THE PROCESSES OF CONSTRUCTION PROCUREMENT IN MALAYSIA: IDENTIFICATION OF CONSTRAINTS AND DEVELOPMENT OF PROPOSED STRATEGIES IN THE CONTEXT OF 'VISION 2020'

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ABSTRACT

This thesis concerns the processes of construction procurement in Malaysia in the context of Malaysia's 'Vision 2020'. The aims of the research study are:

- To identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output; and
- To develop proposed strategies to remove or alleviate the constraints identified.

The findings suggest that constraints in some resources and functions within the processes of construction procurement in Malaysia are currently experienced. They also suggest that the constraints in some resources and functions are perceived to exist in the future until at least 2001. These constraints may inhibit the level of construction output.

The findings also indicate the types and extent of the constraints that exist now and are perceived to exist in the future until at least 2001. In addition, strategies that could be implemented to remove or alleviate the constraints identified have been developed, appraised and validated.

This thesis draws two key implications:

- It brings attention to the authorities responsible for the development of the construction industry in Malaysia the process of construction procurement, the constraints it suffers from and suitable strategies that could be implemented to remove or to alleviate those constraints; and
- It presents a comprehensive research methodology on the basis of the triangulation approach of data sources and research methods. The methodology could be utilised to study constraints and identify appropriate strategies to remove or to alleviate constraints within the processes of construction procurement in Malaysia at other times or in construction industries elsewhere.

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Abbreviations

ACEM	Association of Consulting Engineers Malaysia
ADB	Asian Development Bank
AFF	Armed Forces Fund
ARCOM	Association of Researchers in Construction Management
ASEAN	Association of South East Asian Nations
BCA	British Cement Association
BCIC	Building Cost Information Centre
BCIS	Building Cost Information Service
BO	Build-Operate
BOO	Build, Operate and Own
BOT	Build-Operate-Transfer
BOTB	British Overseas Trade Board
BQ	Bills of Quantities
CF	Certificate of Fitness
CIB	*Conseil International du Batiment pour la Recherche , l'Etude et la Documentation*
CIDB	Construction Industry Development Board
CIOB	Chartered Institute of Building
CITB	Construction Industry Training Board
CSCS	Construction Skills Certification Scheme
DTI	Department of Trade and Industry, UK
DoE	Department of Environment, UK
EAP	Economically Active Population (16-65 years of age)
EIA	Environmental Impact Assessment
EPF	Employees Provident Fund
ENR	Engineering News Record
EPU	Economic Planning Unit of the Prime Minister's Department, Malaysia
FECs	Further Education Colleges

FIC	Foreign Investment Committee
FIDIC	*Federation Internationale Des Ingenieurs-Conseils*
FTZs	Free Trade Zones
GDP	Gross Domestic Product
GFCF	Gross Fixed Capital Formation
GMT	Greenwich Mean Time
GNP	Gross National Product
HDAM	Housing Developers' Association of Malaysia
HICOM	Heavy Industries Corporation of Malaysia
HMSO	Her Majesty's Stationary Office
HRDF	Human Resources Development Fund
IBC	Islamic Banking System
IBRD	International Bank for Reconstruction and Development
IBRS	International Business Reply Service
IBS	Interest-free Banking Scheme
ICE	Institution of Civil Engineers
IDA	International Development Association
IDB	Islamic Development Bank
IEM	Institute of Engineers Malaysia
IGAs	Investment Guarantee Agreement
ILO	International Labour Organisation
INTAN	*Institut Tadbiran Awam Negara Malaysia*
IPRG	International Procurement Research Group
ISM	Institution of Surveyors Malaysia
JICA	Japan International Co-operation Agency
JKR	*Jabatan Kerja Raya*
KLSE	Kuala Lumpur Stock Exchange
MARA	*Majlis Amanah Rakyat*
M.I.C	Malaysian Industrial Classification
MBA	Master Builders Association of Malaysia
MIER	Malaysia Institute of Economic Research
MIP	Malaysian Institute of Planners

MOC	Ministry of Construction
NDP	National Development Policy
NEDO	National Economic Development Organisation
NEP	New Economic Policy
NFPE	Non-Financial Public Enterprise
NHBC	National House Building Council
NICs	Newly Industrialised Countries
NVQs	National Vocational Qualification
OECD	Organisation for Economic Co-operation and Development
OPP1	Outline Perspective Plan 1
OPP2	Outline Perspective Plan 2
PAM	*Pertubuhan Akitek Malaysia*
PDA	Preliminary Detailed Abstract
PKK	*Pusat Khidmat Kontraktor, Kementerian Perusahaan Awam Malaysia*
PKMM	*Persatuan Kontraktor Melayu Malaysia*
PTF	Pension Trust Fund
PWD	Public Works Department
RIBA	Royal Institution of British Architects
RICS	Royal Institution of Chartered Surveyors
RM	Ringgit Malaysia
S.O.	Superintending Officer
SIRIM	Standards and Industrial Research Institute of Malaysia
SOCs	Small or Occasional Clients
SOCSO	Social Security Organisation
TECs	Training and Enterprise Councils
TTD	Tender Table Documents
UK	United Kingdom
US	United States Of America
US$	United States Dollars
YTL	Yeoh Tiong Lay Corporation Berhad

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CHAPTER 1

INTRODUCTION

This thesis concerns the processes of construction procurement in Malaysia in the context of Malaysia's 'Vision 2020'. The aims of the research study are:

1. To identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output; and

2. To develop proposed strategies to remove or alleviate the constraints identified.

1.1 Context and the Research Questions

One fundamental reason for seeking to achieve construction growth is to stimulate and sustain growth in the other sectors of a country's economy and to raise overall growth in the economy. Different researches and writers (including Strassmann, 1970; Turin, 1973a and 1973b; Edmonds, 1979; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1985 and 1986; Ofori, 1980 and 1988; Al-Mufti, 1987; Wang, 1987; Miles and Neale, 1991; Al-Omari, 1992; Salih, 1992; European Commission, 1994; Ruddock and Lopes, 1996) have suggested that in the earlier stages of development construction plays a major role in the country's economy. Construction establishes the basic physical, social and institutional infrastructures, housing, and facilities for the manufacturing and services sectors. This is because much of the infrastructure including housing and other facilities that were then necessary to stimulate growth in the economy are either non-existent or inadequate. Fulfilling these requirements will inevitably demand a high level of construction output. A country's economy therefore requires a capable indigenous construction sector, i.e., in terms of its relative size and the adequacy and timely supplies of the main resources, functions and institutions required for its processes.

The economic growth in Malaysia after the recession of 1985-1986 and specifically since 1988 has been rapid and prominent. For instance, in 1996 the economy recorded a real rate of growth in Gross Domestic Product or GDP (in constant 1978 prices) of 8.6 per cent. The rate of inflation and unemployment at the end of 1996 was at 3.5 per cent and 2.5 per cent, respectively (Ministry of Finance, 1997, p8-9). Nineteen ninety-six was the ninth consecutive year that Malaysia accomplished annual economic growth at a rate averaging above 8.0 per cent. In terms of value, the economy grew by some 1.97 times, i.e., from RM66,303 millions in 1988 to RM130,628 millions in 1996 (Ministry of Finance, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997). Manufacturing is among the most active economic sectors and by the end of 1995 was the leading sector in the economy with output accounting for 33.1 per cent of GDP (Government of Malaysia, 1996, p264). The per capita income at current market prices at the end of 1996 was RM11,239 or US$4,442 (Ministry of Finance, 1997, p7) and is one of the highest among the developing countries. These economic characteristics place Malaysia alongside the other middle income developing countries (Adam and Cavendish, 1995, p11; World Bank, 1995, p163; 1997, p215; Mahathir Mohamad, 1997) as an emerging second-generation newly industrialised country (Auty, 1995, p223).

In tandem with the growth in the economy, the construction industry in Malaysia is also experiencing rapid and prominent growth. For instance, the annual rate of growth in construction's GDP (in constant 1978 prices) expanded from (-) 11.8 per cent in 1987 to 2.7 per cent in 1988 and to 11.6 per cent in 1989. It reached its peak in 1990 with a rate of growth of 19.0 per cent. In terms of value, construction grew by some 2.88 times since 1988, i.e., from RM2,133 millions in 1988 to RM6,150 millions in 1996 (Ministry of Finance, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997). In 1996 the rate of growth in construction GDP was 14.2 per cent and the industry employed 726,200 persons or 8.9 per cent of the total workforce (Ministry of Finance, 1997, p84 and in Statistical Tables plxi). Construction is therefore, among the most active economic sectors in Malaysia.

Table 1.1 shows the annual rate of growth in the economy, in construction and in other key industries in Malaysia between 1985 and 1996.

Table 1.1 – Malaysia's GDP, 1985 – 1996 (RM million, in constant 1978 prices)

Sector	1985	1986	1987	1988	1989	1990
GDP	57,150	57,859	60,929	66,258	72,409	79,463
Agriculture	11,914 (21)	12,389 (21)	13,311 (22)	14,003 (21)	14,768 (20)	14,827 (19)
Manufacturing	11,263 (20)	12,111 (21)	13,734 (22)	16,151 (24)	18,444 (25)	21,340 (27)
Mining and Quarrying	5,985 (10)	6,433 (11)	6,442 (11)	6,869 (10)	7,383 (10)	7,757 (10)
Construction	2,738 (5)	2,355 (4)	2,077 (3)	2,133 (3.2)	2,380 (3)	2,382 (4)
Services*	24,839 (43)	24,703 (43)	25,950 (43)	27,790 (42)	30,348 (42)	33,836 (43)
Percentage Growth						
GDP	-1.0	1.2	5.3	8.7	9.2	9.7
Agriculture	2.5	4.0	7.4	5.2	6.0	0.4
Manufacturing	-3.8	7.5	13.4	17.6	14.2	15.7
Mining and Quarrying	-1.4	7.5	0.1	6.6	8.5	5.1
Construction	-8.4	-14.0	-11.8	2.7	11.6	19.0
Services*	1.7	-1.0	4.7	7.1	9.2	11.5

Table 1.1 - Malaysia's Gross Domestic Product, 1985 - 1996 (RM million, in constant 1978 prices) (Continued)

Sector	1991	1992	1993	1994	1995	1996
GDP	86,345	93,072	100,838	109,915	120,309	130,628
Agriculture	14,828 (17)	15,468 (17)	16,077 (16)	16,047 (15)	16,230 (13)	16,580 (13)
Manufacturing	24,307 (28)	26,859 (29)	30,324 (30)	34,782 (32)	39,825 (33)	44,684 (34)
Mining and Quarrying	7,944 (9)	8,075 (9)	8,031 (8)	8,241 (8)	8,979 (7)	9,381 (7)
Construction	3,240 (4)	3,619 (4)	4,023 (4)	4,589 (4)	5,385 (4)	6,150 (4.7)
Services*	37,372 (43)	40,699 (44)	44,751 (44)	48,710 (44)	53,303 (44)	58,463 (45)
Percentage Growth						
GDP	8.7	7.8	8.3	9.2	9.5	8.6
Agriculture	0.0	4.3	3.9	-1.0	1.1	2.2
Manufacturing	13.9	10.5	12.9	14.7	14.5	12.2
Mining and Quarrying	2.4	1.6	-0.5	2.5	9.0	4.5
Construction	14.4	11.7	11.2	14.1	17.3	14.2
Services*	10.4	8.9	9.9	8.8	9.4	9.7

* Utilities, transport, storage, communications, trade, hospitalities, finance, insurance, real estate, government services, etc.
Figures in brackets are percentage contribution to total GDP.
Sources: Ministry of Finance, Statistical Tables (1989; 1994; 1997).

The government's pragmatic and bold efforts to modernise and industrialise the country has to a larger extent contributed to the rapid and prominent growth in Malaysia's economy. Since independence in 1957 the economy has been planned by strategic five-year development plans. The current development plan is the Seventh Malaysia Plan (1996-2000). Providing the eventual framework to these development plans is Vision 2020, a national agenda for the long-term development for Malaysia.

The key objective of Vision 2020, launched in 1991 by Prime Minister Mahathir Mohamad, is to transform Malaysia from a developing country into a fully developed and industrialised country by 2020 AD. A fully developed country in the context of Vision 2020 refers to a country that is developed not only in economic sense but fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally (Mahathir Mohamad, 1991, p1-2).

One fundamental challenge towards becoming a fully developed country by 2020 AD is the challenge of establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient (Mahathir Mohamad, 1991, p4). This is Vision 2020's ninth challenge. (Table 1.2 shows the strategic challenges of Vision 2020). A prosperous society by 2020 AD, in the context of Vision 2020, refers to a population that is four times richer (in real terms) than they were in 1990 (Mahathir Mohamad, 1991, p8). To meet this challenge, a target of doubling Malaysia's GDP every ten-year between 1990 and 2020 was set. The target requires that Malaysia's GDP should expand (in real terms) by some eight times, i.e., from RM115 billions in 1990 to about RM920 billions (in constant 1990 prices) in 2020 (Mahathir Mohamad, 1991, p7).

In order to achieve the target of doubling the GDP every ten years between 1990 and 2020, Malaysia's economy must grow by an average of 7 per cent (in real terms) per annum over the same period (Mahathir Mohamad, 1991, p7). With the population projected to reach around 32 millions by 2020 (1990: 18 millions), per capita income (in real terms, 1990 prices) would rise by some four times, i.e., from RM6, 182 (US$2, 248) in 1990 to RM26, 100 (US$9, 500) in 2020 (Sulaiman, 1993, p169). The desired per capita income of RM26, 100 or US$9, 500 is the prosperous society that Vision 2020 envisages.

Table 1.2 - The Strategic Challenges of Vision 2020

1. Establishing a united Malaysian nation (*Bangsa Malaysia*)
2. Creating a psychologically liberated, secure and developed Malaysian society
3. Fostering and developing a mature democratic society
4. Establishing a fully moral and ethical society
5. Establishing a mature, liberal and tolerant society
6. Establishing a scientific and progressive society
7. Establishing a fully caring society
8. Ensuring an economically just society, in which there is a fair and equitable distribution of the wealth of the nation
9. Establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient

Source: Mahathir Mohamad (1991, p2-4).

Malaysia is determined to achieve the targets of Vision 2020. This is indicated by the public sector's extensive development allocations for the provision of adequate physical, social and institutional infrastructures and housing to modernise and industrialise the economy. For instance, under the Sixth Malaysia Plan (1991-1995) and Seventh Malaysia Plan (1996-2000) RM117, 500 millions and RM162, 500 millions, respectively were allocated for these purposes (Government of Malaysia, 1996, p189). See Table 1.3.

However, behind these pictures of rapid and prominent economic and construction growth and of extensive development allocations for infrastructures and housing the size of Malaysia's construction sector remains relatively small. The size of the construction sector, measured in terms of construction's annual contribution to overall GDP, ranged from 3.2 per cent in 1988 to 4.7 per cent in 1996 (Ministry of Finance, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997). See Table 1.1.

Table 1.3 - Public Sector Development Allocation, 1991 - 2000
(RM million, in current prices)

Sector	6th Malaysia Plan 1991-95		7th Malaysia Plan 1996-2000	
	Allocation*	(%)	Allocation	(%)
Federal Government				
Economic	**29,875**	**(51.0)**	**33,706**	**(50.0)**
Agricultural Development	6,685	(11.4)	5,460	(8.1)
Mineral Resource Development	55	(0.1)	47	(0.1)
Commerce and Industry	5,034	(8.6)	5,864	(8.7)
Transport	12,749	(21.8)	15,762	(23.3)
Communications	76	(0.1)	58	(0.1)
Energy	872	(1.5)	1,058	(1.6)
Water Resources	3,641	(6.2)	4,030	(6.0)
Feasibility Study	130	(0.2)	223	(0.3)
Research and Development	633	(1.1)	1,204	(1.8)
Social	**14,780**	**(25.3)**	**19,803**	**(29.3)**
Education and Training	7,760	(13.3)	10,210	(15.1)
Health	2,519	(4.3)	2,658	(3.9)
Information and Broadcasting	110	(0.2)	238	(0.4)
Housing	2,056	(3.5)	2,875	(4.3)
Culture, Youth and Sports	502	(0.9)	946	(1.4)
Local Authorities and Welfare	961	(1.6)	1,550	(2.3)
Community Development	633	(1.1)	1,236	(1.8)
Purchase of Land	239	(0.4)	90	(0.1)
Security	**11,139**	**(19.0)**	**9,188**	**(13.6)**
Defence	9,258	(15.8)	7,000	(10.4)
Internal Security	1,881	(3.2)	2,188	(3.2)
General Administration	**2,706**	**(4.7)**	**4,803**	**(7.1)**
General Services	2,605	(4.5)	4,624	(6.8)
Upgrading and Renovation	101	(0.2)	180	(0.3)
Total Federal Government	**58,500**	**(100.0)**	**67,500**	**(100.0)**
State Governments and Others				
State Governments	7,251		12,046	
Local Governments and Statutory Authorities	6,249		7,954	
Public Enterprises	45,500		75,000	
Total Public Sector	**117,500**		**162,500**	

* Revised allocation, total original allocation was RM104,000 millions

Source: Government of Malaysia (1996). Seventh Malaysia Plan 1996 - 2000 (p175-177).

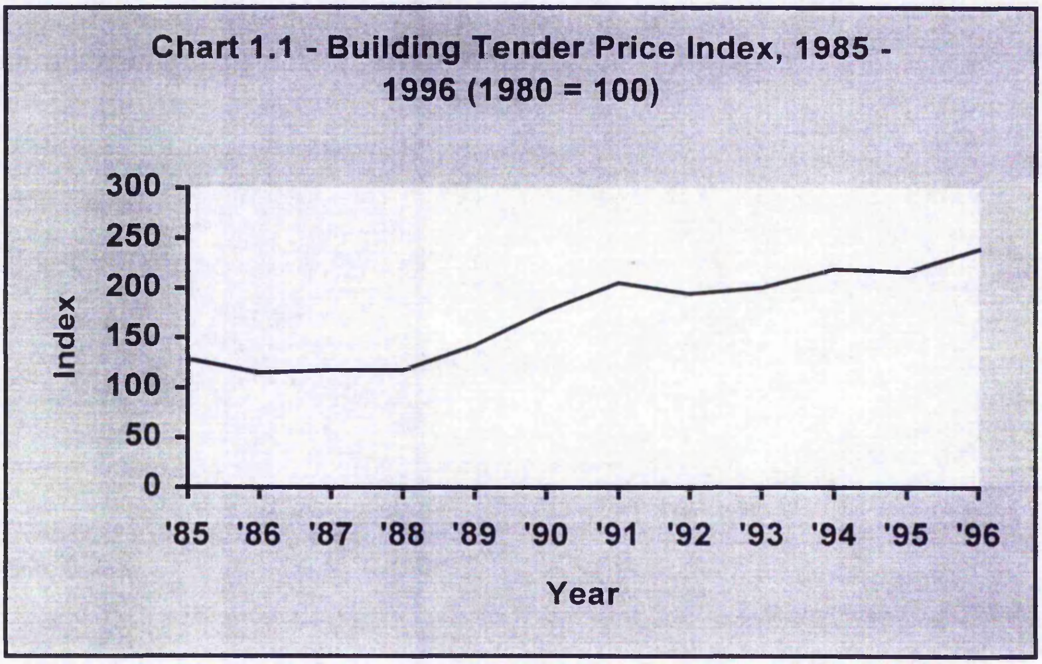
According to Wells (1986, p33) during periods of rapid economic growth, construction should grow at a faster rate than the overall economy. In terms of the size of the construction sector, Wells (1986, p23) recommends that for a middle income developing country including Malaysia, the annual contribution of construction to overall GDP should not be less than 5.4 per cent. Should construction contribute less than the minimum recommended level, inadequate construction capacity may be acting as a constraint on long term sustainable growth in the economy (Wells, 1986, p23-24 and 33; Ruddock and Lopes, 1996, p577).

In fact some strains including inadequacies in infrastructure (Building, 1994; Navaratnam, 1995) have emerged in the Malaysian economy. The strains, according to some commentators including Building (1994) and Navaratnam (1995), are a consequence of Malaysia's prolonged rapid and prominent economic growth. In order to sustain the rate of growth in the economy the commentators call for the enhancement of road, railway, water, electricity, ports and airport systems to meet new demands of an industrialising society. Since large sums of money were allocated for and spent on the development of infrastructure under successive Malaysia Plans and since Malaysia in the past and at present enjoys political stability and favourable climate the inadequacies in infrastructure could not be a consequence of lack of funds, improper or lack of planning, political instability or unfavourable climate. It suggests, therefore, that the construction sector in Malaysia is not capable of meeting the demands of the rapidly growing economy.

In addition to the relatively small size of Malaysia's construction industry, there are growing concerns over several issues that the construction industry is facing. Most pressing among the issues include:

1. The relatively poor performance of construction such as in terms of failure to implement planned development projects (Minister of Works, 1996; Yaacob, 1996), of failure to meet target delivery dates, of failure to meet clients' requirement on quality (Yong, 1988; Abdullah, 1995; Yaacob, 1995; Mohamad, 1995; Hashim, 1996), and in terms of poor health and safety records on construction sites (Abdullah, 1995; Yaacob, 1995; Embong, 1996; Che Man, 1996; Tan, 1996); and

2. The continuous and upward increase in construction prices (Master Builders Association of Malaysia, 1989/1990 and 1996; Ministry of Finance, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; Bank Negara Malaysia, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; Ketua Pengarah Kerja Raya Malaysia, 1996). For instance, Chart 1.1 shows the building tender price index for projects undertaken by the *Jabatan Kerja Raya* Malaysia (JKR) between 1985 - 1996. The chart shows that there has been a steady increase in tender prices for building works in the public sector since 1988.



According to Wells (1986, p40) if both (1) inadequacy in construction output, and (2) sharp rise in construction prices prevail, the phenomena indicate either that effective demand for construction is outstripping the supply or that constraints in the supply side of a country's construction industry are developing.

Many researchers and writers claimed that among the areas of constraints faced by construction industries in developing countries are constraints that prevail within the processes of construction procurement (Turin, 1973a and 1973b; Ofori, 1980; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1985 and 1986; Wang 1987 and 1991; Sharif and Morledge, 1996; Morledge, 1996; Sharif, 1996). Constraints within the processes of construction procurement restrict or limit the effectiveness of the procurement process. Ineffective construction procurement would affect construction output and would subsequently inhibit growth in the construction industries.

The researchers and writers (including Turin, 1973a and 1973b; Edmonds, 1979; Ofori, 1980 and 1984; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1985 and 1986; Wang 1987 and 1991; Quek, 1989; Master Builders 1989/90; Miles and Neale, 1991; Al-Omari, 1992; Abdul Rahman and Alidrisyi, 1994; Sharif and Morledge, 1996; Morledge, 1996; Sharif, 1996) identified the factors that caused the constraints to include either one or a combination of two or more of the following: unavailability, insufficiency or inappropriate use of resources, functions or institutions. Hence, effective and productive construction procurement could only be achieved if the supply chain of resources, functions and institutions are in place (Wang, 1991; Sharif and Morledge, 1996; Sharif, 1996).

In the context of Malaysia, her quest towards Vision 2020 is firm. This suggests that an increase in demand for construction is imminent. Therefore, the issues about construction output being lower than it should be and the continuous and upward increase in construction prices pose several questions including:

1. Are there constraints in the processes of construction procurement that may inhibit the level of construction output?

2. If there are constraints, can the types of constraint be identified and their extent ascertained?

3. If there are constraints and the types and extent of constraints identified, are there appropriate strategies that could be implemented to remove or alleviate the constraints identified?

1.2 Research Aims

The present research endeavours to seek answers to the above questions. Specifically, this research aims to:

1. Identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output; and
2. Develop, appraise and validate suitable strategies to remove or alleviate the constraints identified.

1.3 Impetus for the Research

There is a growing body of research literature on the processes of construction procurement. In the context of Malaysia, most of the research is not necessarily applicable and valid at all times.

This research attempts to fill the gap in research literature and adds to the body of knowledge about the processes of construction procurement in Malaysia in terms of:

1. Constraints that the processes suffer from; and
2. Strategies that could be implemented to remove or alleviate the constraints.

In addition, by drawing attention to these areas, this research creates awareness and provides guidance to the authorities responsible for the development of the construction industry in Malaysia.

Finally, methodology similar to the one being adopted in the present research may be repeated to study constraints and identify suitable strategies to remove or alleviate constraints within the processes of construction procurement in other countries or at other times.

1.4 Definitions of Main Terms

In this study, construction procurement is defined as:

> "The framework within which construction is brought about, acquired or obtained."
>
> (*Conseil International du Batiment pour la Recherche, l'Etude et la Documentation* or CIB, 1991).

