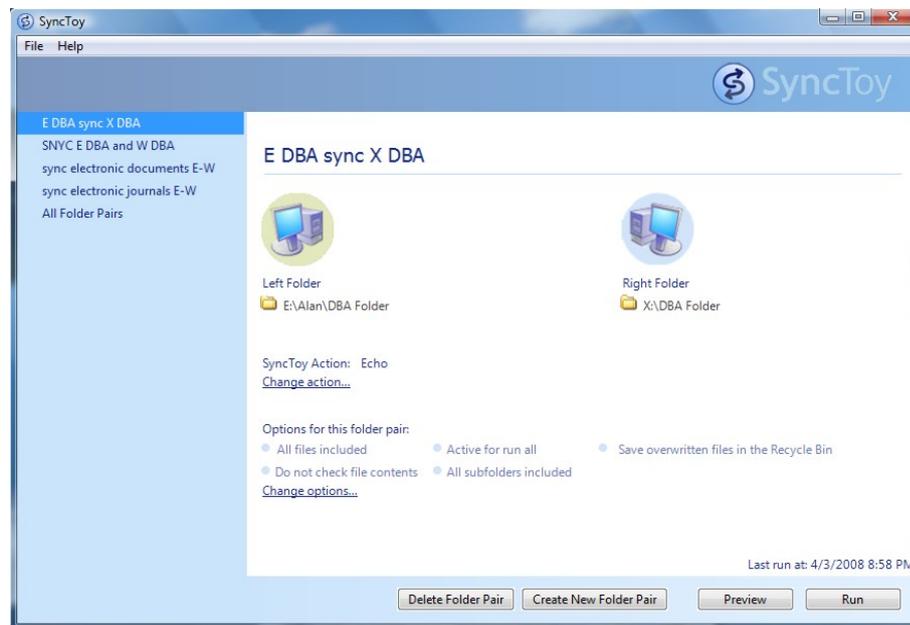


Figure 6A.3: SyncToy – Synchronisation of Folder Pairs

Sadly, it seems that, all too often, either on TV or in the newspapers, we see or read that someone claims to have lost their entire life's research work, text of their latest book, or something similar, due to loss or theft of their computer (particularly laptops) without them having made any backup copies of their work. Therefore, I would strongly recommend the use of a synchronisation utility such as SyncToy to all students and researchers as an easy (but not foolproof) way of managing computer files in conjunction with some form of structured backup arrangement, and that it is used on a regular, systematic basis.

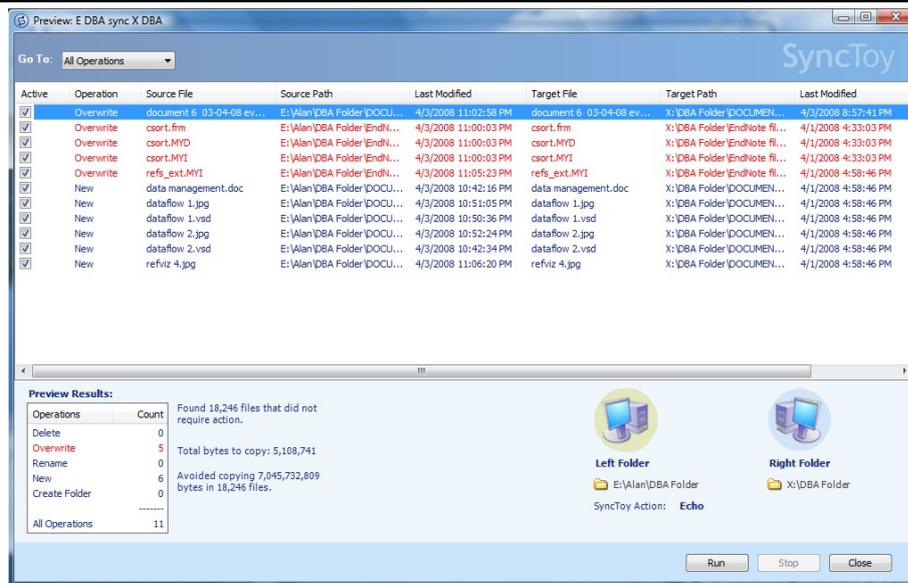


Figure 6A.4: SyncToy – Synchronisation of Files

6A.6.3 Data Corruption

In order to process the data from the questionnaire responses for Document 5 I decided that a MS Excel[®] workbook would be created containing a separate spreadsheet for each question, thus the workbook would contain twenty-eight spreadsheets. Each spreadsheet would also contain an abstraction of the responses, including any subsections, to the question as well as performing calculations such as the Likert mean and the Relative Importance Indices where appropriate. In addition it would contain graphs of both responses in terms of stacked bar-charts for the Likert scale and option responses and bubble-charts for the cross-tabulations. In order to produce the cross-tabulation data for the production of the bubble-charts Visual Basic[®] macros were written to perform the abstraction and collation of data from the various spreadsheets (see Document 5). As all of these were systematically produced and incorporated in the spreadsheets the workbook became progressively bigger and bigger, correspondingly taking more and more time to both open, save and close.