For the purpose of this study, the concept 'constraints' within the processes of construction procurement is defined as limitations or restrictions imposed on the processes of acquiring construction projects.

In this study constraints within the processes of construction procurement are divided into two categories, i.e., (1) current constraints, and (2) future constraints. Current constraints are defined as constraints that are experienced or perceived to exist during the time the study were held. Future constraints are defined as constraints that are perceived to exist in the future until at least 2001. The study of constraints was carried out between November 1996 and February 1997.

For the purpose of this study, 'strategies' are defined as plans or methods to be employed to remove or alleviate the constraints identified.

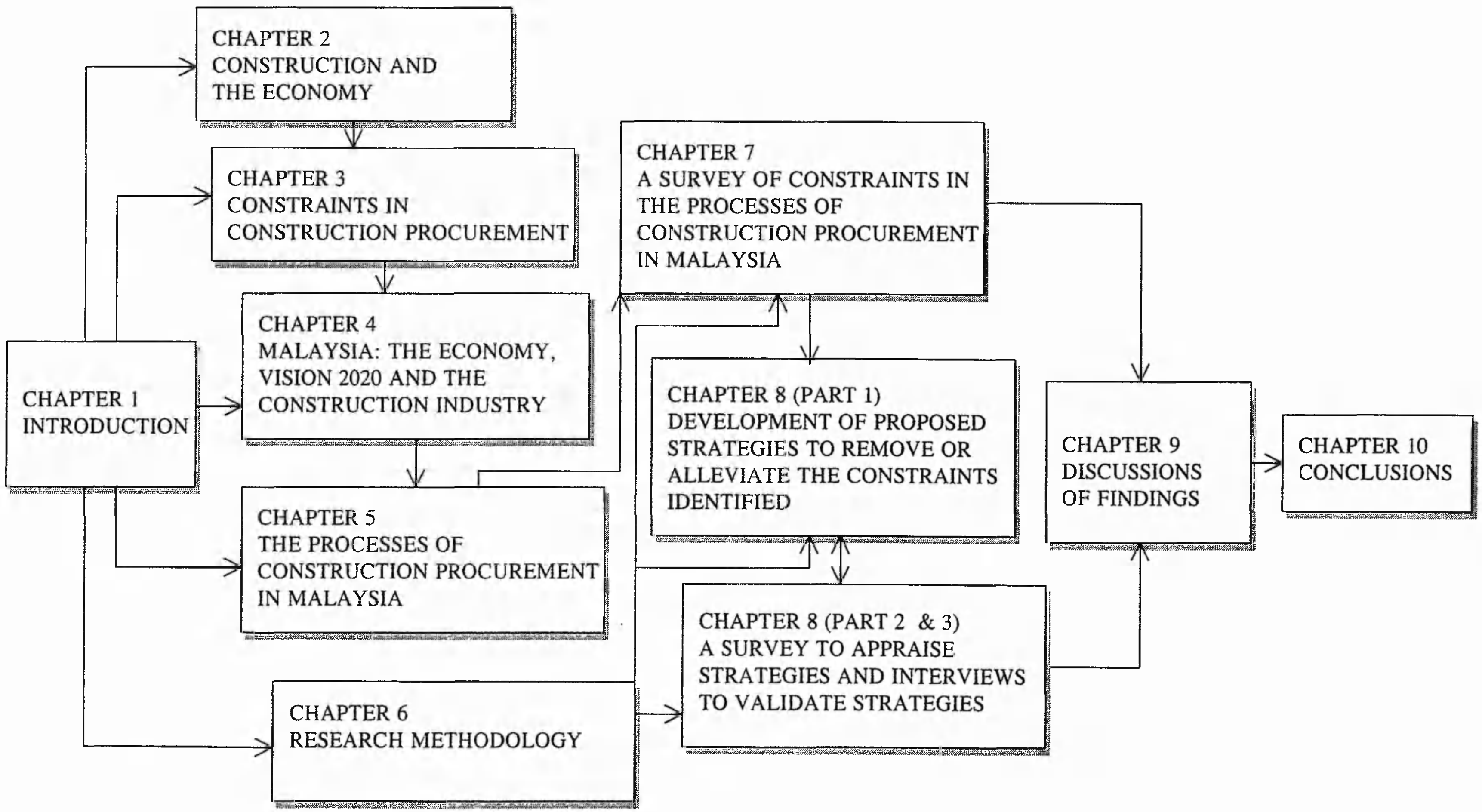
In this study, the strategies are divided into two categories, i.e., (1) strategies to remove or alleviate current constraints identified, and (2) strategies to remove or alleviate future constraints identified.

1.5 Plan of the Thesis

This thesis comprises ten chapters. Chart 1.2 illustrates the interdependency of the different chapters in the context of the overall research.

Conceptually, this thesis may be divided into three parts. Part One consisting of Chapter Two and Chapter Three examines, in an international context, the literature relating to the relationship between construction and the economy and the processes of construction procurement. Similar but more detailed examination concerning Malaysia is presented in Part Two of the thesis. Part Two consists of Chapter Four

Chart 1.2 – Plan of the Thesis



and Chapter Five. Part One and Part Two therefore, set the scene by identifying and discussing the major constraints present in the processes of construction procurement which are likely to inhibit the level of construction output of a country's construction industry. Finally Part Three of the thesis reports the carrying out of investigations to identify any constraints within the processes of construction procurement in Malaysia that may inhibit the levels of construction output and development, appraisal and validation of proposed strategies to remove or alleviate the constraints identified. Part Three consists of five chapters, i.e., Chapter Six to Chapter Ten.

A brief outline of each chapter is as follows:

Part One. Construction and the Economy: An International Perspective

- Chapter Two reviews literature relating to the significance of construction to a country's economy.
- Chapter Three reviews literature relating to factors that lead to deficiencies in construction. The main emphasis of this chapter is on constraints in the processes of construction procurement.

Part Two. Construction and the Economy: A Malaysian Perspective

- Chapter Four presents a background of Malaysia in terms of geography, people, politics, the economy and the construction industry. The emphasis of Chapter Four includes examining Vision 2020's ninth challenge, i.e., the challenge of establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient and its impact upon the processes of construction procurement in Malaysia.
- Chapter Five describes in detail the processes of construction procurement in Malaysia. The aim is to provide an in depth understanding of the Malaysian construction procurement processes and therefore facilitates investigations of any constraints it may suffer.

Part Three. Investigations of Any Constraints Within the Processes of Construction Procurement in Malaysia and Development, Appraisal and Validation of Proposed Strategies to Remove or alleviate the Constraints Identified

- Chapter Six describes in detail the scope of the research and its objectives and the methodologies used and their inherent limitations.

- Chapter Seven describes the carrying out of Survey 1, i.e., a survey of main Malaysian organisations currently involved in the processes of construction procurement in Malaysia. The primary objective of the survey is to identify the types and extent of constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output.

- Chapter Eight is in three parts;

1. The first part of the chapter describes the processes involved in developing proposed strategies designed to remove or alleviate the constraints identified in Survey 1. The emphasis of the first part of Chapter Eight is examination of literature relating to construction procurement strategies, in relations to the constraints identified, adopted by countries whose economies and construction industries have experienced a period of sustained growth. For a number of reasons, including strong ties with Malaysia in politics, history, economy and in construction; the United Kingdom (UK), Japan and South Korea were chosen for this purpose. Lessons learned from the experiences of these countries provide a useful basis in developing appropriate strategies to remove or alleviate the constraints identified in Survey 1.

2. The second part of Chapter Eight describes the carrying out of Survey 2. The primary objective of Survey 2 is to appraise proposed strategies on the basis of viability, feasibility and implementation.

3. Finally, Chapter Eight describes the carrying out of a series of semi-structured interviews held in Malaysia. The primary objective of the interviews is to validate proposed strategies that have been appraised by the respondents in

Survey 2. In addition, the interviews seek to solicit additional information including information on the constraints identified in Survey 1 and on implementation of the proposed strategies.

- Chapter Nine discusses the overall findings of the present research. It also serves to integrate the results of Survey 1, Survey 2 and the semi-structured interviews.
- Finally, Chapter Ten provides a conclusion to the present research. It addresses the aims of this study, limitation to the research and possible areas of future study.

1.6 Papers in Support of this Thesis

During the course of the present research one presentation relating to the area of study was made. In addition, two papers have been published and another has been accepted for publication. They are:

- Abdul Rashid, K., (1997). Construction Procurement: Developing Strategies to Support the Economic Targets of Malaysia's Vision 2020. *A presentation at the Faculty of Environmental Studies Faculty Research Forum, Summer Meeting, 19 June 1997, The Nottingham Trent University.*
- Abdul Rashid, K., and Morledge, R., (1998). Constraints in Resources and Functions within the Process of Construction Procurement in Malaysia. *Journal of Construction Procurement, 4, 1, May 1998, p27-44.*
- Abdul Rashid, K., and Morledge, R., (1998). Construction Procurement Processes in Malaysia: Constraints and Strategies. *Proceedings of ARCOM Fourteenth Annual Conference 1998, September 9-11, University of Reading, p506-516.*
- Abdul Rashid, K., and Morledge, R. Strategies to Remove or alleviate Constraints Affecting the Processes of Construction Procurement in Malaysia. This paper has been accepted for publication in the forthcoming issue of the Journal of Construction Procurement.

CHAPTER 2

CONSTRUCTION AND THE ECONOMY

2.0 Introduction

This chapter aims to highlight the construction sector and its significance to a country's economic growth and development. Accordingly, the chapter will deal with concepts including construction and its characteristics, economic growth, and development. Based on the works of previous researchers and writers, this chapter will endeavour to illustrate the link between construction and the economy and the likely consequences of deficiencies in construction.

2.1 Construction and its Characteristics

'Construction' is a general term used to describe the processes of building physical infrastructure, superstructure and related activities. It encompasses all types of new building projects, all civil engineering works and the repair and maintenance of existing facilities (Wells, 1985a, p55).

Turner (1990, p3) views construction as:

> "... an enterprise, an act of boldness even for the simplest building. For modern, complex buildings it involves the commissioning, management, design and assembly of huge amounts of raw materials and the use of considerable labour resources over a long period of time..."

The above view, even though expressed in the context of construction of building projects, suggests that construction is complex (see also Wang, 1987, p2). It is therefore, thought to be instructive to review some of the more important characteristics of construction.

According to Wells (1986, p3-6) there are three characteristics that are common to construction in all countries. She outlines and explains them as:

1. The products of the construction sector are heterogeneous, i.e., they are different in terms of size, appearance, location and in terms of end-use. In addition, the

products of construction also differ widely in terms of the materials and techniques used in production.

2. The finished products of construction are generally permanent in the particular location where their construction takes place. Consequently, the final process of construction must be in-situ, albeit sections of the completed products may be produced elsewhere. This characteristic of construction has two pertinent implications. Firstly, there is a limit on the potential for 'prefabrication' or using component parts or sections produced elsewhere, perhaps on the basis of economies of scale. This is because there must always be a balance between the economies that may be enjoyed from prefabrication and the ensuing costs of transportation of component parts or sections of a structure to the construction site. In the context of a developing country where the system of communication is generally poor, transport and its costs may become a constraint. Secondly, the fact that the products of construction are site-specific means that generally they cannot be produced in advance of demand but rather have to be sold before they are produced. Construction therefore, follows a sequential process of planning, ordering and the final production on the particular location where they are required. Consequently, each product of construction is unique. According to Morledge and Sharif (1996, p3) a product of construction (in relation to a building project) is unique because it has: (1) a unique demand, in terms of the individual needs of each client, (2) a unique location, in terms of availability of the site for building, (3) unique constraints, in terms of the cost and time limitations for the project, and (4) a unique end product, in terms of the finished building. According to Miles and Neale (1991, p12) "because each client's needs are unique, it is often said that the (construction) industry specialises in the construction of expensive prototypes." However, there are several notable exceptions to the custom of not producing products of construction foregoing demand. For example, repetitive and speculative housing and offices or factories in specific areas may be produced in advance of demand because their demand may be consolidated, continuous and anticipated (Wells, 1986, p5). Apart from these exceptions, "continuity of production in the construction sector is therefore dependent upon the maintenance of continuity of demand" (Wells, 1986, p5).

3. A large part of the output of construction consists of 'capital or investment goods'. Capital or investment goods refer to products required for the production of other goods or services in an economy. Thus the product of construction including roads, railways, air and sea ports, telecommunication, electricity generation and transmission, water supply, buildings for factories, offices, hospitals, schools, houses, etc. are all regarded as capital or investment goods, i.e., "... they are not consumed just for their own sake, but are actually used for the production of other goods, services or means of production" (Wells, 1986, in Preface). Construction therefore, is highly liable to be affected by variations in the level of activity in the economy (Wells, 1986, p6; Tan, 1988, p186). "Thus during periods of rapid economic expansion construction output is required to grow at a faster rate than that of other sectors and during periods of stagnation or decline the construction industry is the first to suffer" (Wells, 1986, p6). According to Tan (1988, p186): "optimism about the future may lead to a high level of investment to upgrade and expand while a gloomy outlook may lead to low levels of investment as older facilities are kept in use" (Tan, 1988, p186).

There are other characteristics of construction (see for example in Ofori, 1980, p76-82; Fellows, Langford, Newcombe and Urry, 1983, p1-3; Edmonds and Miles, 1984, in Preface; World Bank, 1984, p4; Wells, 1986, p6-10; Turner, 1990, p3; Miles and Neale, 1991, p12; Harvey and Ashworth, 1993, p2; Ashworth, 1994, p9-12; and Morledge and Sharif, 1996, p3). In relation to the present research, the more important ones are thought to include:

1. The arrangement of the construction sector, whereby the responsibility for the design of projects has normally been separated from the responsibility for their construction (Wells, 1986, p9; Harvey and Ashworth, 1993, p4). This characteristic, in the most general sense entails a process that is sequential in nature. Firstly, a client engages a designer (either an independent firm of designer or in-house) to produce a detailed design based upon the latter's interpretation of the client's requirements. Secondly, bids are invited from contractors, under some form of competitive process. And subsequently the successful contractor, usually the one that submitted the lowest priced bid, would then be awarded the project.

This form of arrangement has been labelled the 'traditional procurement system'. It has dominated the construction sector until recent years (see for example in Morledge, 1987; Franks, 1990; Turner, 1990; Masterman, 1992; McDermott, Melaine and Sheath, 1995; Morledge and Sharif, 1996; Sharif, 1996). However, in response to the realisation that there are many negative implications for the efficiency of the total construction process under the traditional procurement systems approach (Wells, 1986, p9; Masterman, 1992, p8 citing the 1950 Phillips Report, the 1962 Emmerson Report and the 1964 Banwell Report; Latham, 1993 and 1994) there has been a steady increase in the number of construction projects being carried out and completed through alternative arrangements (see for example in Morledge, 1987, p26; Franks, 1990, p16; Latham, 1993, p6; European Commission, 1994, p37-38; Latham, 1994 p15; McDermott, Melaine and Sheath, 1995, p204; Davis Langdon and Everest, 1996, p8-9; Sharif, 1996, p195). The alternative arrangements include: (1) the 'integrated procurement systems' approach where the responsibility for the design and the responsibility for construction are combined under the same organisation, usually a contractor, or (2) the 'management-oriented procurement systems' approach where overall management of the design and construction processes of a project is emphasised (Masterman, 1992, p3). Nevertheless, the traditional arrangement of the construction sector whereby the responsibility for the design of projects is separated from the responsibility for their construction is still the most common way in the developing countries (Wells, 1986, p9; Yong, 1988, p286; Hashim, 1996, p193; Gidado, 1996, p163; Sharif, 1996, p232-235 & 263). Wells (1986, p7) and Miles and Neale (1991, p1) claimed that the traditional procurement system appears to be used more prominently in market economies than in planned economies.

2. A construction project requires the setting up of an ad-hoc team consisting of persons and firms, each specialising in a particular area of expertise, to work together to complete the project satisfactorily (Ofori, 1980, p80; Wells, 1986, p8; Turner, 1990, p30; Morledge and Sharif, 1996, p3). "It is unlikely that the same team will work together again, and if they do the project is likely to be different" (Morledge and Sharif, 1996, p3).

3. Methods used for price determination whereby payments to contractors for works that they carry out are either based on 'measurement' or 'reimbursement of costs' (Harvey and Ashworth, 1993, p122; Ashworth, 1994, p9-12). In the payment through the 'measurement' method, the contractor is paid for the work based upon the actual quantities of work that formed the finished project multiplied by the respective unit rates. The contractor is also paid for costs of plant hire, temporary materials, contractor's overheads and profit, etc. (Harvey and Ashworth, 1993, p122-123). The quantities of work, measured under some predefined rules of measurement (Ashworth, 1994, p10), may be measured prior to commencement or alternatively it may be measured after the work is completed. The latter approach is also known as a 're-measurement contract' (Harvey and Ashworth, 1993, p123). In the 'reimbursement of costs' method the contractor is paid for the actual costs of materials which have been used, the time spent on the project by the operatives and an agreed amount for the contractor's profit and overheads (Harvey and Ashworth, 1993, p124).

4. Construction work involves risks, the level of risk is much higher than in other types of economic activities (World Bank, 1984, p4). A construction entrepreneur moves from one location to another, organise the logistics required to complete each project, and follows a bespoke design for each project. Since most contracts are awarded through specific tenders, contractors have to estimate the costs for each project, making assumptions about many factors including weather, site conditions, availability and productivity of labour, availability of materials and plant, time constraint, interest rates, etc. In the case of civil engineering work, the risks involved in tendering could be much higher than those for building projects. This is because civil engineering work tends to be larger in scale, inputs in terms of heavy plant and equipment is greater, and in some instances, the site is very remote where services and supply centres are either not available or barely exist (World Bank, 1984, p4).

2.2 Economic Growth

One of the key macroeconomic objectives of all governments, irrespective of political party, nation or the country's level of socio-economic development, is to achieve sustained economic growth (United Nations, 1976, p49; Al-Omari, 1992, p136; Myers, 1994, p83). Economic growth refers to:

> "An increase in an economy's real level of output over time; normally measured by the rate of change of national income from one year to the next."
>
> Myers (1994, p137).

The unit of measurement for economic growth is by the rate of change of output, commonly the GDP. GDP "represents the total money value of all the production within a country during one year" (Myers, 1994, p90). The GDP, after correcting for changes in prices, i.e., adjustment for inflation, is known as 'real' GDP (Myers, 1994, p84). Real economic growth is said to have taken place when the real GDP figures show an increase between one year and the next (Myers, 1994, p90). Sustained economic growth therefore, is the steady increase in a country's real GDP in the long term.

According to the United Nations (1976, p49) economic growth has been aimed at in economic policy for a long time. It views economic growth as the rate of growth of the Gross National Product or GNP, which creates a satisfactory increase in employment opportunities in the context of an expanding population. GNP, like GDP is a method of measurement of the wealth of a country. "It represents the total output of goods and services produced by the country in a year, in terms of residence of the owners of productive resource" (Myers, 1994, p138). In a situation where there is no increase in the population or where the rate of population growth is lower than the growth of the economy, an increase in per capita income is said to have taken place (United Nations, 1976, p49). Growth in per capita income is considered to be desirable in order to improve personal and national incomes and to facilitate attaining other socio-economic goals including a fair and equitable distribution of income or increases in foreign aid (United Nations, 1976, p49).

In order to achieve economic growth and other economic goals a government may apply a single or a combination of the following common instruments of economic policy, i.e., (1) fiscal policy, (2) monetary policy, (3) wage and price policy, and (4) balance-of-payment policy (United Nations, 1976, p51; Myers, 1994, p84-85). A review of these economic policies is not within the scope of this study. Such review is available in economics literature including the United Nations (1976, 51-53) and Myers (1994, p84-85).

In relation to the construction sector, the United Nations (1976, p53) contends that:

> "Governments may use the construction industry as a means through which to influence the national economy. This is usually done by guiding programmes of direct spending towards this industry when the economy needs a boost or by purposely restricting the volume of construction output in times of economic hyper-activity."

According to Kim (1995, p1) one primary reason for a government to desire economic growth is to raise the general living standards of its people. In a poor country therefore, economic growth is the first and necessary step for the well being of its population, and it is assumed that the benefits of economic growth will eventually 'trickle down' to the poorest group of people. The increased household and national incomes arising from economic growth would subsequently solve non-income problems such as housing (Kim, 1995, p1). In the context of economic growth in South Korea, Kim (1995, p115) stated that:

> "Thanks to the economic growth of the last three decades, the pleasures of life and the benefits of civilisation have been available to more people than ever before. Clearly more Koreans are immensely better off with each passing decade."

2.3 Development

The term 'development' is often used interchangeably with economic growth (Al-Mufti, 1987, p29). According to Al-Mufti (1987, p2) the term 'development', in its modern context is complex and wide in scope. The term has been a subject of debate between people from different disciplines including economists, social scientists, technologists, administrators and politicians, and the outcomes have not always been conclusive (see also Wang, 1987, p2 and 148; Mahathir Mohamad, 1991, p2; Baba, 1993, p54). For example, an economist may see development as equivalent to growth in incomes per capita while a technologist may view development as technological achievements or the level of industrialisation in a country (Al-Mufti, 1987, p2).

The concern of this study is national development. According to Al-Mufti (1987, p3) the concept 'national development' indicates a process of change, i.e., from one set of conditions to another preferred set, via growth, production and improvement. According to Al-Omari (1992, p9) the objectives of development are to achieve economic growth, industrialisation and meet housing and employment needs. Wang (1987, p148) views national development as the task of nation building. It involves a process of development activities undertaken by a developing country to transform itself from a backward or under-developed status to that of a more advance and developed country. Thus, governments of developing countries prepared and implemented development plans (Al-Mufti, 1987, p42, Government of Malaysia, 1991; 1993; 1996; Al-Omari, 1992, p4). Their overall objective is to transform the country from current conditions through a process of transition to some predetermined objectives, notably higher living standards and a better quality of life. For instance, under 'Vision 2020', the government of Malaysia plans to transform Malaysia from a developing country into a fully developed and industrialised country by 2020 AD (Mahathir Mohamad, 1991, p1). Baba (1993, p54) suggests the concept of development, in the context of Malaysia's Vision 2020 (see Chapter Four of this thesis) as:

> "The developed country that we envisage for ourself and future Malaysians must be one that is fully developed beyond the economics. We should be a nation not only of high growth, but one which is equally concerned with the social, political and other aspects of human development. We desire a society, which has confidence in itself and whose members are tolerant of each other's way of life and beliefs, and viewpoints while at the same time imbued with strong ethical and moral qualities and beyond all, a society that is caring."

The criteria used in assessing a country's level of development may be economic or non-economic (Al-Mufti, 1987, p30). The economic criteria include living standards whereby the unit of measurement is the per capita income, or levels of industrialisation whereby the unit of measurement is the output of the manufacturing sector. The non-economic criteria may include life expectancy at birth, infant mortality rate, and primary school enrolment ratio (Ofori, 1980, p32-37; Al-Mufti, 1987, p4-10). Among these criteria the non-economic criterion is the least popular. According to Al-Mufti (1987, p30) indices devised from non-economic factors are difficult to interpret or apply in practice.

Development is therefore a wider term than economic growth. In addition, it is difficult to measure development on the basis of a single index that combines both economic and non-economic criteria (Al-Mufti, 1987, p30; Mahathir Mohamad, 1991, p2). However, methods of assessing national development that attempt to incorporate both economic and non-economic criteria are available, for example the IPRG Development Classification Table (Sharif, 1996, p60) and the Human Development Index (United Nations, 1997). Further methods of assessing national development used by various international agencies are available in the World Development Report 1989 (World Bank, 1989, p250-251). However, a review of these methods is not within the scope of this study.

2.4 Country Classifications in Construction Literature

Researchers and writers on construction economics often classify countries, for operational purposes, into broad categories such as 'developed', 'developing' and 'underdeveloped' (see for example in Turin, 1973a, pB3; Ofori, 1980, p32; Wells, 1986, p23; Al-Mufti, 1987, p4 & 31; Al-Omari, 1992, p7; Sharif, 1996, p61). The World Bank (1997, p207) uses country classifications that appear to be similar but labelled the countries as 'high income economies', 'middle income economies' and 'low income economies' respectively. The criteria frequently used to classify countries are the countries' wealth measured in terms of GNP per capita expressed in US$.

The method of classifying countries according to their income (GNP per capita) has been criticised by many researchers and writers. For instance, Ofori (1980, p33) argues that this approach is questionable "... because of the doubtful veracity of international comparison of GNP, and also on moral grounds: its treatment of people as a dividend ... is said to degrade humans, neglect the quality of the population and discourage investments aimed at improving social welfare." Sharif (1996, p59) considers such an approach to be subjective because it does not include non-economic factors. The non-economic factors include a country's level of literacy, health, and other welfare services (Al-Mufti, 1987, p30). In addition, Mahathir Mohamad (1993, p2) contended that the approach of classifying countries according to their income, in terms of the unit of measurement being income per capita expressed in the US$, is not perfect. He argued that defects may arise from fluctuations of a country's currency against the US$. Further, Sharif (1996, p59) contended that the classification issue is:

> "... complicated by the recognition that the process of development is a continual and dynamic one, therefore theoretically, all countries should be classified as developing."

In the case of developing economies, the World Bank (1990, pxi) acknowledges the fact that not all economies in the group experience similar development.

Nevertheless, the method of classifying countries according to their income per capita remains popular. According to Al-Mufti (1987, p30) the method provides "... a major indicator of the overall term as it is difficult to visualise a national development process taking place in the absence of economic growth." In order to take account of economic changes occurring on both the national and international levels the values of income per capita used in the classification is reviewed periodically (Al-Mufti, 1987, p31). Table 2.1 demonstrates this where the GNP per capita between 1978 and 1997 is seen modified.

In this study countries are classified into two main categories, i.e., (1) developing countries comprising the low income or the less developed developing countries and the middle income developing countries, and (2) the developed countries. This study adopts the World Bank's GNP per capita (as shown in Table 2.1) as the criteria for the classification.

Table 2.1 - Country Classifications by GNP Per Capita, 1978 - 1997

Classification	GNP Per Capita (US$)					
	1978	1980	1985	1990	1995	1997
Low Income Countries	250 or less	360 or less	400 or less	545 or less	695 or less	765 or less
Middle Income Countries	> 250	> 360	> 400	546 to 6,000	696 to 8,626	766 to 9,385
High Income Countries				> 6,000	> 8,626	> 9,385

Sources: World Development Report (World Bank, 1978, p73; 1980, p109; 1985, p169; 1990, p173; 1995, p157; 1997, p207)

2.5 Construction and the Economy

Many researchers and writers have examined, in an international perspective, the relationship between construction and the economy as a whole (for example Strassmann, 1970; Turin, 1973a; 1973b; United Nations, 1976; Edmonds, 1979; Ofori, 1980, Edmonds and Miles, 1984; World Bank, 1984; Wells, 1985a; 1985b; 1986; Al-Mufti, 1987; Ofori, 1988; Miles and Neale, 1991; Al-Omari, 1992; Ruddock and Lopes, 1996). Generally, these researchers and writers concur that construction is significant to all countries' economy, irrespective of the countries' levels of economic development. However, it could be argued that construction is more important to a developing country than to a developed country, notably due to the fact that construction establishes the basic infrastructure that the developing country urgently requires in order to stimulate and induce socio-economic growth and development.

The significance of construction to the economy has been discussed in various styles by different researchers and writers. In the context of the present study, the style adopted by Turin (1973a, pB1-B31) is thought to be most appropriate. According to Turin (1973a, pB22) the significance of construction to the economy as a whole may be examined by using four key factors:

1. construction as an industry contributing to GDP
2. construction as a major component of Gross Fixed Capital Formation or GFCF
3. construction as a major employer in the economy, and
4. the structure of the construction sector in terms of inputs and outputs

2.5.1 Construction as an industry contributing to GDP

Construction appears twice in the national accounts of most countries and is the only sector to do so (Turin, 1973a, pB1; Wells, 1986, p13): firstly as a sector in the GDP by industrial origin, and secondly as a component of investment in the GFCF. This section will deal with construction and the GDP while the following section (section 2.5.2) will deal with construction and the GFCF.

Construction is featured as one of the sectors of the analysis of GDP by industrial origin. The share of construction to the GDP is the difference between the value of sales at market prices and the market value of all current purchases. It excludes the value of purchased building materials and components, fuel, transport, professional services, insurance and legal fees (Wells, 1986, p13) and other goods and services which the contracting industry purchases from other parts of the economy (Turin, 1973a, pB2).

Turin (1973a, pB2-B4) studied the relationship between construction and the economy on a large number of countries. His study focused on the period between 1955 and 1965 using the data available in the different editions of the United Nations Yearbook of National Account Statistics. His findings indicate that overall (in relation to the countries studied) the construction sector contributes between 2 per cent and 10 per cent to the GDP. Specifically, Turin (1973a, pB4) found out that: (1) in the developing countries' construction contribute between 3 per cent and 5 per cent to the GDP, and (2) in the developed countries' construction contribute between 5 per cent and 9 per cent to the GDP. Turin admitted that there were a few countries that depart from these typical ranges but argued that the departure did not refute the general relationship.

In addition, Turin (1973a, pA2) analysed the data on value-added by construction, expressed by its percentage share to GDP, and GDP per capita and found out that: (1) there is a strong correlation between value added by construction and GDP per capita, and that (2) the nature of the relationship is exponential suggesting that the rate of growth of value added by construction is slightly greater than the rate of growth of GDP suggesting that the percentage value added in construction increases as the per capita income increases.

In a similar study but applying data circa 1974 and 1979 Edmonds and Miles (1984, p5-7) found out that the value added by construction to the GDP relationship (in relation to the countries studied) is: (1) between 3 per cent and 5 per cent of the GDP in the developing countries, and (2) between 5 per cent and 8 per cent of the GDP in the developed countries.

In addition, Edmonds and Miles (1984, p5) found out that there is a positive relationship between value added by construction and GNP per capita. However, Edmonds and Miles' suggest that the relationship between value added by construction and the GNP is not linear because above a certain level of per capita income the trend settles to a fairly steady proportion of between 7 per cent and 8 per cent of GNP.

In yet a further study focusing on the period between 1977 and 1979 Wells (1986, p14-23) found out that (in relation to the countries studied and in spite of a wide range existing within each category of countries) construction's contribution to the GDP is on average: (1) 3.6 per cent of the GDP in the underdeveloped countries, (2) 5.2 per cent of the GDP in the low income developing countries, (3) 5.4 per cent of GDP in the middle income developing countries, and (4) some 7.3 per cent of GDP for the developed countries.

Further, Wells (1986, p24-25) analysed the data on construction output and the rate of growth in the economy as a whole (in terms of rate of growth in GDP) during the period between 1960 and 1979. She found out that the average rate of growth in construction output (in relation to the countries studied) has been positive for all categories of countries. However, for the low-income countries and the middle income countries, the rate of growth in construction output has been greater than the rate of growth in the economy as a whole. More importantly, Wells found out that the highest annual rates of growth in construction output took place in the middle income developing countries (Wells, 1986, p25). Wells therefore concluded that as the economy expands (in terms of increases in GDP) construction output would grow at an even faster rate. Wells (1986, p24) explained this phenomenon as:

> "... a high rate of investment ... is essential for rapid economic growth....and as construction constitutes around 50 per cent of that investment, it is therefore to be expected that whenever economic growth occurs it must be accompanied by a rapid increase in activity in the construction sector."

More recent studies on the relationship between value added by construction and the GDP could be found in the works of the World Bank (1984, p11-18, covering 48 countries between 1970 and 1980), Al-Mufti (1987, p153-156, covering 100 countries in 1980), Ofori (1988, p58-61, for Singapore between 1960 and 1984), Al-Omari (1992, p137, for Abu Dhabi between 1975 and 1988) and Ruddock and Lopes (1996, p577, covering 16 African countries between 1970 and 1990). In general and in spite of the different in terms of the period focused in each study, their findings (i.e., Turin, 1973a; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1986; Al-Mufti, 1987; Ofori, 1988; Al-Omari, 1992 and Ruddock and Lopes, 1996) were consistent.

The conclusion that may be drawn from the literature reviewed thus far on the relationship between value added by construction and the GDP includes that:

1. The contribution of the construction sector to the GDP follows a general but predictable pattern of up to 3 per cent of GDP, between 3 per cent and 5 per cent of GDP, and between 5 per cent and 10 per cent of GDP in the underdeveloped, developing and the developed countries, respectively;

2. In the low income and middle income developing countries, the rate of growth in construction is higher than the rate of growth in the economy as a whole; and

3. The contribution of the construction sector to the economy as a whole tends to increase as the income per capita increases. This suggests that a country's capability to spend on construction is related to its per capita income, i.e., higher

income countries are able to spend more on construction than the lower income countries.

2.5.2 Construction as a major component of GFCF

GFCF refers to a national income accounting category representing the expenditure on fixed assets (for example buildings, vehicles, plant and machinery). Economists also refer to this expenditure as investment. However, expenditure on maintenance and repairs are not included in the GFCF (Myers, 1994, p138).

Construction is a component of fixed capital formation in the composition of GFCF by type of assets (Turin, 1973a, pB1). The fixed capital formation in construction refers to "... a measure of the gross output of the construction sector, and therefore does include the value of goods and services supplied to the construction industry from other sectors..." (Wells, 1986, p13). However, the value of fixed capital formation in construction, which is the value at market price, excludes the value of repairs and maintenance work because repairs and maintenance work is not regarded as a contributor to the formation to new capital (Turin, 1973a, pB5; Wells, 1986, p13).

In examining the relationship between capital formation by construction and the GDP, Turin (1973a, pA2) found out that, for the period between 1955 and 1965, the share of capital formation by construction (in relation to the countries studied) is (1) between 10 per cent and 16 per cent of the GDP in the developed countries, and (2) between 7 per cent and 13 per cent of the GDP in the developing countries. Turin suggested that fixed capital formation by construction increase with increases in income (in terms of GDP per capita).

In terms of total GFCF, Turin (1973a, pA2) discovered that in the majority of countries studied construction contributes between 45 per cent and 60 per cent to the GFCF. However, Turin found out that on the one hand construction's contribution to GFCF is not related to the countries' level of economic development but on the other hand the fluctuations in investment in construction are smaller in the developed countries than in the developing countries. The latter suggests that it is more difficult to implement both short term and long term planning for the construction industries in the developing countries (Turin, 1973a, pA2).

In a similar study by Edmonds and Miles (1984, p6-10) on data circa 1974 and 1979, they found out that (in relation to the countries studied) construction contributes between 50 per cent and 60 per cent to the GFCF in most countries, whether developing or developed.

In addition, Edmonds and Miles (1984, p9) discovered that the percentage investment in construction (in terms of the percentage of the GNP in GFCF) increases with the increase in income (in terms of GNP per capita). For example, circa 1979 the GFCF per capita was between US$19.5 and US$99.7 in the lower income countries and between US$187.9 and US$1672.1 in middle income and higher income countries (Edmonds and Miles, 1984, p7). Edmonds and Miles (1984, p10) pointed out that the pattern of investment in construction between the developed countries and the developing countries is different. The percentage of investment in new construction in the developing countries is likely to be higher than in the developed countries. This is because in the developed countries a larger proportion of the investment in construction was spend on investments in equipment (since construction is inclined to be more capital intensive) and that there is a higher proportion of repair and maintenance work.

In a similar study by Wells (1986, p23) focusing on the period between 1977 and 1979, she found out that (in relation to the countries studied) capital formation in construction as a percentage of GDP is on average: (1) 8.9 per cent in the underdeveloped countries, (2) 10.6 per cent of the GDP in the low income developing countries, (3) 13.6 per cent of GDP in the middle income developing countries, and (4) 13.5 per cent of GDP for the developed countries.

Wells (1986, p23) also discovered that the proportion of investment in construction ranges from 53 per cent to 57.5 per cent of the GFCF for all categories of countries studied.

Other studies also showed that investment in construction constitutes a higher proportion in the GFCF of most countries. For example, the World Bank (1984, p17) found out that the average investment in construction, for the 48 countries it studied covering the period between 1970 and 1980, accounts to 50.8 per cent of GFCF. Ofori (1988, p58) found out that in Singapore during the period between 1960 and 1967 and between 1974 and 1981, construction contributed over 50 per cent of the GFCF and over 30 per cent of the GFCF, respectively. While Al-Omari (1992, p137) found out that in Abu Dhabi during the period between 1975 and 1985 construction accounts for 51.4 per cent of total GFCF.

In general and in spite of the differences in terms of the period focused in each study, the findings of all the studies on the relationship between investment in construction and the GFCF (i.e., Turin, 1973a; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1986; Al-Mufti, 1987, Ofori, 1988; Al-Omari, 1992) were consistent. The conclusion that may be drawn from the literature includes that:

1. Investment in construction in most countries accounts for some 50 per cent of the GFCF; and
2. Investment in construction increases as the income per capita increase.

2.5.3 Construction as a major employer in the economy

Construction is an important employer of the workforce in most countries, irrespective of the countries' level of economic development (Turin, 1973a, pB9). In a study, covering thirty-two countries, using the data available in the Yearbook of Labour Statistics (published by the International Labour Office) for the period between 1958 and 1967 Turin (1973a, pA3) found out that (in relation of the countries studied) construction employs between 2 per cent and 6 per cent of the total workforce in the developing countries and between 6 per cent and 10 per cent in the developed countries. If the production and delivery of construction materials and components are included, the total workforce employed by construction as a whole can amount to as high as 10 per cent of total workforce in the developing countries and as high as 15 per cent of total workforce in the developed countries (Turin, 1973a, pB11).

Turin (1973a, pA3) also found out that in most countries the share of construction in employment is bigger than the share of construction GDP indicating that productivity in construction (in terms of net output per man employed in construction) is lower than the national average, and much lower than the manufacturing sector. He suggested that the lower productivity in construction is the consequence of "... the traditional role of construction as a transitional occupation between rural and urban forms of productive activities, which is a pattern common to many countries, whatever their level of social and economic development". In addition, Turin suggested that wages in construction in developing countries were lower than wages in manufacturing, but that the situation is reversed, as countries become more developed and industrialised.

According to Edmonds and Miles (1984, p11) the construction sector in all countries is labour intensive. They quoted the International Labour Organisation or ILO as saying that while the proportion of craftsworker, production process workers and labourers is between 30 per cent and 40 per cent of the total of a country's labour force, in construction they account for between 75 per cent and 80 per cent of the construction labour force.

The number of workers employed by construction (in terms of employment per 1,000 population) increases as a country develops. For example, circa 1979 employment in construction per 1,000 population in countries with GNP per capita of less than US$500 is 3.6, whilst in countries with GNP per capita of more than US$2,000 the number is between 25.2 to 26.9 (Edmonds and Miles, 1984, p7). However, as a country becomes more developed the employment levels off, perhaps due to higher levels of mechanisation in the construction sector (Edmonds and Miles, 1984, p11, Al-Mufti, 1987 p151) or perhaps due to lack of need for further construction.

Edmonds and Miles (1984, p11) concurred with Turin (1973a) that the construction sector in most countries provides a transitional stage for rural labour in their migration from the rural economic sectors to the urban wage-earning economic sectors.

Wells (1986, p23) discovered that (in relation to the countries studied) between 1977 and 1979 employment in construction as a percentage of the Economically Active Population or EAP are 3.1 per cent, 3.4 per cent, 6.6 per cent and 8.1 per cent in the underdeveloped countries, low income developing countries, middle income developing countries and the developed countries, respectively. Her findings support the findings of Turin (1973a) and Edmonds and Miles (1984) that employment in construction increases as a country becomes more developed.

A study by the World Bank (1984, p20-21) covering 41 countries for the period 1979-1980 found that construction employed on average: 3.2 per cent of the total workforce in the lower income developing countries, 7.7 per cent of the total workforce in the middle income developing countries and 7.4 per cent of the total workforce in the developed countries. On the one hand, this finding supports the findings of Turin (1973a), Edmonds and Miles (1984) and Wells (1986) that employment in construction increases as a country becomes more developed. On the other hand the World Bank (1984, p20-21) findings support the finding of Edmonds and Miles (1984) that employment in construction tapers off as a country is developed.

In terms of labour productivity in construction, the World Bank's study (1984, p18) indicated that productivity (in terms of the contribution of construction to the gross GDP) increases with increases in income per capita. For example, in 1979 - 1980 the average labour productivity was on average: US$2,609 per capita for the lower income developing countries, US$5,490 for the middle income developing countries and US$22,500 for the developed countries.

The findings of the studies on the role of construction as employer in the economy reviewed thus far (i.e., Turin, 1973a; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1986) show a high level of consistency. The conclusion that may be drawn from the literature includes that:

1. Construction employs between 2 per cent and 10 per cent of the total workforce in most countries;

2. Construction, in most countries, is labour intensive; and

3. Labour productivity in construction increases as income per capita increases.

2.5.4 The structure of the construction sector in terms of inputs and outputs

According to Bon and Yashiro (1996, p319) input-output analysis is based on the central insight that commodities are needed in the current production of other commodities.

In examining the structure of the construction sector, Turin (1973a, pB15-B21) used two country categories at extreme ends of economic development as models, i.e., developing and developed or industrialised country.

According to Turin (1973a) in a developing country the structure of the construction sector includes: a small number of local firms, mostly small in size and often lacking in funds and plant and equipment undertaking small to medium sized building projects and some maintenance work; a large number of self employed artisans; and a small number of foreign firms but undertaking large civil engineering projects for the public sector.

In terms of construction inputs, there is a high proportion (some 55 per cent of total inputs) of imported materials and plant and equipment. The construction sector relies heavily on imported skilled workforce while some 60 per cent of construction materials are imported. Due to poor communication systems, cost of transport is high.

In terms of construction output, some 85 per cent is in the new work category, largely due to the country investing more in the much needed basic infrastructure and other socio-economic development projects such as housing, education, health, etc. Repair and maintenance work constitute a small proportion of the total construction output for reasons including that the stock of construction assets is considerably smaller and younger and that maintenance standards are relatively lower than in developed countries.

While in a developed or industrialised country Turin (1973a) illustrated that the structure of construction inputs includes self-sufficiency in terms of materials, plant and equipment and workforce inputs. Import of materials depends on the availability of local primary products including timber, iron ore, etc. but are partly offset by exports and by the contribution to the balance of payments made by contractors and consultants working abroad.

The structure of construction outputs in the developed country category include that two-third goes into new work and one-third is spent on repair and maintenance work. The higher proportion of repair and maintenance work than in the developing country category is notably due to the stock of construction assets is relatively old. Both the public sector and the private sector are actively involved, with almost equal share of the total of the new work. However, the private sector prevails in repair and maintenance work.

In examining the differences in the structure of the construction sector between developing and developed countries, Edmonds and Miles (1984, p13) observed that in most developing countries the construction sector is heavily dependent on imported materials and equipment. For instance, as much as 60 per cent of all materials used by the construction sector are imported. In the case of construction equipment, in developing countries some 10 per cent of all imported equipment is for the construction sector (Edmonds and Miles, 1984, p14).

In terms of construction output Edmonds and Miles (1984, p12) observed that new construction accounts for the major proportion. They suggested that the phenomenon is logical because in the initial stage of development, much emphasis is placed on basic infrastructure.

In examining the structure of the construction sector, Wells (1986, p6-10) and Miles and Neale (1991, p1) used the economic systems, i.e., market economies and planned economies as models. In the market economies demand for construction is fragmented among different bodies or clients and is characterised by 'peaks and troughs'. The situation is exacerbated by government policies of using the construction sector as one of the means in regulating the economy (Wells, 1986, p7; Wang, 1987, p2).

According to Wells (1986, p7-9) and Miles and Neale (1991, p1) the structure of the construction process in market economies is also fragmented. The process is characterised by a wide variety of participants, each specialised in an area within the construction process, often in competition with each other. Wells argued that this form of structure exists due to the supply side responding to the fragmented demand situation. This phenomenon results in the apparent characteristic of construction in market economies including that the responsibility for the design of construction projects is completely separated from the responsibility for their production. In addition, Wells (1986, p9 & 10, respectively) observed that the:

> "... separation has been accompanied by quite significant professional, legal and institutional barriers to co-operation between designers and producers in the construction industry..."

And

> "... the existence of a number of strong vested interests among the independent construction professions, serve to obstruct any movement towards a greater degree of standardisation of either construction products or components."

The views on the problems arising from the fragmentation in the structure of the construction process in market economies expressed by Wells (1986) is echoed by Miles and Neale (1991, p1), thus:

> "While this system (of projects being executed by large numbers of private firms, in competition with each other) may work relatively efficiently for the execution of the projects themselves in the short term, its competitive and fragmented operation makes long-term development and improvement very difficult. Training is a good example of this problem because construction companies may be reluctant to invest substantial sums in the training of their staff, if there is a strong possibility that they will then offer their new skills to competing firms in order to obtain higher wages."

In planned economies such as in the former Soviet Union fragmentation of the construction sector is less obvious (Wells, 1986, p6; Miles and Neale, 1991, p1). This is indicated by the greater degree of rationalisation in the construction process, whereby

> "... buildings are reduced to a number of common constituent parts, many of which can be 'prefabricated', or manufactured in long production runs, frequently away from the site in some central location. Such common parts, or standard components are then transported to different sites, and put together in a number of ways, to produce a variety of end products."

Wells (1986, p7) claimed that rationalisation of the building process is possible in planned economies because of several factors including the willingness of society to accept a certain degree of standardisation in the final structures and the government policies of generally keeping the levels of construction output in line with the activity in the whole economy. These factors enable a certain continuity of production to be achieved, which is a prerequisite for efficient operation in the rationalisation of the building process (Wells, 1986, p7).

Further analysis of construction input-output is provided by Salih (1992, p5). He examined the relationship of the construction sector with the other sectors of the economy by using "inter-industry linkages analysis within an input-output framework." In Malaysia, Salih found out that in 1983 construction has the second largest backward linkages with other sectors of the economy after manufacturing. The Malaysian construction industry for example, procured about 68 per cent of its inputs from other industry sources in 1983. The largest supplier to the construction sector is the manufacturing sector, i.e. in 1983 the construction sector procured about 47.8 per cent of its inputs from the manufacturing sector and 13. 1 per cent from the services sector. From the total inputs purchased by the construction sector in 1983, some 20.2 per cent were imported from abroad.

In terms of construction output, Salih (1992, p5 & 15) found out that in Malaysia between 1978 and 1983 most of the output of construction is absorbed by investment demand (more than 90 per cent) while intermediate demand formed about 9.8 per cent. Of the intermediate demand, transport and communication accounted for 7.3 per cent of the total demand while the utility sector procured about 0.7 per cent of the output of the construction sector.

In his study on the construction input-output in Malaysia between 1978 and 1983 Salih (1992, p5) concludes:

> "In view of the strong backward linkages of the industry with the manufacturing sector, the promotion of the industry will help boost the manufacturing sector ... Through its high forward linkages with investment, an investment-led growth economy will auger well for the development of the construction industry."

From the review of literature on the structure of the construction sector in terms of inputs and outputs thus far (i.e., Turin, 1973a; Edmonds and Miles, 1984; Wells, 1986; Miles and Neale, 1991; Salih, 1992) the conclusion that may be drawn includes that:

1. The construction sector in the developing countries is heavily dependent on foreign inputs in the areas of construction materials, plant and equipment and skilled manpower;
2. In the developing countries construction of new structures form the major proportion of construction output;
3. The construction sector in market economies is highly fragmented; and
4. Through construction's backward and forward linkages with other sectors of the economy it promotes other economic sectors and its own sector, respectively.

2.6 Deficiencies in Construction and their Likely Consequences

The review on the relationship between construction and the economy in the foregoing section indicates the vital role played by construction in stimulating and inducing growth in all economic sectors and in social development. However, in order for the construction industry to perform its vital role and in order for its products to achieve their goals in terms of all the dimensions: politics, economics, social and culture, it has to be based on indigenous capabilities (Zahlan, 1991, p2). According to Zahlan (1991, p2):

> "... the capacity to manage, operate and maintain construction products all depend on the ability of a society to define, design, select and construct its structures."

It is therefore contended that should a country's construction sector lack the capacity to manage, operate and maintain construction products due to its lack of ability to define, design, select and construct buildings or civil engineering works, a deficiency in construction may occur.

According to Adams (1997, p95) deficiencies in indigenous construction capacity in developing countries have resulted in an unwholesome dependence on imported inputs: construction materials, machinery, and the skilled manpower. However, prolonged dependence on imports, increasing foreign debt and unfavourable balance-of-payment conditions faced by most developing countries have drastically reduced their capacity to import foreign construction materials, plant and services. Consequently, the establishment of development projects urgently needed to promote and induce socio-economic growth and development are put on hold or abandoned completely. This phenomenon may slowdown or causes a downturn in the rate of socio-economic growth and development of the country (Adams, 1997, p95).

Turin (1973a, pF19) argued that rapid growth in the whole economy is dependent upon an efficient construction industry. While the World Bank (1984, p18) and Wells (1986, p33) indicated that construction deficiencies in developing countries may inhibit socio-economic growth and development. For instance:

> "The very significance of construction as a factor of development, however, can turn it into an impediment to progress."
>
> World Bank (1984, p18).

> "Inadequate construction capacity could act as a constraint on capital investment programmes. Investment and the rate of growth will be slowed down - and may eventually grind to a halt."
>
> Wells (1986, p33).