As a matter of good practice at the end of each work session back-up copies of all files, including the workbook were routinely made on three other hard-drives; a portable hard-drive, a networked hard-drive at home, and a networked hard-drive at work. The master-files remained on the laptop computer being used for the research

project. Unbeknown to me, and for reasons that have never been fully established, the workbook became corrupted one day as it was being saved at the end of a work session. This corrupt workbook was then systematically transferred to all the back-up drives, overwriting earlier copies of the workbook, and effectively destroying all working copies of the workbook.

Only when I attempted to next open the workbook on the laptop did the problem become apparent as messages were displayed that the workbook was corrupt and could not be opened. I believe that this was no more than a minor inconvenience as there were three back-up copies in existence and one of those could be retrieved and used. As this was being done an ever increasing sense of desperation and despair developed as one-by-one each of the back copies was reported to be corrupt and unopenable. Hundreds of hours of work was potentially lost and would have to be recreated. Eventually, it was possible to perform a partial recovery of the workbook, but the corruption had resulted in the loss of every macro and graph from the spreadsheets, but fortunately very little of the basic data that had been inputted was lost. Every macro and graph had to be recreated from scratch, a process that took many weeks, although, fortunately, printouts of some of the macros codes had been made, mainly for error checking purposes, and had been retained, thus making the recreation of the macros somewhat easier than it might otherwise have been. However, I was able to take some advantage of this disastrous situation and make improvements to both macros and graphs based on lessons learned producing the earlier versions, which otherwise would probably not have been made.

Whilst the exact cause of the corruption was never established I am of the opinion that it was caused by the workbook becoming too large for the laptop I was using to handle. If more than one application was open at the same time (i.e. Excel and Word) as was the case when the workbook was saved, due to the laptop have insufficient memory (512Mb) and a relatively low processor speed of 1.2GHz then the file might not have saved correctly. Problems with the file sizes and/or using multiple applications had not been encountered on either of the two desktop PCs

used, both having 2Gb of memory and processor speeds of more than 3GHz; i.e. four times the memory and two-and-a-half time the processor speed.

As the workbook and spreadsheets were being recreated I decided that to try and mitigate the likelihood a repeat of this situation two new procedures would be adopted:

- 1) The workbook would be divided into three smaller workbooks, each covering the questions relating to each thread of the questionnaire, i.e. a workbook for each of Questions 1 to 10, 11 to 20, and 21 to 28; and
- 2) That a 'date and three-shift' system of saving files would be adopted for work done in a morning, afternoon or evening. Thus each time any work was undertaken on any file it would be opened and immediately saved with a new filename containing the date and shift for example 'document 6 21-03-08 AM.doc' is the file being used to save this work as I type it. Any work done this afternoon or evening will be saved in a new file with either PM or EVE as appropriate. Thus, if a corruption does occur the most that could be lost would be the work for that morning, afternoon or evening.

Only two minor disadvantages have been found with this method. The first is the rapid consumption of hard-drive storage space, but given the very large size of hard disk drives (HDDs) now provide in laptops, desktop PCs, and even portable drives, this was not found to be a problem as much older/earlier versions of files could always be deleted, although this was not found to be necessary. The second is the need to create a structured folder system to separate various drafts of documents from one another, i.e. separating more recent and current files from much earlier versions to make locating current files easier. However, these disadvantages are mere trivialities compared to the problems of losing large amounts of work.

Alas, this was not the last problem encountered with the spreadsheets and my laptop computer. Based on previous experience of producing Word documents incorporating MS Excel[®] graphs I was aware that copying and pasting graphs from MS Excel[®] into MS Word[®] can not only result in very large file sizes but also

formatting problems can occur when trying to resize the charts in Word, especially with font sizes. Therefore I had opted to adopt a much used technique of saving the charts as JPG files which can then be pasted into MS Word[®] documents as ‘pictures’ and resized as required. This technique requires ‘capturing’ the chart using the ‘print screen’ facility and then pasting the captured image into a graphics program to extract the required image and save it as a JPG file. The lack of memory in the laptop, and having two large applications open at the same time caused some of the JPG files, particularly those of the bubble charts, to be corrupted as the JPG images were not generated correctly. Whilst they appeared correctly on screen in the Word documents when they came to be printed out, the chart images printed with large black bands in them, in some instances almost entirely obliterating the image. Having encountered this problem before elsewhere I knew immediately what the problem was – lack of memory in the computer creating the images. Around twenty chart images were corrupt. The problem was rectified by using a more powerful desktop PC to create the graph images, but even so, it was a time-consuming process to identify which were the corrupt JPG images and recreate them.

The problems were ultimately resolved by purchasing a new laptop computer with 2GB of memory and a 2.4GHz dual core processor. Expensive, but well worth it.

The lessons that were learned here are:

- 1) Making back-up copies, even multiple back-up copies, cannot always prevent loss of work if the same file names are being used each time. New, separate back-up files must be made each and every time.
- 2) Make sure the computer being used is has sufficient power, both in terms of memory and processor speed, to be able to perform the tasks you require it perform with ease, not only for the size of files likely to be generated, but also for the number and size of applications to be used together, i.e. open at the same time.