The arguments put forward by Turin (1973a, pF17), Adams (1997, p95), the World Banks (1984, p18) and Wells (1986, p33) suggest some of the likely adverse consequences of deficiencies in construction. Consequently, in the developing countries where adequate construction capability may be lacking desired socio-economic growth and development as envisaged in development plans may not be achieved and subsequently, the living standards of the population could not be raised.

However, expanding and sustaining construction capability in a developing country may not be easy. For instance, Turin (1973a, pB21) commented that:

> "... the adequate provision of building and civil engineering works is one of the limiting constraints to a more rapid and more equitably distributed social and economic progress. When it is remembered that in many developing countries, ... up to one third of the total value of construction ... is dependent on import, it will be possible to appreciate the size of the task facing economic planners in the building up of the resources of this vital sector of the economy."

2.7 Indicators of the Capability of a Country's Construction Industry

Different researchers and writers used different indicators when assessing the capability of the construction industry in any country (for example see Turin, 1973a, pF2-F6 and Wells, 1985, p43; 1986, p34 and 56). However, in the context of the present research, the indicator used by Wells (1985, p43; 1986, p34) is thought to be most appropriate. Wells suggested two key indicators that could be used to assess the strength of a country's construction industry and its significance to socio-economic growth and development. They are:

1. Construction output in terms of the percentage contribution of value added by construction to GDP, and

2. Construction output as a percentage of GFCF.

Wells (1986, p23) studied the construction statistics of 105 countries using the data available in the United Nations Yearbook of National Account Statistics for the year 1977 to 1979. The outcomes of her study include a table on the average contribution of construction to GDP and GFCF in the countries studied (see Table 2.2). Her findings largely confirmed the findings of earlier studies by Turin (1973a, pA2), Edmonds (1979, p357), Edmonds and Miles (1984, p7) and concurred with more recent studies by Al-Mufti (1987, p155-156 and 165) and Ruddock and Lopes (1996, p576).

Wells (1986, p34 and p40) argued that should (1) the percentage contribution of value added by construction to GDP, or (2) construction output as a percentage of GFCF, fall below the average figures (in relations to the country's level of income per capita, see Table 2.2) there is an inadequate construction output. She contended that inadequate construction output in developing countries might act as a constraint

Table 2.2 - The Average Contribution of Construction to GDP and GFCF (Countries Grouped According to Income Per Capita, 1977 - 1979)				
Variable	Group 1 <US$350	Group 2 US$350-US$700	Group 3 US$700-US$2000	Group 4 >US$2000
Value added in construction as a % of GDP	3.6	5.2	5.4	7.3
Construction as a % of GFCF	56	53	55.4	57.5
Source: Wells (1986, p23)				

and can dampen socio-economic growth and development. The hypotheses are largely supported by many researchers and writers including Edmonds (1979, p358), Ofori (1988, p58-59) and Al-Omari (1992, p14). In addition, the first hypothesis has been tested and confirmed by Ruddock and Lopes (1996, p576) where they discovered that;

> "... there is a critical level of construction value added / GDP (at 4 per cent - 5 per cent) below which, a relative decrease in construction volume corresponds directly to a decreasing growth in GDP per capita."

However, Ruddock and Lopes (1996, p576) found no evidence to suggest that the converse is true.

According to Turin (1973a, pA2), Wells (1986, p22-24 and 32) and Ofori (1988, p58) should construction output failed to grow faster than overall GDP, inadequate construction output could acts as a constraint on socio-economic growth and development. Wells (1986, p24) provided the rationale of this as:

> "All products of the construction industry are regarded as investment goods, or a part of fixed capital formation. In fact the output of the construction sector constitutes a substantial proportion, on average more than one-half of GFCF in all countries. As a high rate of investment (30 per cent of GDP is not uncommon) is essential for rapid economic growth and as construction constitutes around 50 per cent of that investment, it is therefore to be expected that whenever economic growth occurs it must be accompanied by a rapid increase in activity in the construction sector."

Wells (1986, p24 and p32), in her study on the average annual growth rates of construction output, of GDP and of manufacturing on a large number of countries over a twenty year period discovered that the highest annual construction growth rates have occurred in the middle-income developing countries. In these countries construction output has grown faster than both GDP and manufacturing, and the growth rate has been sustained over 15 to 20 years.

According to Wells (1986, p40) phenomena including inadequate construction output and a sharp rise in construction prices are common in a large number of developing countries. They provide a clear indication that effective demand for construction is outstripping the supply or the development of a constraint on the supply side of the construction industry.

Upon her studies on assessing construction capability in relation to its role in socio-economic growth and development in developing countries, Wells (1986, p56) concluded that:

> "By any, or all, of these indicators, the vast majority of the (very large) number of developing countries ... fare very badly; the least developed countries among them fare worst of all."

2.8 Summary

This chapter illustrated that construction is undoubtedly complex. The workings of the construction sector are diverse, so are its products. In most countries the construction sector is fragmented. The extent of fragmentation appears to be higher in the market economies than in the planned economies.

In most countries, construction contributes between 3 per cent and 10 per cent of the GDP, accounts for some 50 per cent of GFCF and employs between 2 per cent and 10 per cent of the total workforce. Through its backward and forward linkages, construction induces its own growth and growth in all the other economic sectors.

Construction is the major (and in some countries the largest) component of investment programmes. Arguably, this makes construction more significant to developing countries than to developed countries. Demand for new construction seemed to be most rapid during the early stages of a country's development process largely due to the fact that much of the country's basic infrastructure required for stimulating and inducing economic growth and development was either not available or inadequate. As a country becomes more developed the demand for new construction stabilises while the proportion of repair and maintenance work increases. The middle income developing countries seemed to enjoy the highest rate of growth in construction output, while the low income and middle income developing countries experience construction rate of growth that is higher than the rate of growth in the economy as a whole.

Deficiencies in construction, especially in the developing countries, may act as a constraint on socio-economic growth and development. Main indicators that can be used to assess the capability of the construction sector in relation to its role in sustaining socio-economic growth and development have been identified. They are the percentage contribution of construction value added to GDP and construction output as a percentage of GFCF.

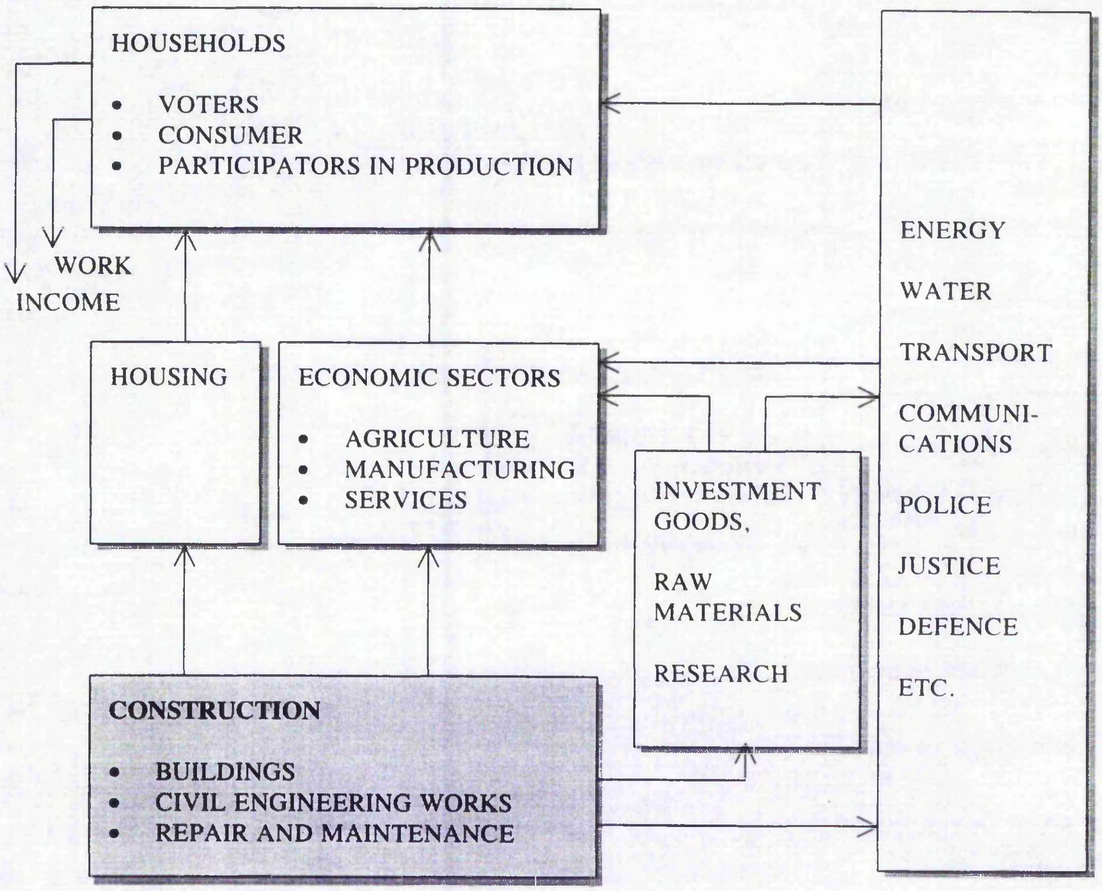
It is concluded from these findings that construction plays an active and vital role, albeit in varying degrees depending on a country's level of socio-economic development, in economic growth and development in all countries. Its significance is most apparent in relations to:

- Construction's contribution to the GDP;
- Construction's contribution to GFCF;
- Construction's share in employment of the total workforce; and
- The construction sector's backward and forward linkages with all the other sectors in the economy.

Chart 2.1 illustrates the significance of construction to the economy as a whole.

Chapter Three will review the constraints that may influence the capability of the construction sector. The main emphasis of Chapter 3 will be on constraints within the processes of construction procurement.

Chart 2.1 - The Relationships between Construction and the Economy



Source: United Nations (1976, p3).

CHAPTER 3

CONSTRAINTS IN CONSTRUCTION PROCUREMENT

3.0 Introduction

This chapter discusses the concept process of construction procurement. It seeks to identify the major constraints the processes suffer from that are likely to lead to deficiencies in construction. The identification of the constraints is based on the works of previous researchers and writers. The emphasis of this chapter is on the processes of construction procurement in developing countries.

3.1 Construction Procurement

The linguistic definition of the term 'procurement' is:

> "... the action or process of obtaining by care or effort, acquiring or bringing about."
>
> The Concise Oxford Dictionary (1990, p952).

The term 'procurement', in its modern context, has been defined in various styles by different researchers and writers. This is hardly surprising as the term 'procurement' is widely used in different contexts including commerce, industry, defence and construction. In order to arrive at a reasonably clear and common understanding of the meaning of the term 'procurement', therefore, it is important to identify the context in which the term is used. In this study the term 'procurement' is used in the context of construction.

The principal definition of the term 'procurement' in this study is adopted from the CIB (1991), i.e., 'procurement' refers to:

> "... the framework within which construction is brought about, acquired or obtained."

However, the definition of the term 'procurement' has been commented as being broad (Morledge, 1997; Rowlinson, 1997). In addition, literature relating to construction often refers to the term 'procurement' as either (1) the processes of acquiring construction projects, or (2) the organisation system used in acquiring construction projects. For the purpose of the present research therefore, it is thought to be instructive to provide a discussion on the term 'procurement' with the intention of arriving at a more robust meaning.

3.1.1 Definitions of procurement as a process

The definitions of the term 'procurement' as a process include:

> "... the general process of obtaining, acquiring or securing property..."
>
> Myers (1994, p141).

> "... the whole process of acquisition from third parties (including the logistical aspects), a process sometimes referred to as supply chain management, and covers goods, services and construction projects."
>
> Chancellor of the Exchequer (1995, p4).

> "Procurement is a process term which refers to the acquisition of new buildings or space within buildings..."
>
> Abdel-Meguid and Davidson (1996, p12).

The definitions presented above suggest that 'procurement' is a process term. It refers to the actions involved in acquiring construction projects.

3.1.2 Definitions of procurement as organisation system

The definitions of the term 'procurement' as organisation system include:

> "... the amalgam of activities undertaken by the client to obtain a building."
>
> Franks (1990, pxiv).

> "... the organisational structure adopted by the client for the management of the design and construction of a building project."
>
> Masterman (1992, p1).

> "... a matrix of functional relationships and processes established and operated to secure the realisation of building or civil engineering works."
>
> Liu and Fellows (1996, p301).

Thus, there is also literature proposing the use of the term 'procurement' to indicate the organisation system used in acquiring construction projects. It is common therefore, to find in literature on construction different procurement systems being presented, each system with its own style of arranging and operating the elements in the process of construction procurement; its advantages and disadvantages. (For example see Franks, 1990; Turner, 1990; Masterman, 1992; Morledge and Sharif, 1996; Sharif, 1996; Hashim, 1996).

3.1.3 Definitions of procurement: an appraisal

Acquiring a building or civil engineering work involves a large number of people, firms and authorities. In addition, there is a myriad of activities to be performed within the constraints of time, money and quality (in terms of fulfilling the needs of the client). Consequently, many researchers and writers concur that the use of an appropriate procurement system increases the probability of achieving success (Wang, 1987, p24 & 29; Franks, 1990; Turner, 1990; Wang, 1991, p89; Masterman, 1992; Morledge and Sharif, 1996; Sharif, 1996; Hashim, 1996; Liu and Fellows, 1996, p301).

However, it has been argued that the procurement system alone could not secure a successful completion of a construction project. For instance, Wang (1987, p24) states that in the context of Malaysia:

> "The implementation of development projects can achieve resounding success if the various phases ... can be properly managed, controlled, co-ordinated and monitored, having also ensured that the major ingredients surrounding and supporting the development processes can be present or made available for such development."

Wang (1987, p24 & 29; 1991, p89-95) argued that successful completion of construction projects, in the context of a developing country like Malaysia, depends on effective management of the procurement processes and the presence and availability of vital 'ingredients'. Wang (1987, p24; 1991, p92) listed the vital 'ingredients' as:

1. Sufficient supply of qualified and experienced technical personnel at professional and sub-professional levels;
2. Sufficient supply of workers at skilled, semi-skilled and non-skilled levels;
3. Sufficient and timely supply of materials;

4. Sufficient and timely supply of plant, equipment and tools;
5. Availability of land for construction purposes;
6. Willingness on the part of all parties involved in the construction processes to make appropriate changes and to introduce and adopt new technology suitable for local conditions and environment;
7. Desire and commitment on the part of all parties involved in the construction process to achieve a high degree of efficiency and productivity;
8. Responsiveness to national and social responsibilities concerning working attitude resulting in reasonable balance between selfishness and public-consciousness;
9. Acceptance of the concept of teamwork and the subjugation of one's self to team discipline;
10. Reduction of unnecessary red tape and artificial administrative obstruction.

Wang's (1987, p24) argument therefore, suggests that the scope of construction procurement extends beyond organisation system to encompass other factors that influence the successful acquisition of a building or civil engineering work. Viewing procurement as a process therefore brings into perspective and into focus all these factors.

In the context of a construction industry, it is contended that viewing procurement as a process brings into perspective all the factors and issues that influence the successful acquisition of construction projects and subsequently, the country's construction capability.

Therefore, in this thesis it is felt appropriate to use the term 'procurement' to refer to the processes of acquiring construction projects, unless otherwise stated.

3.2 A Framework for the Process of Construction Procurement

It has been established in Section 3.1.3 that in this thesis the term 'construction procurement' refers to the processes involved in acquiring construction projects. It is thought to be instructive therefore to identify what are the processes. The identification of the processes of construction procurement is based on the works of previous researchers and writers. However, this research concerns the processes of construction procurement in Malaysia and Malaysia is a developing country, it is felt therefore that priority should be given to the literature related to the processes of construction procurement in Malaysia and in other developing countries.

A detailed examination of literature on construction in Malaysia (including Arbi, 1985; Wang, 1987; Wang, 1991; The Department of Environment Malaysia, 1992; *Ketua Pengarah Kerja Raya Malaysia*, 1992) and in other developed and developing countries by Sharif (1996) reveals different models of the process of construction procurement.

For instance, Arbi (1985) presented a flow chart of activities involved in a typical housing development project in the City of Kuala Lumpur and in a district in the State of Selangor, respectively. From the flow charts, the main elements in the process of construction procurement could be identified, i.e.,

1. Feasibility study;
2. Purchase of land;
3. Preparation of layout plan;
4. Government approval for construction;
5. Detail design;
6. Tendering;
7. Financing;
8. Construction;

9. Certificate of Fitness for the occupation of the completed building; and
10. Handing over and maintenance and liability period.

In his discussion of the model, Arbi (1985) stressed the importance of the processes of government approval for construction.

Wang (1987, p16; 1991, p92) suggested that there are four main phases in the overall process of construction procurement. The phases are:

1. Ownership and finance processes;
2. Design process;
3. Approving process (Government approval for construction); and
4. Production process.

Wang's model relates to the public and the private sectors' processes of construction procurement in Malaysia. A distinct feature in his model is the emphasis on the processes of obtaining government or statutory approvals for construction. Wang (1987, p2) claimed that in Malaysia the systems of Government control in construction are complex.

The Department of Environment Malaysia (1992, p10-11) suggests that the process of construction procurement comprise eleven key stages. The stages are:

1. Project identification;
2. Sourcing for technology or licence;
3. Pre-feasibility/siting decision;
4. Feasibility/project design;
5. Contract;
6. Detailed design;
7. Tendering;
8. Development and construction;

9. Commissioning;

10. Operation and maintenance; and

11. Abandonment/end of project life.

Under the Environmental Quality Act, 1974, Amendment, 1985; nineteen categories of activities including construction require Environmental Impact Assessment or EIA Approvals (The Department of Environment Malaysia, 1992, p12-25). The Department of Environment Malaysia is the authority responsible for EIA Approvals. It uses the model on the process of construction procurement as a basis for processing applications for EIA Approvals for construction activities. For each stage of the process of construction procurement there are steps to be followed to facilitate EIA Approval.

The *Ketua Pengarah Kerja Raya Malaysia* (1992, p13) suggests that the process of construction procurement comprises twenty key stages. The stages are:

1. Development plan and approval;

2. Funding;

3. Preparation of project brief;

4. Land acquisition;

5. Site survey, and site and soil investigations;

6. Preparation of the preliminary design and site layout plans;

7. Detail architectural and/or engineering designs;

8. Preparation of the preliminary estimate and exercising of cost control;

9. Preparation of tender documents;

10. Invitation and receipt of tenders;

11. Evaluation and acceptance of tender;

12. Preparation and signing of the Contract Document;

13. Supervision and monitoring of progress of work;

14. Extension of time for completion;

15. Imposition of Liquidated and Ascertained Damages;

16. Determination of employment of the contractor;

17. Completion and handing over of work completed and making good of defects;

18. Nomination of sub-contractors and suppliers;

19. Administration of payments; and

20. Preparation of valuation of variation work and the Final Account.

The above model suggests that in the JKR the process of construction procurement is sequential in nature, thus implying the prevalent use of the traditional system of procurement.

The objective of the model proposed by the *Ketua Pengarah Kerja Raya Malaysia* (1992) is to provide guidance for implementing public sector development projects undertaken by the JKR Malaysia. The JKR is the principal body that implements public sector development projects - buildings and civil engineering works - in Malaysia. The model is therefore, very detailed and contains elaborate procedures outlining the design and supervision functions of the JKR Malaysia.

Sharif (1996, p27) examined construction procurement systems and processes in developing and developed countries. He concluded that there are five generic functions in the processes of construction procurement namely:

1. Initiation/promotion;
2. Funding;
3. Design - subdivided into schematic design, detailed design and specialist design;
4. Construction - subdivided into the management process and the physical construction process; and
5. Risk allocation among the functions 1 to 4.

Sharif (1996, p435) pointed out that his model did not include management of design within the design function. But he suggested that further research should be undertaken to assess its suitability for inclusion into the model. However, in the JKR design management is not seen as a separate function but an activity within the design function (Abdul Rashid, 1992, p8).

Sharif (1996, p27) claimed that his model is universal, i.e.,

> "The use of such functional terminology allows the identification of the generic functions carried out by each participant in the procurement process, irrespective of professional titles which are often country specific and inconsistent when compared between countries."

A closer examination of the models reviewed thus far reveals that on the one hand there are differences between them, notably in terms of style of presentation and the context to which each model relates: government approval for construction, supervision, or functions in procurement. But on the other hand, there are many elements of the process of construction procurement that are common to all the models. It is felt that the differences are not significant and therefore, a synthesis of the models is possible.

The synthesis results in seven main elements of the processes of construction procurement that may be considered to be specific to Malaysia. The seven main elements are (see Table 3.1 for the definition of each of the element):

1. Initiation/promotion;
2. Funding;
3. Design - subdivided into schematic design, detailed design and specialist design;
4. Statutory Approval - subdivided into approvals to initiate and to construct a facility and final approvals to occupy the completed facility;
5. Tendering;
6. Construction - subdivided into the management and the physical construction processes; and
7. Risk allocation.

The processes of construction procurement in this research therefore, will be examined in the context of the above framework.

Table 3.1 Framework of the Process of Construction Procurement

Element	Definition
1. Initiation/ promotion	The processes of recognising the need for a facility.
2. Funding	The provision of the finance required in order for the project to be undertaken.
3. Design	The translation of the requirements of the initiator/promoter into drawings and specifications to facilitate construction. Design is sub-divided into three parts: 1. Concept/schematic design - the processes of translating the requirements of the initiator/promoter into a basic design form, indicating the general design in terms of shape, size and function of the facility; 2. Detailed design - the production of detailed drawings and specifications, from the concept/schematic designs, detailing and describing each element of the facility so that it may be constructed, and 3. Specialist design - the development of detailed drawings and specifications for a specific component or element within the structure, which requires specialist technical knowledge to design and construct such as mechanical and electrical, systems.
4. Statutory approval	The processes of obtaining permissions from the relevant authorities to initiate and to construct a facility and upon its completion occupy and/or use the completed facility.
5. Tendering	The process that is used to obtain offers leading to a contract between a client and contractor, a client and consultant or a contractor and subcontractor[1].
6. Construction	The processes of physically fitting the various components of a facility together, to form a final structure. Construction is sub-divided into two parts: 1. Management of construction - the management of the construction processes for the initiator/promoter; 2. Construction production - the physical construction of all or part of the structure for the initiator/promoter, in accordance with the detailed designs.
7. Risk allocation	The susceptibility of each of the above generic functions to varying degrees of risk. The degree of risk is dependent upon the type of procurement system used and the individual functional roles.

Sources: A synthesis of the models of the processes of construction procurement by Arbi (1985), Wang (1987; 1991), The Department of Environment Malaysia (1992), *Ketua Pengarah Kerja Raya Malaysia* (1992) and Sharif (1996). [1] Turner (1990, p104).

3.3 Constraints within the Processes of Construction Procurement that could lead to Deficiencies in Construction

Wells (1986, p56) indicated that many developing countries experience deficiencies in construction in terms of construction's inability to fulfil its full potential role in socio-economic growth and development. Wells (1986, p56-58) suggested four main areas of constraints that may lead to deficiencies in construction in developing countries.

Firstly, the inability to execute, or long delays in the completion of, construction projects in some developing countries may be caused by factors such as inadequacies or inefficiencies in the capacity to design and plan projects; difficulty in obtaining tenders for small projects in which foreign contractors are not interested, or for projects that are too large for the indigenous contractors to handle; or difficulty in obtaining vital inputs such as materials, skilled labour, plant and equipment. According to Wells (1986, p56) delays of this kind are common, and represent a physical constraint on development.

Secondly, in many developing countries, the import content of construction activity is high. The import contents may include a significant proportion of materials, plant and equipment and workforce: professional, managerial, supervisory and craftsworker. The foreign construction organisations and workforce would normally remit their profits, salaries and wages to their home countries. Consequently, construction imposes a severe strain on the host country's balance of payments.

> "In many countries therefore there is a foreign-exchange constraint on construction activity and the implementation of development plans."
>
> Wells (1986, p57).

Thirdly, most developing countries frequently experience an acute shortage of skilled labour for the construction industry. The shortage of skilled labour is often exacerbated by inadequacies in training facilities, both in qualitative and quantitative terms. Consequently, the construction industry has to rely on imported skilled labour. Wells (1986, p57) contended that:

"There may therefore be in many countries a skilled labour constraint on the expansion of construction activity."

Fourthly, in most developing countries the sectors that are responsible for the production and distribution of construction materials are generally undeveloped, or insufficient to meet demands. The construction industry therefore, faces severe shortages in locally produced materials such as cement, aggregates, bricks, tiles, limestone and timber. In addition, the presence of a monopolistic market, i.e., the indigenous production sector usually enjoys government protection and preferential treatment means that the production and marketing of construction materials are manipulated in order to maximise revenues (Wells, 1986, p45). Consequently, there would be an increase in the price of construction materials to a level well above average costs. Further, qualities of locally produced materials are often poor and inconsistent. In order to make up for the poor and inconsistent quality, designers tend to over-design projects. In other cases, the poor and inconsistent quality of locally produced materials may result in low quality construction products and subsequently, high costs of maintenance.

According to Wells (1986, p58) there are other factors that may contribute to construction deficiencies in developing countries. They include constraints in terms of inadequate funds available for development and for equity and working capital, inadequate plant and equipment and poor communication and transportation systems. Wells (1986, p58) therefore, concluded that:

"... the construction industry in the majority of developing countries must be, by any definition, 'inefficient', with low levels of productivity and high costs."

Turin (1973a, pF11-F19), Ofori (1980, p82-84) and Edmonds and Miles (1984, p28) indicated that all countries, irrespective of their levels of economic development, face deficiencies in construction. Turin (1973a, pF11-F19) provided a detailed assessment of the constraints facing construction industries in the industrialised countries, in the middle income developing countries and in the least developed developing countries, respectively. According to Turin (1973a, pF12) some of the constraints faced by the construction industries in the industrialised countries are aggravated in the middle income developing countries, while at the same time the middle income developing countries also face particular constraints of their own. However, it is the construction industries in the least developed developing countries that suffer the most constraints. In addition, some of the constraints faced by the construction industries in both the industrialised countries and the middle income developing countries are exaggerated to the point of becoming critical bottlenecks in the least developed developing countries (Turin, 1973a, pF14). Table 3.2 provides a summary of the constraints faced by the construction industries in the industrialised countries, in the middle income developing countries and in the least developed developing countries, respectively, as suggested by Turin (1973a, pF11-F19).

In the context of construction industries in developing countries, Ofori (1980, p83) cites a report produced by the Economic Commission for Africa (1965). The report outlined some of the constraints faced by the construction industries in the African continent in the 1960s as:

> "The absence of local production of materials, high cost of imported materials, low productivity of labour, high proportion of overheads and profits, lack of managerial and technical skills, use of ineffective and ill-adapted designs, the application of obsolete building regulations and bye-laws, the inadequacy of present programmes of research..."

In the context of construction industries in developed countries, Ofori (1980, p83) reviewed the literature relating to the constraints faced by the construction industries in the UK in the 1960s. He identified the constraints included shortage and high cost of land for building; delay, frustration and increased costs arising from planning procedures; bye-laws that were irrational, restrictive and diverse; lack of standardisation and simplification of procedures; lack of co-operation between various persons and firms involved in the construction process; and insufficient capital and low profit margins.

Similarly, construction industries in other developed countries such as in the US (Ofori, 1980, p83; Roberts, 1987; The Business Round Table, 1983 in Rosenfeld and Warszawski, 1993, p18-29) and in Japan (Bennett, 1993, p10; Gann, 1996, p443) also face various constraints including gross inefficiency, escalating cost of construction, shortages of skilled labour and low productivity. In the case of Japan

Table 3.2 - A Summary of The Main Constraints Facing Most Construction Industries

Industrialised countries	
Availability of skilled labour	Failure to attract young people into traditional skills and the inability of training and education systems to adapt to changes.
Better management	Due to the uniqueness of construction.
Demand structure	Restructuring of demand is thought to be necessary to create incentives for changes in the structure of the construction industry.
Middle income developing countries	
All the problems facing the industrialised countries	Some of the problems are aggravated.
Construction inputs - materials, components, plant and equipment	Bulk of building materials and components may be manufactured locally but specialised fittings, plant and equipment are largely imported. Also the materials and components industries are sensitive to relatively large fluctuation in the market.
Statutory requirements for building and construction	Combination of strict but obsolete codes and regulations and inadequate administrative and technical skills for their enforcement.
Training and education	Syllabuses are outdated and unsuitable to local requirements. Training schemes are inadequate in terms of approach and quality.
Research and development	Provided that the application of new knowledge and the production of new knowledge were geared more closely to local conditions.
Least developed developing countries	
All the problems facing the industrialised and middle-income countries	Some of the problems are exaggerated to the point of becoming critical bottleneck.
Basic building materials and components	Dependence on imports.
Plant and equipment	Dependence on imports. Insufficient working capital and unavailability of spare parts further limit its use.
Human resources	Dependence on imports for professionals, managers and supervisory staff. The gap between local needs and the indigenous supply is still very large in a majority of countries.

Table 3.2 - A Summary of The Main Constraints Facing Most Construction Industries (Continued)

Least developed developing Countries (Continued)	
Government policies in terms of either to promote capital or labour intensive operations	In most developing countries, there is ample supply of unskilled labour but a shortage of capital. If construction is to be made more efficient, it cannot be expected at the same time to play its traditional role of employer and training ground for migrant unskilled labour. In addition, a large amount of unskilled labour would put a serious strain on management and supervision.
Capital	Very little is available locally. Most of the least developed countries are dependent on foreign assistance, which is channelled towards the large and very large enterprises, which constitute a small minority of the firms.
Inadequacies of transport facilities	Transport costs may form a large proportion of construction costs whenever the quality or quantity of local supplies of building materials is inadequate.
Knowledge of available resources	Information is very scanty.
Contract and management practices	Most of the contract practices were imported from the most industrialised countries, often without revisions and adaptations to suit local requirements. Consequently, contract practices become a serious obstacle to a more efficient use of local resources. Much of the management practices adopted by firms in the developing countries are poor and inadequate.

Source: Turin (1973a, pF11-F19)

for instance, the constraint in skilled labour led to efforts to industrialise the Japanese construction industry in the 1950s (Gann, 1996, p443).

Turin (1973a, pC12), Ofori (1980, p84), Bennis and Nanus, 1985 (in Miles and Neale, 1991, px) and Newcombe, Langford and Fellows (1990, p21) argued that the environment within which construction industries operate is both complex and dynamic. In the context of a construction organisation, Bennis and Nanus, 1985 (in Miles and Neale, 1991, px) argued that the complexity in the environment arises because it "... contains both physical and man-made elements." Newcombe et al. (1990, p21) viewed the dynamism in the environment to be in terms of the exchange between the organisation and their environment, i.e., organisations respond to environmental forces and changes. For instance;

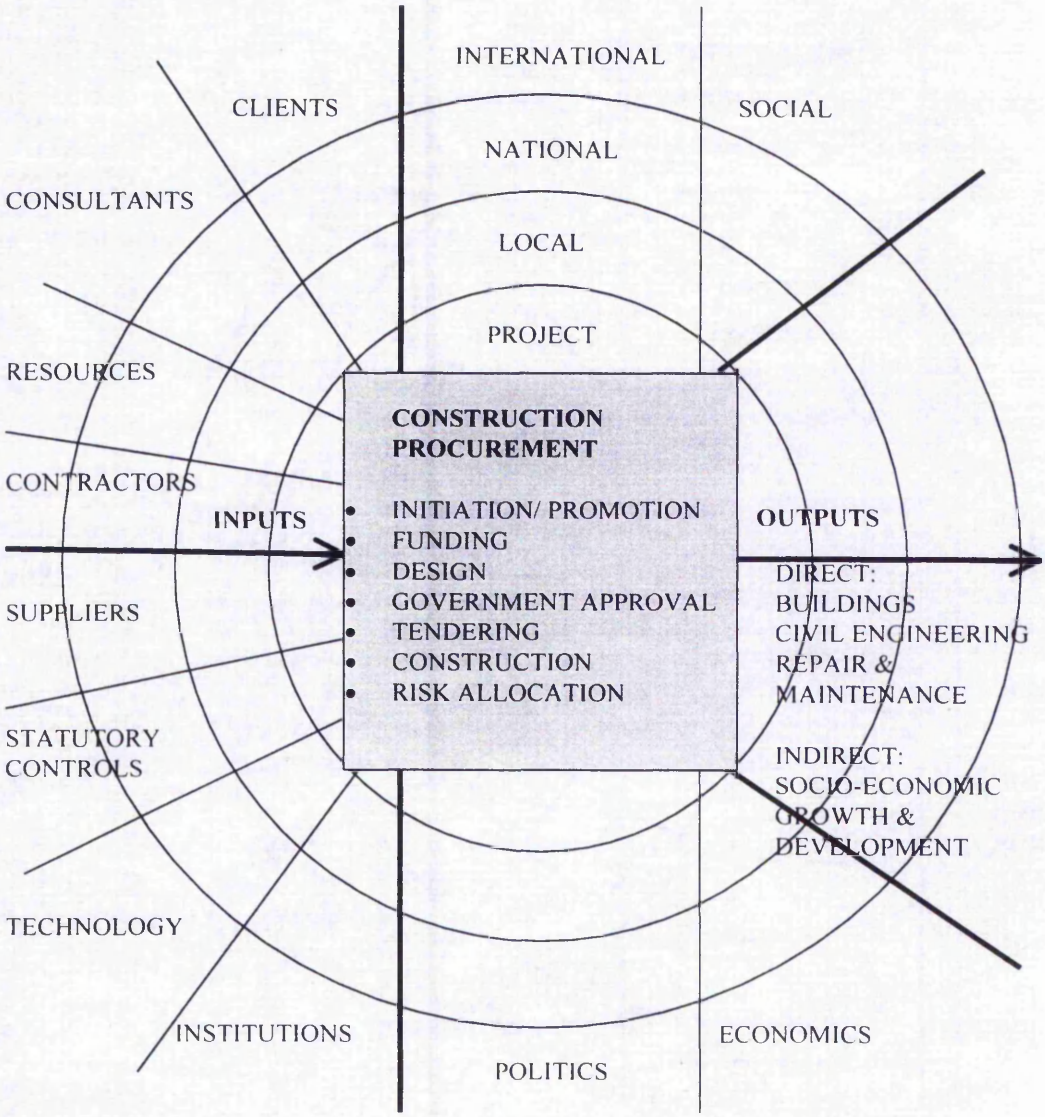
> "Clients' requirements, briefs and project designs tend to be modified frequently - the project system must respond readily to the changes in order to be efficient."
> Newcombe et al. (1990, p22).

Chart 3.1 suggests the environmental variables surrounding the processes of construction procurement in most construction industries. The variables include issues relating to politics, the economy, social and technology; and each prevails at different levels such as at project, local, national or international levels.

In the context of a construction industry Ofori (1980, p84) argued that the dynamism within which the construction industry operates means that the constraints that affect the effectiveness and efficiencies of the construction industries in developed countries will, sooner or later, assume importance in the construction industries in developing countries. The construction industry therefore, must continuously seek to offer new materials, systems, industrial processes, managerial and organisational approaches in order to respond to factors of change. The factors of change may include the changing pattern of total demand (for example, a decrease in the proportion of new work and subsequent increase in repair and maintenance works as the country develops), energy generation or conservation, call for better living conditions, health and safety, etc. (Ofori, 1980, p84). Should a construction industry fail to respond to the factors of change inefficiencies and ineffectiveness may consequently occur and subsequently, lead to deficiencies in construction.

In their review of constraints facing the construction industries in developing countries, Edmonds and Miles (1984, p21 and 30) stressed two factors, i.e., (1) no incentives to innovate and (2) inefficiencies, as among the major factors that may cause deficiencies in construction in developing countries. They argued that the lack of incentives to innovate and the inefficiencies arise largely from the construction industry's practice of separating the responsibility for the design of construction projects from the responsibility for their construction.

Chart 3.1 - The Environment Surrounding the Processes of Construction Procurement



Source: Modified from Newcombe, et al. (1990, p21)

For instance, Edmonds and Miles (1984, p21) commented that the practice of separating the responsibility for the design of construction projects from the responsibility for their construction;

> "... results in a situation where the product is defined by the client, the cost specified in a bill of quantities and even the method of producing the final article is circumscribed by various conditions of contract. This means, amongst other things, that the contractor has no incentive to innovate."

On inefficiency that could lead to deficiencies in construction, Edmonds and Miles (1984, p21) claimed that the practice of separating the responsibility for the design of construction projects from the responsibility for their construction is full of bureaucratic red tape, in terms of the various administrative and legal procedures involved in taking a design from its inception to construction.

In addition, the lack of incentives to innovate and the inefficiencies in the construction industries in most developing countries prevail due to governments in many countries using their construction industries as an economic regulator.

> "The industry is often used as an economic regulator for it is easier to slow down and accelerate programmes in construction than in, say, the manufacturing sectors. Consequently, contractors rarely have continuity of work, which not only means that in general they are not prepared to deviate from their traditional methods, but also that they continue to rely on casual labour which can be laid off or taken on at will. This has the effect that there is little long-term employment in the sector, ... and discourages the emergence of a reliable construction labour force."
>
> Edmonds and Miles (1984, p31).

Wang (1987, p148-151; 1991, p92-95) argued that in the context of the construction industry in a developing country, constraints in resources, in the conditions and in the elements within which the construction industry operates would directly affect its efficiency, effectiveness and the performance. Wang referred to the resources as finance, construction materials, plant and equipment and human resources, while by the conditions and elements Wang meant contractors' organisations and capability, levels of technology, practices and traditions of the construction industry and teamwork. Wang (1987, p149 and p150 respectively) argued that:

"... projects cannot be expeditiously and successfully implemented without the requisite resources being available to the construction industry covering finance, material, equipment and man-power resources. There is a necessity to place emphasis on these ingredients and to acknowledge the important role they play in the construction industry as a whole."

And

"In addition to the man-power, materials, equipment and financial resources, it is also important that the existing conditions in the construction industry are favourable and certain essential elements are present to enable the industry to organise the use of these resources to achieve efficiency and productivity."

There is other literature, including the more recent ones, outlining the constraints in the construction industries in developed countries and in developing countries. Literature relating to constraints in construction industries in developed countries such as the UK and other European countries includes Baron (1983, p17-29), Finnimore (1986, p20-21), Hillebrandt (1988); Briscoe (1989, p2), Latham (1993), Latham (1994), McDermott, Melaine and Sheath (1995, p205) and the European Commission (1994, p2). Literature relating to constraints in construction industries in developing countries includes Kartahardja (1980), Ofori (1984), World Bank (1984), Arditi, Akan and Gurdamar (1985), Aniekwu and Okpala (1987), Master Builders (1989/90), Ofori (1991), Miles and Neale (1991), Abdul-Rahman and Alidrisyi (1994), Sharif, (1996), Kong (1996), Zakeri, Olomolaiye, Holt and Harris (1996), Kaming, Olomolaiye, Holt and Harris (1997), and Adams (1997). In all, the literature iterated many of the constraints reviewed thus far.

Perhaps, Ofori's (1980, p83-84) statement summed it all:

"Thus, in no country is the construction industry altogether free from any major problems. Some of the issues are of concern in all countries but, generally, the problems are more severe in the developing countries, and resources more scarce. Thus, just as in general socio-economic development, the industries of all countries are still developing in some ways... the issues facing the developing countries are, however, more fundamental and/or more critical."

In conclusion, there are five main issues that may be drawn from the literature review relating to constraints facing the construction industries. They are:

1. All construction industries face constraints;

2. The nature and extent of constraints vary according to the country's level of economic development, i.e., the construction industries in developed countries appear to face the least constraints while the construction industries in the least developed countries appear to face the most severe constraints;

3. Most of the major constraints exist within the processes of construction procurement;

4. The likely cause or causes of the constraints include unavailability, insufficiency or inappropriate use of resources, functions or institutions; and

5. The constraints restrict or limit the effectiveness of the procurement process that would affect construction output and would subsequently inhibit growth in the construction industries.

3.4 Summary

The present research proposes a framework for the processes of construction procurement that may be considered to be specific for Malaysia. The framework encompasses the processes of (1) initiation/promotion, (2) funding, (3) design, (4) government approval for construction, (5) tendering, (6) construction, and (7) risk allocation among the parties involved.

This chapter established that all construction industries face constraints in one way or another. However, most of the constraints exist within the processes of construction procurement. The likely cause or causes of the constraints include unavailability, insufficiency or inappropriate use of resources, functions or institutions. In addition, the constraints restrict or limit the effectiveness of the procurement process that would affect construction output and would subsequently inhibit growth in the construction industries.

The following chapter will provide an overview of Malaysia in terms of the economy and the construction industry. The focus of Chapter Four is on the structural transformation of the economy and the construction industry and Vision 2020 and its impact on the construction industry.

CHAPTER 4

MALAYSIA: THE ECONOMY, VISION 2020 AND THE CONSTRUCTION INDUSTRY

4.0 Introduction

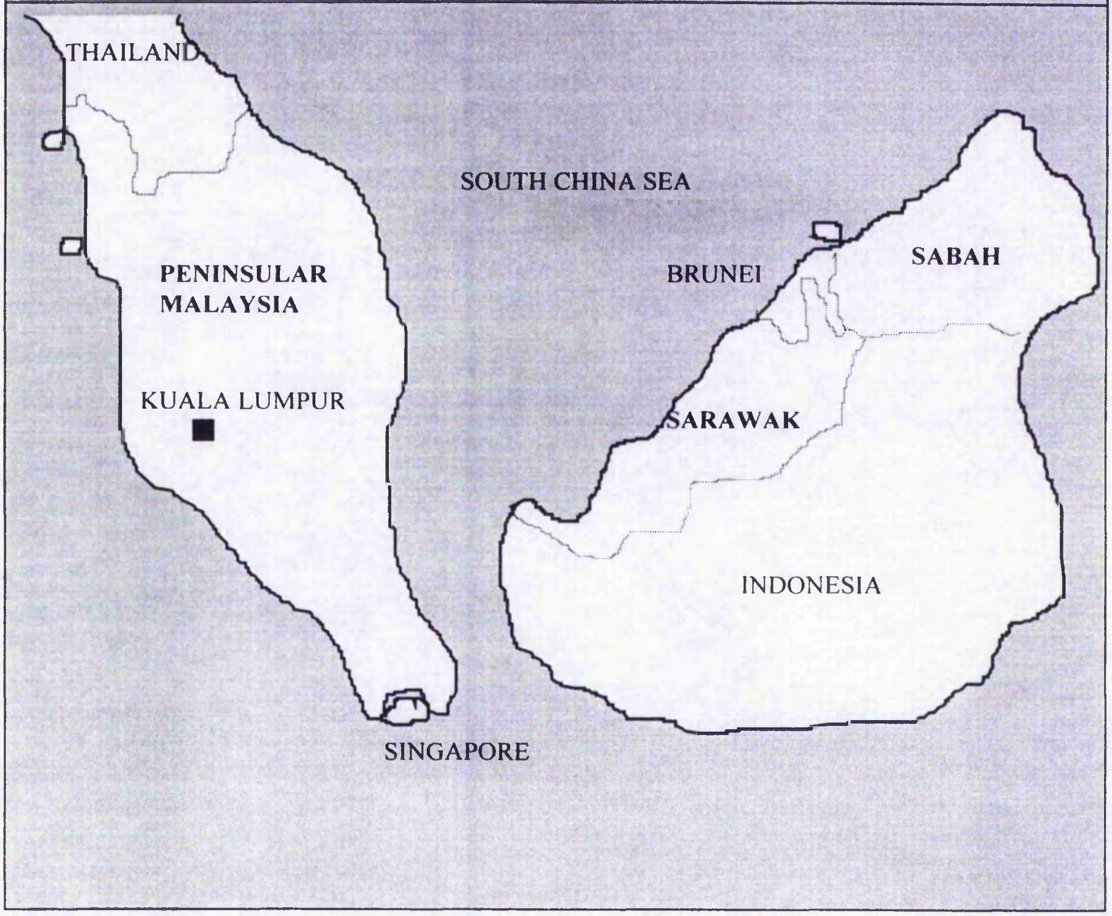
The objective of this chapter is to provide an overview of Malaysia in terms of the economy, Vision 2020 and the construction industry. Initially, the chapter will deal with a characterisation of the economy emphasising the general changes in its performance and the structural transformation that have occurred since independence in 1957. These aspects of the economy serve as a background to the ensuing discussion of Malaysia's Vision 2020. Vision 2020 is a national agenda for the long-term development for Malaysia. There are social, political and economic challenges facing Malaysia in its pursuit of Vision 2020. In this research the focus is on the economic challenges. Finally, this chapter will deal with the construction industry of Malaysia emphasising the past and current position and its significance to the economy of Malaysia. The aim of this chapter is to demonstrate the connection, at macro level, between construction and the economic challenges of Vision 2020.

4.1 Country Profile for Malaysia

4.1.1 Area and location

Malaysia lies between latitude 1 degree and 7 degrees north and longitudes 100 degrees and 120 degrees east. It covers a total area of 329,733 square kilometres and is divided into Peninsular Malaysia (131,573 square kilometres) and Sarawak and Sabah (198,160 square kilometres). Peninsular Malaysia extends 736 kilometres in length and 320 kilometres in width. Thailand is in the North and Singapore in the South. Sarawak and Sabah, cover 124,449 and 73,711 square kilometres, respectively and are 704 kilometres away across the South China Sea in the North of the island of Borneo. Together, Sarawak and Sabah stretch for about 1,200 kilometres, with a maximum width of some 256 kilometres. Chart 4.1 shows a map of Malaysia.

CHART 4.1 - MAP OF MALAYSIA



4.1.2 Time

Greenwich Mean Time (G.M.T) +7 hours

4.1.3 Capital

The capital of Malaysia is Kuala Lumpur, centrally located on Peninsular Malaysia. The total population of Kuala Lumpur in 1991 was 1,145,075 million.

4.1.4 Climate

Malaysia has a tropical climate that is warm and humid. Temperature varies from 31C (88F) during the day to around 23C (74F) during the night. These temperatures, with local variations depending on altitude and distance from the coast, are reasonably constant throughout the year.

There are two monsoon periods, that is the north-east that lasts from October to February and tends to be wetter, and the south-west that lasts from May to August. Average annual rainfall is about 100 inches in the Peninsular and about 150 inches in Sarawak and Sabah.

4.1.5 Currency

Ringgit Malaysia (RM) which is divided into 100 sen. Rate of exchange as at 14 February 1996: £1.00 = RM3.947 (Malayan Banking Berhad, in Utusan Malaysia, 15 February 1996, p11).

Since September 1997, there has been a decline in the value of the Ringgit against the Sterling and other world's major currencies. It has been argued that one key reason for the decline is due to the economic crisis facing Malaysia and the other economies in the Far East.

4.1.6 Population

The total population of Malaysia in 1996 was 21.169 millions. An overwhelming majority (16.73 millions) lives in Peninsular Malaysia. For the period between 1991 and 1994, the average population growth rate was 2.3 per cent per annum (Ministry of Finance, 1995, p220).

Until the 1980's it was the government's policy to encourage a slow rate of growth in the population. However, this policy has now been reversed. Considering a growth rate of 3.2 per cent per annum the government aims to achieve a target population of 70 millions (Ismail and Md. Isa, 1995, p51).

In 1996, about 35 per cent of the population are below 15 years of age, while about 61 per cent are in the working age, e.g. the 15-64 age group (Ministry of Finance, 1997, plxix). The statistics suggest that the Malaysian population is young and comprises a large size of the Economically Active Population (EAP).

Seventy-eight per cent of the population are literate (Auty, 1995, p211). More than half of the labour force has undergone secondary education (Government of Malaysia, 1993, p38).

Life expectancy is 74.2 years for females and 69.7 years for males (Ministry of Finance, 1995, p220).

Fifty-one per cent of the population of Malaysia lives in urban areas. Most of the urban population is in Peninsular Malaysia, representing about 86 per cent of its total population. In Sarawak and Sabah the urban population is 37 and 33 per cent of their total population, respectively (Ismail and Md. Isa, 1995, p54).

Malaysia is probably one of the world's most racially integrated country. Broadly, Malaysia's ethnic groups fall into two main categories: (1) those with cultural affinities indigenous to the region and to one another, who are classified as *bumiputera,* and (2) those whose cultural affinities lie outside, that is the non-*bumiputera* (Ismail and Md. Isa, 1995, p51).

The *bumiputera* comprises three broad categories: (1) the aboriginies (*Orang Asli*); (2) the Malays (*Orang Melayu*); and (3) Malay-related. The *Orang Asli* is the oldest element in the population but survives in only small numbers and in scattered groups, mainly in the Peninsular. The *Orang Melayu* is the majority and they represent the largest ethnic group in the Peninsular, and a substantial minority in Sarawak and Sabah. The third category consists of ethnic groups found in Sarawak and Sabah. The largest ethnic group in Sarawak is the *Iban* while in Sabah it is the *Kadazan.*

The non-*bumiputera* group consists primarily of ethnic Chinese and Indians, with other smaller communities including Arabs, Europeans, Eurasians and Singhalese.

The Chinese and Indians were brought to the Malay Peninsular by the British in the 19th and early 20th century to work in the tin mines and rubber estates, respectively, laying the foundation for the multi-ethnic society.

The other non-*bumiputera* groups consist of the descendants of the Arabs, Indians, Chinese and the European merchants who were involved in trading of precious goods, especially spices, in the 15th century when Malacca was a major regional entrepot: linking Europe and the Middle East with China. A small fraction of the Europeans is the descendants of the former colonialists: the Portuguese and Dutch in Malacca and the British. The breakdown of the ethnic population is as shown in Table 4.1.

Table 4.1 - Malaysia's Ethnic Population

Ethnic Race	%
Bumiputera	61
(Malay 55.25%, other 'indigenous peoples' 5.75%)	
Chinese	30
Indians	8
Others	1
Total	100

Source: DTI, UK (1995).

4.1.7 Religion

The official religion is Islam and is the largest single religious group in the country. The Malaysian Constitution guarantees freedom of religion. Other main religions include Buddhism. Hinduism and Christianity.

4.1.8 Official language

The national language is *Bahasa Melayu* (*Bahasa Malaysia*). However, English is widely used. Other languages commonly used are several Chinese dialects and Tamil. Other native languages are to be found in Sarawak and Sabah.

4.1.9 Politics

Malaysia is a federation comprising 13 states and 2 federal territories. Malaya, comprising all 11 Malay states of Peninsular Malaysia attained independence from Britain on 31 August 1957. On 16 September 1963 Malaysia was formed comprising Malaya, the British colonies of Sarawak, Sabah and Singapore. Singapore left Malaysia to be an independent republic on 9 August 1965.

Malaysia is a constitutional monarchy, headed by the *Yang di-Pertuan Agong* (King). The nine hereditary Malay Rulers elect the King for a period of five years from their own members. The *Timbalan Yang di-Pertuan Agong* (Deputy King) is elected in the same manner.

Legislative power is divided between federal and state legislatures. Federal legislative powers are vested in the Parliament. Parliament consists of two houses: the *Dewan Raayat* (House of Representatives) and the *Dewan Negara* (Senate). The House of Representatives consists of 192 members who are elected by universal suffrage every 5 years. The Senate consists of 2 elected representatives from each of the 13 states plus 32 appointed members to represent official and minority interests. The Cabinet led by the *Perdana Menteri* (Prime Minister) holds executive power.

Each of the 13 states has a *Dewan Undangan Negeri* (State House of Representatives). The members are elected in similar manner to the Federal House of Representatives. A *Mentri Besar* (Chief Minister) and the state executive councillors lead each State Government.

All matters - except land, Islam, Malays and other indigenous peoples - are under the authority of the federal government. Matters pertaining to land, Islam, Malays and other indigenous peoples are under the authority of the state governments. In addition, Sarawak and Sabah enjoy autonomy on immigration, civil service and customs.

On the whole, Malaysia's record on political stability has been excellent. The one and only exception was the racial riots in May 1969. Since then, the government embarked on a grand socio-economic engineering effort with the key aims of eradicating poverty regardless of race, and to eliminate the identification of race with economic function. These policies were contained in the New Economic Policy (NEP) introduced in 1970 and later superseded by the National Development Policy (NDP) introduced in 1991. The NEP and NDP will be featured in section 4.2.

4.1.10 The legal system

The Malaysian legal system is based on common law. It comprises the following courts:

1. Federal Court
2. Court of Appeal
3. High Courts, for the Peninsula, Sarawak and Sabah
4. Sessions Courts

5. Magistrates Courts

6. Juvenile Courts

7. Penghulu's (Chieftain) Courts

Matters pertaining to Islam are tried in the *Syariah* Courts. In addition, in Sarawak and Sabah, matters pertaining to native law and custom are tried in the native courts.

4.1.11 Society

Malaysia has achieved excellence in providing basic services to its population. Some of the basic socio-economic indicators are as shown in Table 4.2.

Table 4.2 Key Socio-economic Indicators

Service	Time series data
Infant mortality rate per 1,000 live births	1993: 11.9; 1975: 32.1
Government hospital beds	1994: 26,500; 1980: 24,400
Safe water in urban areas	1993: 96%; 1980: 89%
Safe water in rural areas	1993: 74%; 1980: 42.9%
Electricity in urban areas	1993: 99%; 1980: 94%
Electricity in rural areas	1993: 89.6%; 1980: 60%
Student-teacher ratio in primary schools	1993: 20.2; 1975: 31.8
Student-teacher ration in secondary schools	1993: 17.8; 1975: 27.3
First degree course enrolment	1993: 75,000; 1975: 15,000
Hard surface roads	1994: 61,900 km; 1980: 21,900 km

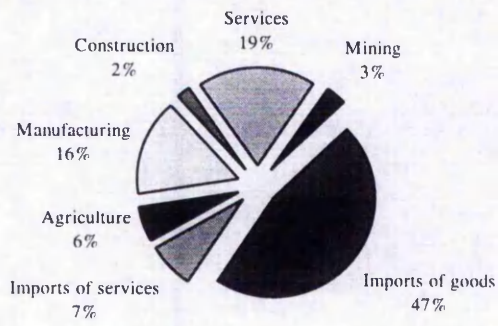
Source: Ministry of Finance (1994, p211-214; 1995, p221-222).

4.2 The Economy of Malaysia

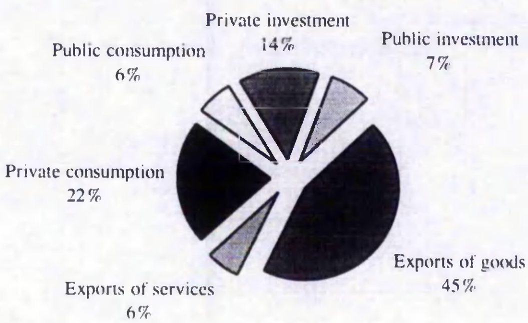
For a statistical overview of the Malaysian economy, in terms of GDP by industrial origin and its transition between 1985 and 1996, see Table 1.1, Chapter One of this thesis. For a snapshot of the Malaysian economy in 1996, in terms of domestic supply of and demand for goods and services and in terms of distribution of the workforce, see Chart 4.2.

Chart 4.2 - The Malaysian Economy in 1996 (at 1978 Prices)

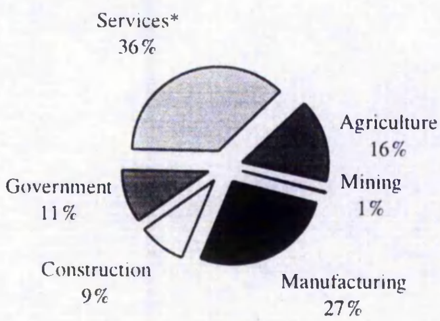
Supply of Goods and Services (RM 285.9 billions)



Demand for Goods and Services (RM 285.9 billions)



Total Employment (8,161.4 millions)



* Services include utilities, transport, storage, communications, trade, hospitalities, finance, insurance, real estate, etc.

Source: Ministry of Finance (1995, p5; 1997, plx-lxi).

4.2.1 Performance since independence

Muhd Salleh and Meyanathan (1993, p1) examined the Malaysian economy for the period from 1957, when Malaysia achieved independence, to 1990. Their work revealed that: (1) from 1960 to 1990, real GDP increased seven-fold at an annual growth rate of 6.8 per cent, (2) from 1967 to 1974 the growth rate averaged 7.7 per cent per annum, and (3) that from 1975 to 1981 economic growth averaged 8.3 per cent per annum. The only exception was the severe 1985 -1986 recession, which naturally lowers the annual growth rate figure for the period between 1960 and 1990.

The statistics compiled by the Ministry of Finance for the period 1988-96 show that for nine consecutive years, i.e. from 1988 to 1996, the Malaysian economy has attained rapid and prominent growth averaging over 8 per cent per annum. The growth rate for 1996 was 8.6 per cent (Ministry of Finance, 1997, p7). Between 1985 and 1995 inflation was under 5 per cent. Inflation stood at 3.5 per cent at the end of 1996 (Ministry of Finance, 1997, p8).

The statistics, compiled by Muhd Salleh and Meyanathan (1993, p1) and the Ministry of Finance for the period 1988-96, therefore, indicate that the Malaysian economy since independence has been characterised by relatively uninterrupted rapid growth with relative price stability.

The income per capita in 1984 was US$2,000 (United States Department of State, 1994). By 1991 the figure was US$2,520 (World Bank, 1993). At the end of 1996, per capita income was US$4,442 (RM11, 239 at RM2.53 = US1.00; Ministry of Finance, 1997, p7). Malaysia's income per capita is one of the highest among the developing countries (Navaratnam, 1995) and compares favourably with the Newly Industrialised Countries or NICs (Auty, 1995, p211).

The performance of the Malaysia's economy since independence has been one of the most successful in Asia (United States Department of State, 1994) and among the developing countries in the world (Navaratnam, 1995). Malaysia is now a middle-income developing country (Auty, 1995, p211; Adam and Cavendish, 1995, p11; the World Bank, 1995, p163; 1997, p215; Mahathir Mohamad, 1997) and an emerging second-generation NIC (Adam and Cavendish, 1995, p11; Auty, 1995, p13, 223).

Table 4.3 shows the economy of Malaysia in relation to some selected East Asian countries.

Table 4.3 - The Economies of Malaysia and Selected East Asian Countries

Country	Area (million square km)	Population (millions)	Population Growth (%/yr)	GDP Growth 1980-91 (%/yr)	Per Capita Income (US$ 1991)
Japan	0.378	123.9	0.5	4.2	26,930
NICs					
Hong Kong	0.001	5.8	1.2	6.9	13,430
South Korea	0.099	43.8	1.1	9.6	6,330
Singapore	0.001	2.8	1.7	6.6	14,200
Taiwan	0.036	20.4	1.4	6.5	7,600
Mid-Income					
Malaysia	**0.330**	**18.2**	**2.6**	**5.7**	**2,520**
Philippines	0.300	62.9	2.4	1.1	730
Thailand	0.513	57.2	1.9	7.9	1,570
Low-Income					
China	9.561	1150.0	1.5	9.4	370
Indonesia	1.905	181.3	1.8	5.6	610

Source: Auty (1995, p211).

The Malaysian economy is virtually at full employment. The demand for labour in 1996 expanded by 3.1 per cent, exceeding the labour force growth of 2.8 per cent. The unemployment rate in 1996 was 2.5 per cent (1995:2.8 per cent). At the end of 1996, the total labour force was 8.37 millions, of which 8.161 millions were employed (Ministry of Finance, 1996, p9; 1997, p9). The distribution of the labour force in 1996 is as shown in Chart 4.2.

4.2.2 Structural transformation

The Malaysian economy has gone through rapid structural changes since independence in 1957. From a primary producing economy, with rubber, tin, palm oil and timber as its staple products and exports (Navaratnam, 1995), Malaysia now is emerging as an industrialising economy (Adam and Cavendish, 1995, p13; Navaratnam, 1995; Auty, 1995, p224).

At independence, the Malaysian economy was dominated by the agricultural sector that accounted for over 40 per cent of GDP, 60 per cent of formal sector employment, and almost 70 per cent of export earnings (Adam and Cavendish, 1995, p13). Through labour intensive and high-technology export-oriented production policies introduced in the 1970's, the manufacturing sector became more prominent and by 1993 manufactured exports accounted for over 50 per cent of all exports (Adam and Cavendish, 1995, p13). In 1995 the manufacturing sector contributed 33 per cent to the GDP (Ministry of Finance, 1995, p18).

The economy at independence inherits a typical colonial administration: division of labour, was expected to supply raw materials and provide the market for manufactured imports from Britain; except where transport and other considerations necessitated local processing (Jomo, 1993, p1; 1995, p3). The economy then was characterised by: (1) primary commodities particularly rubber and tin, (2) wealth and equity ownerships were in the hands of foreigners and ethnic Chinese, and (3) the *Bumiputeras* were the poorest of all and mostly living in the rural areas (British Overseas Trade Board or BOTB, 1974, pM5; Jomo, 1995, p3). In addition, due to their weak economic background and 'the inequities of the British education system' the *Bumiputeras* were left behind in education (Muhd Salleh and Meyanathan, 1993, p23).

Consequently, at independence Malaysia was faced with a highly complex society that was troubled by unbalanced economic structure, ethnic inequality, and large inter and intra-regional disparities (Muhd Salleh and Meyanathan, 1993, p3). The greatest challenge of the government then was to provide economic growth for the entire society.

According to Muhd Salleh and Meyanathan (1993, pix-x) Malaysia, since independence, has undergone three socio-economic development phases, i.e.,

1. Market led development, 1957-1970
2. State led development, 1971-1985, and
3. Adjustment and liberalisation, 1986-1990

In addition, the 1990's saw Malaysia actively pursuing the Vision 2020 policy. The aim of Vision 2020 is to transform Malaysia from a developing country into a fully developed and industrialised nation by 2020 AD. It therefore represents the fourth phase in Malaysia's socio-economic development processes. These four socio-economic development phases provide context in examining the structural transformation of the Malaysian economy.

The key instrument in charting the socio-economic growth and development for Malaysia is the successive five-year Malaysia Plans. Basically, each Malaysia Plan describes the policies, strategies and programmes to operationalise the long-term plan that is in operation at the time and outlines in detail the macroeconomics and sectoral targets. It provides detailed public sector programmes and development allocation by sector and level of government. Table 4.4 shows the sums allocated for socio-economic development under the successive five-year Plans, i.e. First Malaysia Plan to Seventh Malaysia Plan (1966-2000). The breakdown according to the various socio-economic sectors for the Sixth Malaysia Plan (1991-1995) and the Seventh Malaysia Plan (1996-2000) is as shown in Table 1.3, Chapter One of this thesis.

Table 4.4 - Public Sector Development Allocation By Five-year Plan Period

Malaysia Plan	Total Allocation (RM Millions, in Current Prices)	% of GNP
First Malaysia Plan, 1966-70	4,551	not available
Second Malaysia Plan, 1971-75	7,250	11.2
Third Malaysia Plan, 1976-80	18,555	14.6
Fourth Malaysia Plan, 1981-85	42,830	24.1
Fifth Malaysia Plan, 1986-90	74,000	14.2
Sixth Malaysia Plan, 1991-95	104,000	14.8
Seventh Malaysia Plan, 1996-2000	162,500	11.5

Sources: First Malaysia Plan (1965); Sixth Malaysia Plan (1991, p76); Seventh Malaysia Plan (1996, p189).

4.2.2.1 Market led development, 1957-1970

According to Muhd Salleh and Meyanathan (1993, p4) between 1957-1970, Malaysia pursued market-based policies for industry but the government intervened to promote rural development and to provide social and physical infrastructures. The government's aims were to reduce the economy's dependence on primary commodities, particularly rubber and tin. It therefore sought to boost infrastructure and amenities that would encourage other forms of private sector production (Muhd Salleh and Meyanathan, 1993, p4).

Agriculture and infrastructure projects were the focus of public sector development allocations under the First and Second Malayan Plans (1954-1965) and the First Malaysia Plan (1966-1970). For instance, together agriculture and infrastructure received 22.3 per cent of the total development allocation during the period 1956-70 (Bowie, 1991, cited by Muhd Salleh and Meyanathan, 1993, p4). In 1960, agriculture contributed about 40 per cent of the GDP (Bruton, 1992, cited by Muhd Salleh and Meyanathan, 1993, p8). In contrast, industry and construction contributed 11 per cent and trade and finance contributed 23 per cent to the GDP. Almost 60 per cent of the workforce were in agriculture (Muhd Salleh and Meyanathan, 1993, p2). Muhd Salleh and Meyanathan, 1993, pix) observed that:

> "Growth was stable during this period and was largely based on the export of primary products. Nevertheless, there was little improvement in the level of absolute poverty, particularly among the indigenous *Bumiputera* population. Ethnic discontent led to communal rioting in 1969 and prompted a radical rethinking of policy."

4.2.2.2 State led development, 1971-1985

The 1969 racial riots prompted a major shift in the government's development policy. The government introduced a long-term development plan known as the Outline Perspective Plan 1 (OPP1) for the period between 1971 and 1990. A key policy under OPP1 was the New Economic Policy or NEP.

The NEP has two key objectives: (1) to eradicate poverty irrespective of race, and (2) to eliminate the identification of race with economic function. The two most significant targets of the NEP were:

1. The *Bumiputera* group would, within 20 years, i.e., by 1990, manage and own at least 30 per cent (as opposed to 2.4 per cent at the time) of total commercial and industrial activities; while other Malaysians from 34.3 per cent to 40 per cent; the foreigners were targeted to reduce their holdings from 63.3 per cent to 30 per cent, and

2. Employment pattern at all levels and in all sectors, must reflect the ethnic composition of the Malaysian population

The NEP was implemented during the period of rapid structural changes and expansion of the economy. This therefore, ensured that no particular ethnic group experienced any loss or felt any sense of deprivation in the process (Government of Malaysia, 1973, cited by Muhd Salleh and Meyanathan, 1993, p5). In pursuit of the ownership target, the government bought out and restructured the equity of foreign held companies through trustee companies (Muhd Salleh and Meyanathan, 1993, p5).

> "The NEP thus gave impetus to a more active and direct state role in resource allocation, production and trade... The aims of the government were to establish new industrial activities ... and to create a *Bumiputera* involvement in commercial and industrial life."
>
> Muhd Salleh and Meyanathan (1993, p5).

To accelerate economic growth, the government stressed agriculture and industrial diversification. In agriculture, the decline in world demand for rubber led the government to focus on other primary commodities such as cocoa, palm oil and forestry. In industry, the government introduced policies to shift the economy from import-substitution of the 1960's to export-oriented. It promoted industrialisation by introducing various incentives: export incentives, investment credits, tax exemptions and credit subsidies; and the granting of 'pioneer status' to industries and the setting up of Free Trade Zones (FTZs). The FTZs in particular were successful in attracting foreign direct investments. The export-oriented policies, the incentives and availability of low-cost, semi-skilled workers led to the rise of the semi-conductor (electronics) industry and other manufacturing industries such as textile, footwear and garments in Malaysia. Furthermore, the discovery of oil in the eastern part of Peninsular Malaysia and offshore Sarawak and Sabah made Malaysia a net exporter of oil.

To further accelerate economic growth, the government invested in a range of capital-intensive industrialisation strategies, implemented through government owned companies collectively known as the Non-Financial Public Enterprises (NFPEs). The most notable NFPE is the Heavy Industries Corporation of Malaysia (HICOM). The government aims of setting up HICOM were to promote industrial diversification, creating modern manufacturing activity outside the FTZ's enclaves and fostering backward linkages (Muhd Salleh and Meyanathan, 1993, pix). HICOM's best-known project is the PROTON national car.

During this period, the Second Malaysia Plan (1971-75), Third Malaysia Plan (1976-80), and the Fourth Malaysia Plan (1981-85) were implemented.

In 1981, public expenditure measured 58.4 per cent of GDP (Muhd Salleh and Meyanathan, 1993, pix) as the state invested heavily in the development of the economy. Muhd Salleh and Meyanathan (1993, p6) observed that:

> "During this period, both state and market forces were operating on the economy at the same time, though not necessarily always in contention. On the one hand, state intervention via licensing and quotas and regulated prices acted to restrain the market. On the other hand, the government was encouraging private sector development through promotion of investments in export-oriented industries. The nett effect was a mixed economy which was increasingly state dominated."

The period saw the government introducing two further policies that have significant influence on the future of the Malaysian economy, that is, (1) the Look East Policy in 1981, and (2) the Privatisation Policy in 1983.

The Look East Policy (*Dasar Pandang ke Timor*) was to develop Malaysia by emulating the rapidly developing countries of the East. The policy had a number of different strands. Some policies linked to the Look East Policy stress on the development of heavy industries and a greater reliance on countries such as Japan and South Korea for technical assistance and training and for construction and industrial contracts (Jomo, 1993, p302). Through the Look East Policy Malaysia's trade with other Asian nations increased considerably (Muhd Salleh and Meyanathan, 1993, px).

The Privatisation Policy (*Penswastaan*) was introduced in 1983. It gained momentum after: (1) the government introduced the 'Guidelines on Privatisation' in 1985 and later replaced by the 'Privatisation Masterplan' in 1991, and (2) the economy recovered from the recession years of 1985-1986 (Jomo, 1995, p42). Privatisation policy will be discussed in Section 4.2.2.3.

However, the world's recession in the late 1970's and early 1980's led to a decline in demands for Malaysia's products and an increase in expenditure on imports. The economic growth rate dropped from 8 per cent in 1979 to 6 per cent in 1982 and dived to a negative growth rate of -1 per cent in 1985 (Muhd Salleh and Meyanathan, 1993, p6, Ministry of Finance, 1988-95). Consequently, the financing of investment in the country, which was largely from domestic savings prior to 1980, shifted to external borrowing after 1980 (Muhd Salleh and Meyanathan, 1993, p6; Jomo, 1995, p4;)

In terms of structural changes during 1971-80, the changes were substantial, including (Muhd Salleh and Meyanathan,, 1993, p6-7):

- Agriculture was taken over by manufacturing. For example, the share of agriculture in GDP declined from 30 per cent in 1970 to 20 per cent in 1980, while manufacturing increased from 13 per cent to 20 per cent;
- Employment in manufacturing rose at 7.6 per cent per annum, in construction at 6.8 per cent, and in utilities at 6.5 per cent; and
- The unemployment rate as a percentage of the labour force fell from 7.5 per cent in 1970 to 5.3 per cent in 1980.

4.2.2.3 Adjustment and liberalisation, 1986-1990

The period 1986-1990 saw the adjustment and liberalisation of the Malaysian economy and a more active promotion of private sector participation in the economy.

The government realised that in the past while it has been successful in achieving growth targets and in meeting many of the country's socio-economic goals through the state's direct involvement in the economy, dependence on the public sector was found to be unsustainable. The government therefore, took several measures to correct the deficits in the public sector budgets and in the balance of payments from 1984 onwards (Mahathir Mohamad, 1991, p423-424) including;

"... restraints public sector expenditure, reduced public sector involvement in the economy as well as a reversal of the past practices of using public sector expenditure to boost demand and growth."

In order to offset the declining role of the public sector expenditure, the government took steps to stimulate private sector expenditure and investment in the economy. The steps included measures to liberalise and deregulate the economy such as the relaxation in the licensing requirements that were frequently used in the early 1980s, but the most significant of all was when the government intensified the implementation of the Privatisation Policy, first introduced in 1983. The Privatisation policy has the following aims:

1. To reduce the financial and administrative burden of the government, particularly in undertaking and maintaining services and infrastructure;
2. To promote competition, improve efficiency and increase productivity in the delivery of these services;
3. To stimulate private entrepreneurship and investment and thus accelerate economic growth;
4. To reduce the size of the public sector; and
5. To assist in achieving the NEP objectives.

In addition, Privatisation is increasingly seen as an effective vehicle to address the problems faced by the government owned companies, the NFPEs. The problems included large government funds that were required by the NFPEs for capital intensive business and their dependency upon the government to cover recurrent financial needs (Adam and Cavendish, 1995, p22; Muhd Salleh and Meyanathan, 1993, p23).

The government also kept public spending under control, i.e. by focusing on providing the infrastructure and conducive environment needed for private enterprise to thrive (Muhd Salleh and Meyanathan, 1993, p7). The Fifth Malaysia Plan (1986-1990) was implemented during this period.

According to Muhd Salleh and Meyanathan (1993, p7) the growth pattern during this period shifted from demand that was led by the external sector towards domestic demand, partly due to the rise in consumer spending after the recession years of 1985-86.

The economy was showing signs of success. Between 1987 and 1990 the economy sustained its growth rate averaging 8.25 per cent per annum. However the prolonged and high growth rate caused problems associated with a successful economy. Towards the end of the 1980's there were signs of overheating arising from labour shortages and rising inflationary pressures. Imports, concentrated largely in intermediates and capital goods outstripped exports, and Malaysia's balance of payments deteriorated (Muhd Salleh and Meyanathan, 1993 p7; Ministry of Finance, 1995, p165).

The structural changes between 1986 and 1990 included (Ministry of Finance, 1988-95; Muhd Salleh and Meyanathan, 1993, p7):

- The share of agriculture in GDP continues to decline, i.e., from 21 per cent in 1985 to 20.4 per cent in 1989, while manufacturing increased from 20 per cent to 25.5 per cent;
- Employment in manufacturing rose to 18.6 per cent per annum in 1989, and in construction rose to 10.9 per cent; and
- The unemployment rate as a percentage of the labour force fell from 8.3 per cent in 1986 to 5.1 per cent in 1990.

In terms of equity ownership as targeted under the NEP, the goal of 30 per cent *Bumiputera* ownership by 1990 was not reached. *Bumiputera* wealth ownership increased from 2 per cent in 1970 to 20.3 per cent by the early 1990's. Although all ethnic races benefited from Malaysia's successful growth, the average *Bumiputera* household is still behind the other ethnic groups, especially the Chinese (Muhd Salleh and Meyanathan, 1993 p39). Therefore, ethnic inequality, in particular national unity remains the core issues in economic policies for the 1990's.

In summary, it can be said that the Malaysian economy between the period 1957 and 1990 is characterised by an economy that included:

- Moving from the export of primary goods to manufactured goods;
- Moving from public sector driven to private sector driven; and

- An economy that is relatively stable and that it has achieved growth, equity and structural transformation in a multi-racial society.

In the context of rapid and prominent economic growth, a high rate of economic growth is of paramount important for Malaysia in the years commencing 1991. Malaysia needs to achieve a rapid and sustainable growth rate of 7.0 per cent per annum in real terms until at least 2020 in order to realise its' Vision 2020. Vision 2020 therefore, represent the fourth phase in the socio-economic development process of Malaysia.

4.3 Vision 2020

The principal policy to induce socio-economic growth and development in Malaysia in the 1990's and beyond is Vision 2020. Vision 2020, introduced in 1991, is a national agenda for the long-term socio-economic development for Malaysia.

4.3.1 Objective of Vision 2020

The principal objective of Vision 2020 is to transform Malaysia from a developing country into a fully developed and industrialised country by 2020 AD. A fully developed country in the context of Vision 2020 refers to a country that is developed not only in economic sense but fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally (Mahathir Mohamad, 1991, p1-2).

> "Hopefully, the Malaysian who is born today and in the years to come will be the last generation of our citizens who will be living in a country that is called 'developing'. The ultimate objective that we should aim for is a Malaysia that is fully developed country by the year 2020.
>
> What, you might rightly ask, is 'a fully developed country?' Do we want to be like any particular country of the present 19 countries that are generally regarded as 'developed countries'? Do we want to be like the United Kingdom, like Canada, like Holland, like Finland, like Japan? To be sure, each of the 19, out of a world community of more than 160 states, has its strength. But each also has its fair share of weaknesses. Without being a duplicate of any of them we can still be developed. We should be a developed country in our own mould.

Malaysia should not be developed only in the economic sense. It must be a nation that is fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally. We must be fully developed in terms of national unity and social cohesion, in terms of our economy, in terms of social justice, political stability, system of government, quality of life, social and spiritual values, national pride and confidence."
(Prime Minister Mahathir Mohamad in presenting 'Vision 2020' on 28 February 1991, in Mahathir Mohamad, 1991, p1-2).

4.3.2 The strategic challenges to Vision 2020

There are nine strategic challenges that face Malaysia in its pursuit towards Vision 2020 (Mahathir Mohamad, 1991, p2-4). The challenges are:

1. Establishing a united Malaysian nation (*Bangsa Malaysia);*
2. Creating a psychologically liberated, secure, and developed Malaysian society;
3. Fostering and developing a mature democratic society;
4. Establishing a fully moral and ethical society;
5. Establishing a mature, liberal and tolerant society;
6. Establishing a scientific and progressive society;
7. Establishing a fully caring society;
8. Ensuring an economically just society, in which there is a fair and equitable distribution of the wealth of the nation; and
9. Establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient.

According to Mahathir Mohamad (1991, p4) the nine central objectives are not listed in order of priority. He suggested that the priorities of any moment in time must meet the specific circumstances of that moment in time.

4.3.3 The economic challenges to Vision 2020

According to Mohd Kassim (1993, p68) all nine challenges are interrelated, all encompassing and cover all issues that are relevant in transforming Malaysia into a fully develop and industrialised country by the year 2020. From the nine challenges, Mohd Kassim (1993, p68) identified the sixth, eighth and the ninth as challenges relating to economic aspect while the rest of the challenges pertain to socio-political challenges.

Many researchers and writers viewed the economic challenges as critical in meeting the objectives of Vision 2020. For instance. Abdul Rahman (1993, p272-273) contended that sustained economic growth would provide the necessary means to meet the overall socio-political objectives of Vision 2020. Sulaiman (1993, p151) contended that achievement of the socio-political challenges rests on the existence of a viable economic base for Malaysia. He claimed the ninth challenge is one of the most crucial challenges. And Abdul Hamid (1993, XV-XVI) claimed that the achievement of a high level of economic growth is the critical factor for success in making Malaysia a fully developed nation by the year 2020. These views therefore, suggest that Malaysia's economy, in particular rapid and sustainable economic growth, is the key factor of success in making Malaysia a fully developed nation by the year 2020. This aspect of the economy is the subject of Vision 2020's ninth challenge.

The ninth challenge of Vision 2020 is: "establishing a prosperous society, with an economy that is fully competitive, dynamic, robust and resilient." Mahathir Mohamad (1991, p7-8) indicated that there are two key issues within the ninth challenge of Vision 2020: (1) the establishment of a prosperous society, and (2) the establishment of a competitive economy.

On the first issue of the ninth challenge, prosperous society in the context of Vision 2020 refers to Malaysians that will be four times richer (in real terms) than they were in 1990 (Mahathir Mohamad, 1991, p8). In order to establish the prosperous society by 2020 the Government set a target that Malaysia's economy must achieve a rapid and sustainable growth rate of 7 per cent per annum in real terms (measured in terms of growth in GDP) for thirty years, that is, from 1991 to 2020. The targeted growth rate would result in Malaysia's GDP expanding by some eight times, i.e. from RM115 billions in 1990 to about RM920 billions in 2020 (Mahathir Mohamad, 1991, p7). With the Malaysian population projected to reach around 32 millions by 2020 (1990: 18 millions, at 2.5 per cent annual rate of population growth) the income per capita would rise from RM6, 180 in 1990 to RM26, 100 (in constant terms, 1990 prices) or to US$9,500, i.e. by some four times. It is hoped that high growth would trickle down so that most Malaysians improve their standard of living. Consequently, the disparity in wealth between Malaysians and the developed countries would be narrowed.

Table 4.5 shows the macroeconomics targets of Vision 2020. Tables 4.6 and 4.7 show the economic sizes and per capita incomes of Malaysia in relations to some selected regions between 1990 and 2020, respectively.

Table 4.5 - Macroeconomic Targets of Vision 2020

	1990	1995	2000	2020
GDP (RM Billions)				
In 1978 Prices	79	114	156	630
In 1990 Prices	115	165	230	920
Manufacturing				
Share of GDP (%)	27.0	32.4	37.2	40.0
Employment ('000)	1,290	1,700	2,144	
% Total Employment	19.3	22.0	24.0	
Unemployment Rate (%)	6.0	4.5	4.0	0.0
GNP Per Capita (RM)				
Nominal Terms	6,180	10,200	17,000	80,000
Constant 1978 Prices	4,273	5,400	6,700	17,100
Constant 1990 Prices	6,180	7,860	9,400	26,100
GDP Growth Rate (% per annum)	6.7	7.5	7.0	7.0
Inflation Rate (%)	4.6	Low	Low	Low
Population (Millions)	18	-	23	32

Source: Mohd Kassim (1993, p72) and Sulaiman (1993, p161).

Table 4.6 - GDP of Malaysia and Some Selected Regions, 1990-2020 (in Constant 1990 Prices, US$ Billions)

Region	1990	2000	2010	2020	2020/1990
North America	5,645	7,590	9,710	12,430	2.2
European Community	4,690	6,240	7,610	9,280	2.0
ASEAN	245	420	740	1,330	5.4
World	19,982	27,400	36,450	48,490	2.4
Malaysia US$	**43**	**90**	**172**	**340**	**8.0**
RM	**115**	**230**	**474**	**920**	**8.0**

Source: Sulaiman (1993, p164-165).

Table 4.7 - Per Capita Incomes of Malaysia and Some Selected Regions, 1990-2020 (in Constant 1990 Prices, US$)

Region	1990	2000	2010	2020	2020/1990
North America	20,527	25,220	29,810	35,590	1.7
European Community	14,475	18,880	22,680	27,370	1.9
ASEAN	790	1,130	1,730	2,670	3.4
World	3,812	4,480	5,220	6,210	1.6
Malaysia US$	**2,248**	**3,420**	**6,380**	**9,500**	**4.2**
RM	**6,182**	**9,400**	**17,560**	**26,100**	**4.2**

Source: Sulaiman (1993, p168-169).

The second key issue of Vision 2020's ninth challenge is the objective of securing the establishment of a competitive economy. A competitive economy, in the context of Vision 2020, refers to an economy that is able to sustain itself over the longer term, is dynamic, robust and resilient. It means, among other things (Mahathir Mohamad, 1991, p8-9):

1. A diversified and balanced economy with a mature and widely based industrial sector, a modern and mature agriculture sector and an efficient and productive and equally mature services sector;

2. An economy that is quick on its feet, able to quickly adapt to changing patterns of supply, demand and competition;
3. An economy that is technologically proficient, fully able to adapt, innovate and invent, that is increasingly technology-intensive, moving in the direction of higher and higher levels of technology;
4. An economy that has strong and cohesive industrial linkages throughout the system;
5. An economy driven by brain-power, skills and diligence, in possession of wealth of information, with the knowledge of what to do and how to do it;
6. An economy with high and escalating productivity with regard to every factor of production;
7. An entrepreneurial economy that is self-reliant, outward-looking and enterprising;
8. An economy sustained by an exemplary work ethic, quality consciousness and the quest for excellence;
9. An economy characterised by low inflation and low cost of living; and
10. An economy that is subject to the full discipline and rigour of market forces.

4.3.4 Strategies to achieve Vision 2020

Having enunciated and propagated Vision 2020 the Government of Malaysia set upon the tasks of establishing the process and infrastructure to support the achievement of the set goals. The Government formulated and implemented appropriate plans, programmes and strategies to guide the movement in the desired direction. The implementations of these are supported by the necessary rules, regulations and procedures that will ensure adherence to the set process and minimise derailment along the way and to monitor and evaluate periodically to take into consideration changes in the light of new circumstances.

Among the key plans, programmes and strategies formulated and implemented aimed at realising the objectives of Vision 2020 include:

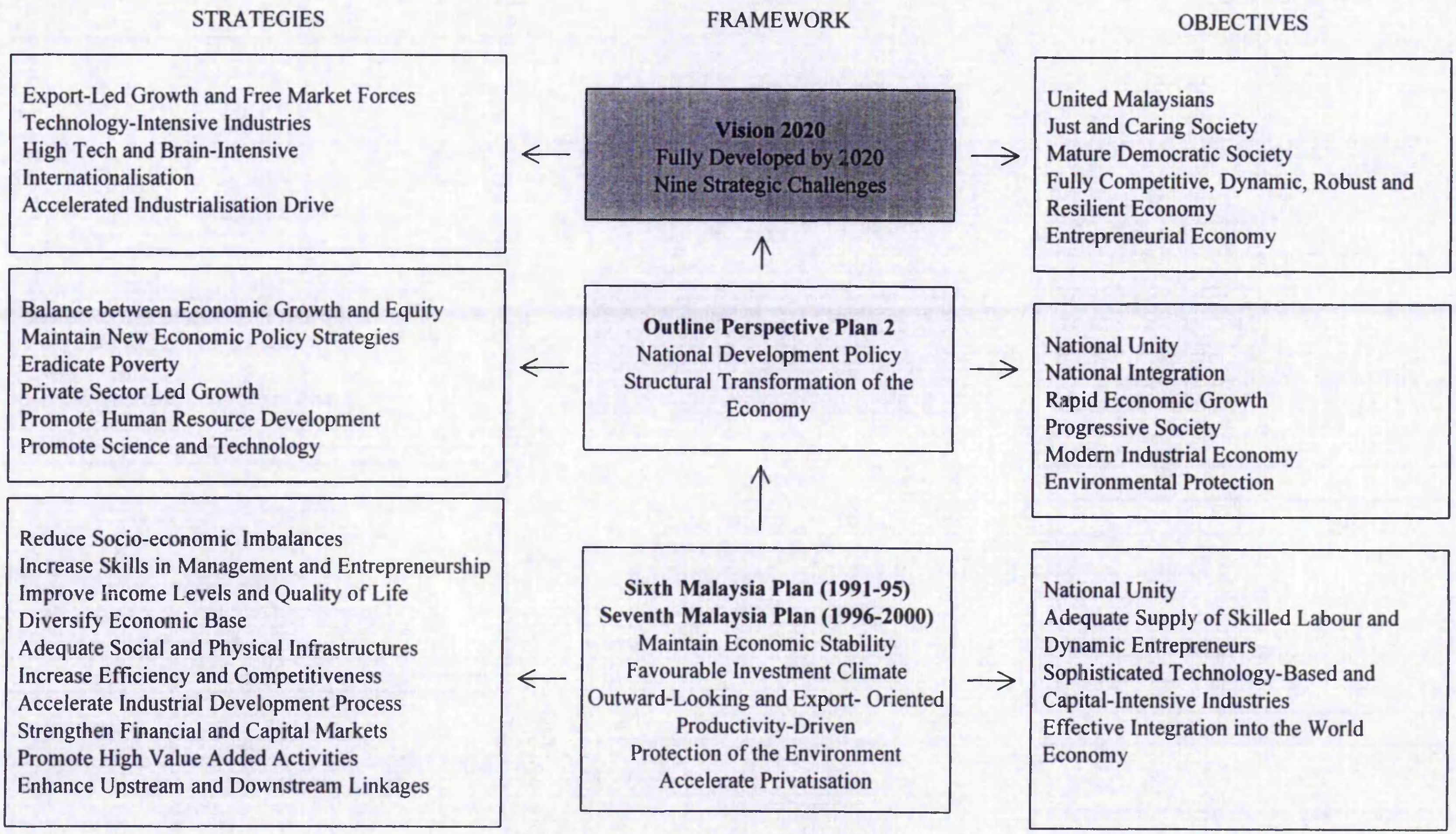
1. The Outline Perspective Plan 2, OPP2 (1991-2000);
2. The National Development Policy (NDP);
3. The Sixth Malaysia Plan (1991-1995); and
4. The Seventh Malaysia Plan (1996-2000).

Chart 4.3 presents a conceptual model of the linkages between Vision 2020 and the key strategies and outlines their key objectives.

The OPP2 replaces OPP1 that expires in 1990. OPP2 is basically a long-term plan that embodies the new NDP. The latter replaces the NEP that also expires in 1990. In essence the NDP is an extension of the NEP, as the objectives of the latter have not been fully realised. The main objective of the NDP is to attain a balanced development so as to establish eventually a more united and just society as envisioned in Vision 2020. However, the government has set up no deadline. The OPP2 provides a framework for achieving certain social economic targets within the first ten-year period (*Rangka Rancangan Jangka Panjang Kedua 1991-2000*, Jabatan Percetakan Negara, 1991, p3-7).

The Sixth Malaysia Plan, 1991-95 and the Seventh Malaysia Plan, 1996-2000, describe the policies, strategies and programmes to operationalise the first ten-year of OPP2. Both plans provide detailed macro-economic and sectoral targets, detailed public sector programmes and development allocation by sector and level of government (see Government of Malaysia, 1991 - Sixth Malaysia Plan 1991-1995; Government of Malaysia, 1996 - Seventh Malaysia Plan 1996-2000). Under the Sixth Malaysia Plan and the Seventh Malaysia Plan, a total of RM117, 500 millions and RM162,500 millions, respectively, were allocated for socio-economic development programmes. The breakdown of allocations according to the various sectors under both plans is as shown in Table 1.3, Chapter One of this thesis.

Chart 4.3 Objectives and Strategies for Socio-economic Development for Malaysia (Principal source: Mohd Kassim, 1993, p70).



It would appear that the strategies vary both in terms of time frame and focus. But their ultimate objective remains the same, that is to build a progressive, prosperous and united nation (Mohd Kassim, 1993, p68) with industrialisation as the unquestioned developmental priority for the decades ahead (Jomo, 1993, p11).

In addition to the official government strategies designed to facilitate attaining Vision 2020, economists and industrialists have been active in proposing appropriate strategies. For instance, Merican (1993, p150) proposed several measures to increase the competitiveness of the Malaysian economy, notably:

1. Malaysia should integrate its economy to the growing global economy by encouraging Malaysian firms to provide goods and services for both the home market and the global market;

2. Malaysia should attract foreign investments and work with these firms to produce competitive goods and services for the Malaysian market and the markets abroad; and

3. The effectiveness of regulatory authorities be improved to improve the functioning of a competitive market-oriented economy.

In order to achieve economic resilience, Merican (1993, p150) proposed that Malaysia further improve its macroeconomics monitoring and management capability to ensure appropriate and rapid response to a changing economic situation.

The then Director General of the Economic Planning Unit of the Prime Minister's Department (Sulaiman, 1993, p183-185) proposed five socio-economic qualities that he claimed will help ensure that Malaysia is able to develop competitive industries and increase overall economic resilience. They are:

1. The existence of political stability and social justice;

2. The maintenance of economic, financial and price stability so that long-term economic decisions can be undertaken;

3. The maintenance of non-distorted prices, whether for goods and services, capital or foreign exchange. This will ensure efficient allocation of economic resources between industries and between tradable and non-tradable sectors;

4. The development of a well-integrated production structure through greater inter-sectoral linkages as well as within each sector; and

5. The development of a large domestic or regional market to reduce external uncertainties.

On becoming competitive in a particular industry, Sulaiman (1993, p185-186) contended that the way forward is to become the most efficient producer within that industry, producing at a lower cost than the competitors. Consequently, more specific efforts to upgrade factor efficiency will be necessary. Sulaiman (1993, p185-186) listed four factors:

1. The establishment of adequate physical, social and institutional infrastructure to support an increasing level of economic activities. Such a development prevents bottlenecks and physical constraints from holding up economic activities, and ensuring that overhead costs remain low;

2. Ensuring adequate supply of professional, technical, skilled, managerial and research personnel through an effective programme of human resource development complemented by high labour mobility within an efficient labour market. This will help upgrade the efficiency of labour;

3. Increasing production efficiency or improving product quality through better organisation, more efficient, advance productive capital, and ability to produce newer and better quality products. These require the development of an advanced research and development capability. These actions help improve the efficiency of capital; and

4. The development and the creation of a market-oriented private sector.

4.3.5 Some views on the prospect of achieving the objectives of Vision 2020

The objectives of Vision 2020 are not easy tasks to realise. For instance, Mahathir Mohamad (1991, p7) warned that, in the context of achieving the 7 per cent growth rate per annum between 1991-2000:

> "We must guard against 'growth fixation', the danger of pushing for growth figures oblivious to the needed commitment to ensure stability, to keep inflation

> low, to guarantee sustainability, to develop our quality of life and standard of living, and the achievement of our other social objectives. It will be a difficult task, with many peaks and low points..."

Similarly, Mohd Kassim (1993, p73) contended that Vision 2020 is difficult to realise and that its attainment:

> "... entails structural transformations that need to be taken at a stable, manageable and sustainable rate."

According to Merican (1993, p133-150) and Mohd Kassim (1993, p74) long term projection of Malaysia's economy is plagued with various national and international uncertainties. For instance, the prospects for the economy will continue to depend on favourable domestic policies and the performance of the major industrial countries (Mohd Kassim, 1993, p74) and against a backdrop of an increasingly global world economy (Merican, 1993, p133). The attainment of Vision 2020 is therefore, dependent upon these factors being favourable at all times up to 2020. In addition, Merican (1993, p135) argued that despite concentrated efforts to narrow the gap between Malaysia and the developed countries in terms of socio-economic growth and development the gap continues to increase:

> "... every year in spite of our higher percentage growth rate, the absolute income gaps with these rich countries continue to increase. Even if we allow for currency conversion errors, there is a lot that we should aim to achieve in order to catch up, or to strive to enable Malaysians to enjoy a fuller life."

However, many writers and commentators believe that the objectives of Vision 2020 are attainable. For instance, Mahathir Mohamad (1991, p7-8) is confident that the target of achieving economic growth of 7 per cent per annum for the period between 1991 and 2020 is attainable. He argued that:

> "In the 1960's, we grew by an annual average of 5.1 per cent; in the 1970's, ... Malaysia grew by an average of 7.8 per cent; in the 1980's, because of the recession years, we grew by an annual average of 5.9 per cent.
> If we take the last 30 years, our GDP rose annually in real terms by an average of 6.3 per cent. If we take the last 20 years, we grew by an annual average of 6.9 per cent. What is needed is an additional 0.1 per cent growth. Surely if we all pull together, God willing, this 0.1 per cent can be achieved."
>
> Mahathir Mohamad (1991, p8).

Sulaiman (1993, p151), too, believed that Vision 2020 is attainable. He contended that:

> "The rapid economic development that we have achieved since independence has progressively brought the vision of a fully developed economy by the year 2020 within our reach. Among the strengths that we now have include a high domestic savings rate, a relatively well-developed physical, social and institutional infrastructure, political, economic and financial stability as well as a relatively developed private sector-driven manufacturing and industrial base."

Similarly, other commentators including Abdul Hamid (1993, pXIV), Navaratnam (1995), Anwar Ibrahim (1995), DTI, UK (1995), and Mahathir Mohamad (1997), while appreciating the difficult tasks that lie ahead, firmly believe that Malaysia could attain the objectives of Vision 2020. They believe that the macro-economic environment of Malaysia in the 1990's and for the period up to the year 2020 is very promising. Perhaps, the following comments made by Abdul Hamid (1993, pXIV) summed-up the optimistic feelings of the Malaysians people that Vision 2020 is attainable:

> "Malaysia has been fortunate ... It has leadership with the foresight and courage to set a long-term vision which acts a the rallying point for the nation as a whole. Vision 2020 can be said to have captured the imagination of the Malaysian people as a desirable goal to work towards. At the same time, it is not just a grandiose dream. It is a realistic programme which draws on past achievements and known potentials of the nation and provides the right impetus for national development..."

The views expressed by the writers and commentators on the prospect of Malaysia attaining the objectives of Vision 2020 suggests, therefore, that on the one hand, there are various difficulties that lie ahead. It is contended that this phenomenon is relatively common to a nation that embarks on a new challenge. On the other hand, Vision 2020 has been shown to be achievable provided Malaysia is able to sustain rapid economic growth and continues to pursue the correct policies.

4.4 The Construction Industry of Malaysia

For a statistical overview of the construction industry, in terms of gross value of output between 1971 and 1992, of its relationship to total GDP between 1967 and 1996, and of construction's share in total employment between 1970 and 1996, see Tables 4.8, 4.9, and 4.10, respectively and Charts 4.4, 4.5 and 4.6, respectively. For a statistical overview of the construction sector in relation to the other economic sectors, in terms of both GDP and the annual rates of growth between 1985 and 1996, see Table 1.1, Chapter One of this thesis.

4.4.1 The Malaysian Industrial Classification's definition of construction

The Malaysian Industrial Classification (M.I.C) 1972 (updated 1979) as cited by Department of Statistics (1994, p19) defined construction as:

> "... new construction, alteration, repair and demolition. Installation of any machinery or equipment which is built-in at the time of the original construction is included, as well as installation of machinery or equipment after the original construction but which requires structural alteration in order to install."

The M.I.C categorises construction works into two categories: (1) general contracting, and (2) special trade contracting. General contracting covers residential, non-residential, civil and engineering construction. Special trade contracting covers specialist works. The full classification is given in Table 4.11.

According to Wang (1987, p2) the M.I.C classification facilitates data collection on revenue, cost, employment and payment and their geographical breakdown of the construction sector in Malaysia. Thus, when data on output, employment, etc., in the construction industry of Malaysia are being featured, it refers to all activities by the construction industry as provided for in the M.I.C definition.

In this study, the definition of construction proposed by the M.I.C and its classification is adopted for use.

Table 4.8 - Value of Output of the Malaysian Construction Industry, 1971-92

Year	Gross Value of Output (RM '000)[1]
1971	658,452
1972	854,920
1973	1,118,353
1974	1,600,483
1975	2,221,209
1976	2,373,523
1977	2,578,356
1978	2,817,526
1979	3,367,436
1980	not available
1981	6,086,240
1982	8,111,496
1983	9,108,806
1984	9,702,165
1985	9,648,075
1986	8,026,323
1987	5,914,975
1988	6,187,098
1989	8,288,596
1990	11,938,881
1991	15,573,500
1992	19,634,765

[1] Data collected from construction firms with value of work done during the year was RM100,000 and above that participated in a survey of construction industries administered by the Department of Statistics.

Sources: Figures for 1971 - 82, Department of Statistics, in Wang (1991, p98).
Figures for 1982 - 92, Department of Statistics (1994, p25).

Table 4.9 - Construction and GDP, 1967-96[1]

Year	Value of Construction GDP	% Share in Total GDP	% Growth in Construction GDP
1967	343	}	not available
1968	347	}	1.2
1969	351	} 3.8 to 4.1	1.2
1970	384	}	9.4
1971	430	}	12.0
1972	477	}	10.9
1973	651	4.4	14.0
1974	729	5.0	12.0
1975	654	5.0	-10.3
1976	713	5.0	9.0
1977	800	5.0	12.2
1978	919	4.0	14.9
1979	1,027	4.3	11.8
1980	2,066	4.64	17.3
1981	2,367	4.97	14.6
1982	2,598	5.15	9.8
1983	2,867	5.35	10.4
1984	2,988	5.17	4.2
1985	2,738	4.79	-8.4
1986	2,355	4.07	-14.0
1987	2,077	3.41	-11.8
1988	2,133	3.22	2.7
1989	2,380	3.29	11.6
1990	2,832	3.57	19.0
1991	3,240	3.76	14.4
1992	3,619	3.89	11.7
1993	4,023	3.99	11.2
1994	4,589	4.18	14.1
1995	5,385	4.47	17.3
1996	5,870	4.50	9.0

[1] Figures for 1967-72 are in current prices, for 1973-79 are in 1970 constant prices and for 1980-96 are in constant 1978 prices.

Sources: Abdul Rashid (1995, p7), Ministry of Finance (1988 to 1997).

Table 4.10 - Employment in the Malaysian Construction Industry, 1970-96

Year	Number of Workforce	% Share of Total Employment	% Growth in Construction Employment
1970	91,000	2.7	-
1971	102,000	not available	12.1
1972	114,000	not available	11.8
1973	127,000	not available	9.0
1974	143,000	not available	12.6
1975	160,000	4.0	11.9
1976	169,000	not available	5.6
1977	182,000	not available	7.7
1978	197,000	not available	8.2
1979	212,000	not available	7.6
1980	269,900	5.58	27.3
1981	299,000	not available	10.8
1982	318,000	not available	6.3
1983	442,600	8.15	39.2
1984	442,300	7.94	-0.1
1985	429,400	7.63	-2.9
1986	382,000	6.69	-11.0
1987	354,600	6.02	-7.2
1988	340,000	5.50	-4.1
1989	377,000	5.90	10.9
1990	424,000	6.34	12.5
1991	465,000	6.75	9.8
1992	507,000	7.14	9.0
1993	544,000	7.36	7.3
1994	597,600	7.84	9.7
1995	659,000	8.33	10.3
1996	705,100	8.62	6.9

Source: Abdul Rashid (1995, p7), Ministry of Finance (1988 to 1997).

Chart 4.4 - Value of Output of the Malaysian Construction Industry, 1971-92

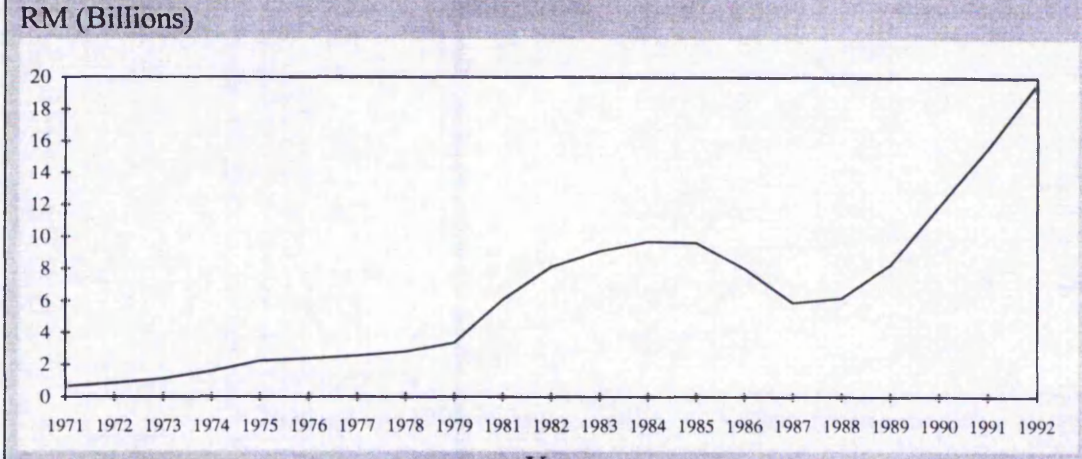
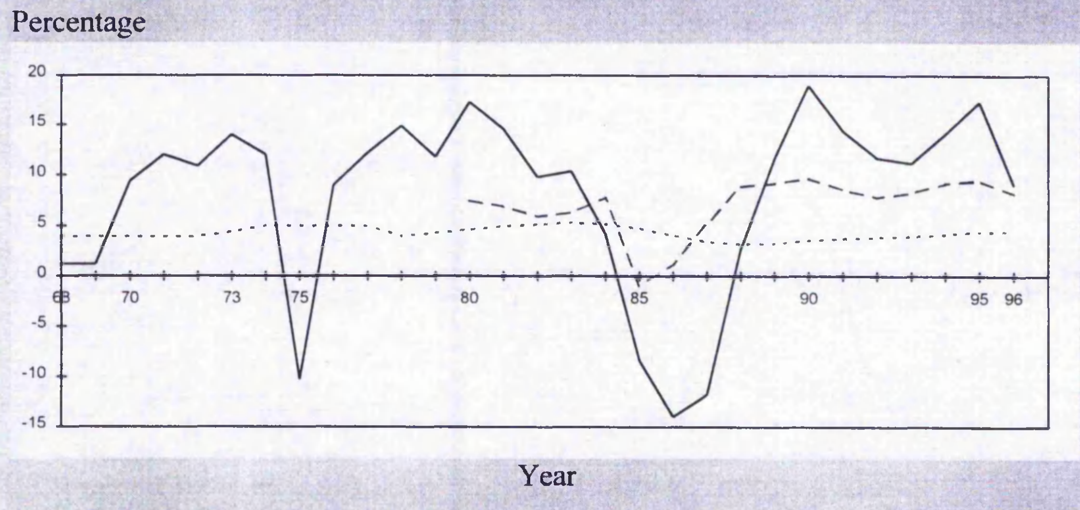


Figure for 1980 is not available.

Chart 4.5 - Growth in Construction GDP compared with Growth in Total GDP and Contribution of Construction to Total GDP



____ % Growth in Construction GDP, 1968-96.
_ _ _ % Growth in Total GDP, 1980-96.
.... % Share of Construction to Total GDP, 1968-96.

Chart 4.6 - Employment in the Malaysian Construction Industry, 1970-96

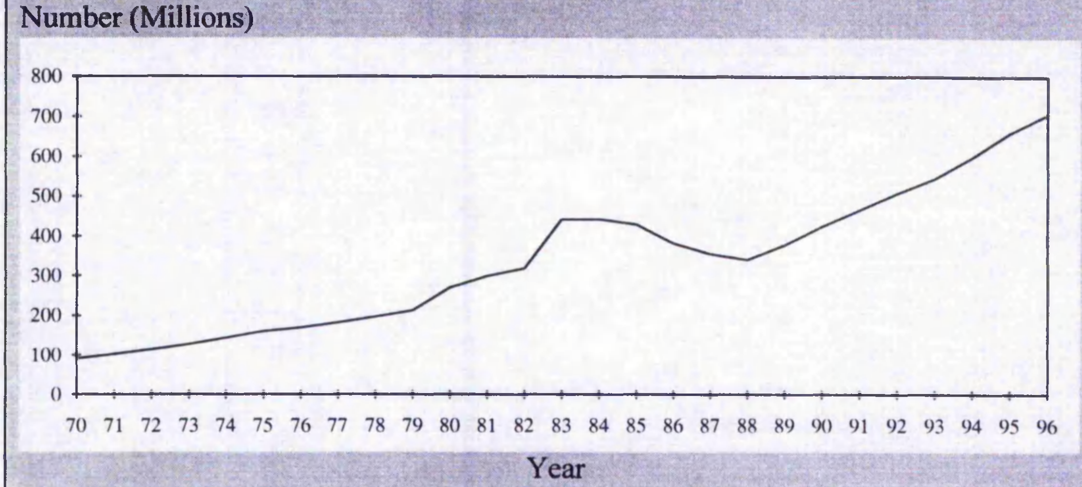
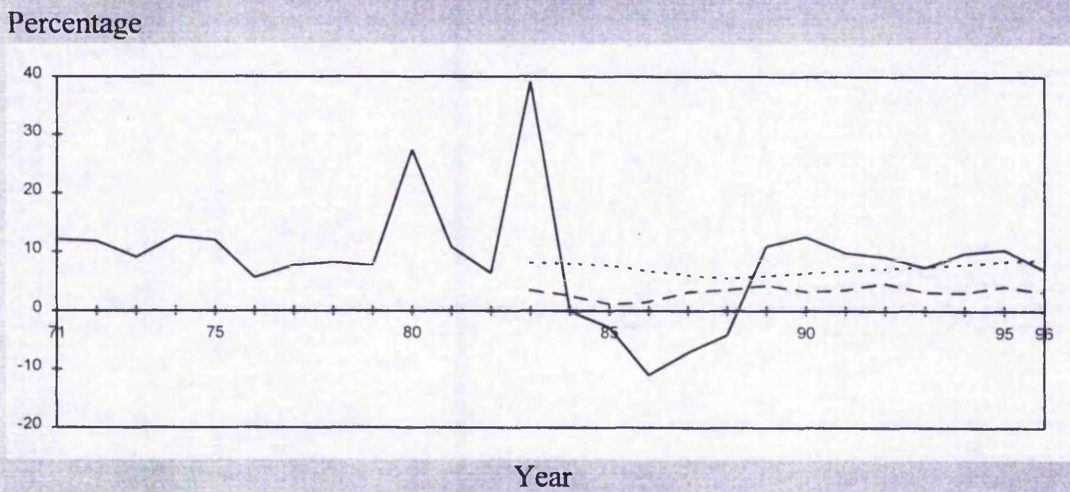


Chart 4.7 - Growth in Construction Employment compared with Growth in Total Employment and Contribution of Construction to Total Employment



____ % Growth in Construction Employment, 1971-96.

_ _ _ % Growth in Total Employment, 1983-96.

.... % Share of Construction Employment to Total Employment, 1983-96.

Table 4.11 - Malaysian Industrial Classification on Construction

Division	Major Group	Group	Industry	Description
				Major Division 5: Construction
50	500			Construction
		5001		**General Contracting including civil engineering contractors**
			50011	Residential construction
			50012	Non-residential construction
			50013	Civil and engineering construction
		5002		**Special trade contractor**
			50021	Metal work
			50022	Electrical
			50023	Planting, sewage and sanitation
			50024	Refrigeration and air-conditioning
			50025	Bricklaying
			50026	Painting
			50027	Carpentry
			50028	Cement and concrete
			50029	Special trade

Source: Wang (1987, p4).

4.4.2 Construction: The formal or informal sector?

Ofori (1980, p93) and Wells (1986, p13) contended that construction industries of developing countries comprise two main sectors: (1) formal, and (2) informal. Their works suggest that in the formal sector, designs are prepared and government planning permission sought. However, contractual arrangements may not be formal, nor a need for formally registered or formally organised contractors. Construction projects in the informal sector may not be formally designed, nor planning permission sought. They represent the subsistence sector or undertaken in the rural areas sometimes by self-help or unpaid labour.

The difference between the formal and informal sectors is therefore, regulatory. The informal sector is not inhibited by conventional regulations. In addition, construction is organised in a more spontaneous manner and clients play a major role. According to Ofori (1980, p93) in the developing countries the informal sector is more widespread but is often ignored by writers and researchers as well as governments and planners. In addition, data on the activities of the informal sector is unlikely to be sufficiently covered by national statistics (Ofori, 1980, p93) or if it is covered, the method of assessment is possibly crude (Wells, 1986, p13).

The construction industry of Malaysia appears to fit into the classification offered by Ofori (1980, p93) and Wells (1986, p13). On the one hand, all construction works require government approval. The works must be based on designs prepared by qualified designers and approved by the authorities (Wang, 1987, p8, 84-96; Davis Langdon and Seah International, 1994, p149; Uniform Building by-laws 1994 (International Law Book Services, 1996). In addition, since the Construction Industry Development Board (CIDB) Act 520 (1994) on the registration of contractors was enforced in July 1996, all construction works must be undertaken by contractors that are registered with the CIDB. These aspects of the construction industry of Malaysia may be classified under the formal sector.

On the other hand, the government regulatory requirements on construction are unlikely to be followed or loosely enforced in both the rural areas and in the squatter areas of most Malaysian cities. This is evidenced by the presence of a large number of buildings that appear to be inconsistent with the provisions of the Uniform Building by-laws 1994. The inconsistencies include poor or improper sanitation in the rural areas and overcrowding, poor or improper sanitation, fire hazards and lack of proper drainage systems in the squatter areas (Long Idris, 1993, p16). In the case of squatter areas, Long Idris (1993, p16) contended that the proliferation of squatter areas is due to factors that included a high rate of rural-urban migration, shortage in the production of affordable housing in urban areas and the lack of enforcement or inability to control the development of new settlements on state land. In the rural or squatter areas, people build their homes as resources become available to them using traditional technology such as domestic equipment, simple machines and indigenous materials (Monerasinghe, 1985, p48). Construction could either be self-build, built under the *gotong-royong* concept (villagers' co-operation), or built by odd jobbers or small unregistered contractors.

In this study the focus is on construction in the formal sector of the construction industry of Malaysia. It is thought that the formal sector, being regulated by the authorities, would have significant impact on the economy, particularly in the context of the challenges of Vision 2020. This approach does not suggest that the informal sector of the construction industry is not important to the Malaysian economy. The informal sector is excluded for practical reason: published data on the activities and products is not available. To collect data from primary sources on the workings of the informal sector of the construction industry of Malaysia is not within the scope of this study.

4.4.3 Past performance, 1957-1996

Salih (1992, p3) examined the performance of the construction industry of Malaysia between 1956 and 1991. He suggested that there were four construction cycles: the first (trough-to-trough) cycle is from 1959 to 1969, the second cycle from 1969 to 1976, a third cycle from 1976 to 1987. The current construction cycle began in 1987 and reached its peak in 1990. Chart 4.5 shows the construction cycles for the period between 1968 and 1996. These construction cycles provide context in examining the past performance of the construction industry of Malaysia.

4.4.3.1 The first construction cycle, 1959-1969

Peng (1994, cited by Sharif, 1996, p255) examined the history of the Malaysian construction industry. His comments included that construction was traditionally a small neglected sector regarded as a by-product of other activities in the economy of Malaysia. In addition, the Government of Malaysia (1965, cited by Abdul Rashid, 1995, p1) observed that construction, prior to 1960, was depicted by its low degree of mechanisation. Further, Lam (1990, p34) suggested that construction activities have mainly been concentrated on the Western side of Peninsular Malaysia, notably around Kuala Lumpur, until recently.

Construction began to gain importance in the economy of Malaysia in the 1960's through its roles in the areas of reconstruction and modernisation (Abdul Rashid, 1995, p1) and in the areas of national security (YTL Corporation, 1995). Reconstruction was essential to revive the basic infrastructure damaged during the Second World War.

Modernisation reflected Malaysia's endeavour to progress upon attaining independence in 1957. While external threat to the formation of Malaysia in 1963 is believed to have prompted the government to enhance national security that included building new and improving existing defence facilities. The emphasis on infrastructure for socio-economic development and on national security programmes is evidenced from the development allocation under the First Malaysia Plan, 1966-70, whereby a large sum (RM4, 550.9 millions) was allocated for these purposes (First Malaysia Plan, 1966-70, Government of Malaysia, 1965; Naidu, 1995, p201). In addition, Naidu (1995, p202) observed that under the first four Malaysia Plans, 1966-85 some RM31 billions were devoted to the development of infrastructure.

The statistics compiled by the Department of Statistics (based on data collected from construction firms in Peninsular Malaysia, with value of work done RM 100,000 and above that participated in a survey of construction industries) for the period from 1964 to 1969 show that: (1) the gross value of construction output increased by 1.24 times, i.e., from RM 364 millions in 1964 to RM 450 millions in 1969, and (2) construction employment increased by 1.22 times, i.e., from 36,291 persons in 1964 to 44,231 persons in 1969. (Department of Statistics, in BOTB, 1974, Appendices). In 1969 the share of construction to GDP was about 4 per cent or RM 351 millions (Table 4.8).

4.4.3.2 The second construction cycle, 1969-1976

The period between 1969 and 1974 saw the Malaysian construction industry expanding before abruptly going into a recession in 1975. From 1969 to 1976, gross value of construction output increased by 5.27 times, i.e., from RM 450 millions to RM 2,373 millions (Department of Statistics, in BOTB, 1974 and Table 4.8). Between 1969 and 1976 real growth in construction GDP averaged 7.27 per cent per annum. The world oil crisis of 1973-74 caused a slump in the Malaysian economy. The construction sector plunged into a trough, registering -10.3 per cent in the rate of growth in 1975 (Table 4.9 and Chart 4.5).

In terms of employment, the construction industry employed 91,000 persons in 1970. The number increased by 1.86 times to 169,000 in 1976 (Table 4.10 and Charts 4.6 and 4.7).

The BOTB (1974, pM34) and YTL Corporation (1995) indicated that the 1970's saw the construction industry of Malaysia changing from a traditional sector into a specialised and modern industry. For instance, the BOTB (1974, pM34) observed that there was a growing market for specialised construction plant and equipment in Malaysia in the early 1970's. YTL Corporation (1995) claimed that the increased number of high-rise buildings completed in Kuala Lumpur and elsewhere, and the introduction and use of innovative techniques such as slip-form construction, steel scaffolding, skid mounted portable cabins, tower cranes and passenger hoists on construction sites during the period illustrated the extent of specialisation and modernisation attained by the construction industry.

4.4.3.3 The third construction cycle, 1976-1987

The recovery of the economy of Malaysia from the world's oil crisis of 1973-74 saw the construction industry making a rapid recovery. From 1976 to 1984 gross value of construction output increased by 4.09 times, i.e., from RM 2,373 millions to RM 9,702 millions (Table 4.8). Between 1976 and 1984 real growth in construction GDP averaged 11.57 per cent per annum. The construction industry was experiencing a boom. There were growing demands in every sector of the construction industry: public, private, commercial, industrial, residential and civil engineering. The factors believed to be responsible for the rapid expansion during the period between 1976 and 1984 included:

1. The intensive state led socio-economic development policies under the OPP 1 and the NEP. The implementation of these policies led to massive public sector investments in the economy (Ministry of Finance, 1988, p57). For example, public investments rose significantly during 1979 to 1983, i.e., from 9.3 per cent of GNP to 20.5 per cent of GNP, respectively (Ministry of Finance, 1988, p54). From the allocations for development, construction of infrastructure were given a major boost (Naidu, 1995, p200-202) leading to an escalation in construction activities; and

2. The stable and rapidly growing economy and the diversification of the economy from primary commodities into the manufacturing industries leading to increased demands in the private sector.

The collapse in commodity prices across the board plunged the economy of Malaysia into a recession in 1985. The government exercised budgetary restraint in public sector expenditure as part of the structural adjustment policies to encourage economic recovery (Ministry of Finance, 1988, p57; Lam, 1990, p35; Salih, 1992, p3). The phenomena caused a severe contraction in the construction industry leading to a downturn in 1985. The industry's real rate of growth in GDP dropped from 10.4 per cent in 1983 to 4.2 per cent in 1984 before plunging to -8.4 per cent, -14.0 per cent, and -11.8 per cent consecutively, for the years 1985, 1986 and 1987 (Table 4.9 and Chart 4.5).

Likewise, the share of construction to GDP also dropped, i.e., from 5.17 per cent of GDP or RM 2,988 millions in 1984 to 3.41 per cent of GDP or RM 2,077 millions in 1987 (Table 4.9 and Chart 4.5). In addition, employment in the construction industry also dropped, i.e., from 442,300 persons in 1984 to 340,000 persons in 1988 (Table 4.10 and Charts 4.6 and 4.7).

The period between 1985 and 1987 saw a plethora of private residential and commercial properties (Ministry of Finance, 1988, p57 and 74; Lam, 1990, p35). In addition, developers, contractors and building materials manufacturers had a hard time and many projects under construction worth billions were abandoned before completion (Quek, 1989, p50; Lam, 1990, p35). The government introduced several measures to revive the construction industry. One of the more prominent measures was the Special Low Cost Housing Programme introduced in July 1986. The primary aim of the programme was to utilise existing idle capacity in the construction and building materials manufacturing sectors. The programme was also intended to address the problem of housing shortages for the lower income group of the population (Ministry of Finance, 1988, p74; Quek, 1989, p50).

However, the Special Low Cost Housing Programme failed to achieve its objective. According to the Ministry of Finance (1988, p74) 78,927 units of low cost houses were targeted to be built during the first year (July 1986-July 1987). As at the end of June 1988, only 15.1 per cent (11,945 units) of the target had been completed. The Ministry of Finance (1988, p74) claimed that the major factors that contributed to the poor performance of the programme included (1) inappropriate choice of locations,

(2) inappropriate designs of houses and (3) the abandonment of projects by inexperienced developers. In contrast, Quek (1989, p50) contended that the major causes of poor performance were (1) difficulties faced by developers and contractors in obtaining finance and (2) the bureaucracy: there were too many legislation and policies and contradictory interpretations by government officials.

The 1970's and early 1980's also saw several changes taking place in the construction industry of Malaysia. The changes were brought about by two key government's socio-economic policies: the NEP, implemented in 1970 and the Look East Policy, implemented in 1981. In relations to construction, these policies have significant impact, notably in the areas of tendering and the participation of foreign firms in the construction industry of Malaysia.

Firstly, under the NEP the government is committed to assist the *Bumiputera* to advance in the areas of business and commerce. The NEP had a number of different strands. In relations to construction, the policy requires that 30 per cent of the total value of all public works must be allocated to '*Bumiputera* status' contractors under an open tendering system (*Arahan Perbendaharaan* No 7 of 1974). Construction firms with good track records and having the following prerequisites could, on application, be granted '*Bumiputera* status', i.e.,

1. Fifty-one per cent of its equity held by *Bumiputeras;*
2. Fifty-one per cent of its management staff are *Bumiputeras;* and
3. Fifty-one per cent of its workers are *Bumiputeras*

A '*Bumiputera* status' contractor is eligible to participate in bids for public works allocated for the '*Bumiputera* status' contractors only.

It is not known how successful the '*Bumiputera* status' policy has been but judging from the number of '*Bumiputera* status' construction firms, the policy appears to be a success. According to the *Pusat Khidmat Kontraktor* or *PKK*, the government agency responsible for registering contractors for public works and for both implementing and co-ordinating the policy on the '*Bumiputera* status', there were a mere 13 '*Bumiputera* status' contractors in 1984. The number had risen significantly to 14,574 in 1995.

Secondly, the implementation of the Look East Policy in 1981 paved the way for the active participation of Asian countries into the Malaysian economy. In relation to construction, the Look East Policy facilitates the entry of firms from other Asian countries, notably the Japanese and South Koreans into the Malaysian construction industry. Before the Look East Policy construction, like the other sectors in the Malaysian economy, was largely dependent on the West, particularly the UK, for technical assistance and training.

4.4.3.4 The fourth construction cycle, 1987-1996 and present

The recovery of the Malaysian economy in 1986 saw the construction industry picking up very rapidly from 1988 onwards. From 1987 to 1992 gross value of output increased by 3.32 times, i.e., from RM5, 915 millions to RM19, 635 millions (Table 4.8 and Chart 4.4). Real growth in construction GDP rose from (-) 11.8 per cent in 1987 to register a positive figure of 2.7 per cent in 1988. The annual rate of growth in construction GDP then rose significantly to 11.6 per cent in 1989 and to 19.0 per cent in 1990, scoring the highest growth rate in the Malaysian economy within three years. Between 1988 and 1996, real growth in construction GDP averaged 12.33 per cent per annum. Once again the rate of growth in construction exceeds the rate of growth in the total economy (Tables 1.1 Chapter 1 and 4.9 and Chart 4.5) and once again the construction industry of Malaysia is experiencing a boom.

In terms of its share to GDP, construction contributed 3.2 per cent or RM2, 133 millions in 1988. The valued added increased by 2.75 times to RM5, 870 millions in 1996 (in constant 1978 prices). In 1996 real growth in construction GDP was 9.0 per cent and construction contributed 4.50 per cent to total GDP (Table 4.9 and Chart 4.5).

Employment in the construction industry also rose significantly during the period between 1988 and 1996. Construction employed 340,000 persons or 5.5 per cent of the total employment in 1988 but rose to 705,100 persons or 8.62 per cent of the total employment in 1996, an increase of 2.07 times (Table 4.10 and Charts 4.6 and 4.7).

The factors believed to be responsible for stimulating the rapid recovery and the rapid growth of the construction industry of Malaysia from 1988 up to mid 1997 included:

1. The stable and rapidly growing economy. The significantly improved conditions for economic sectors including manufacturing, tourism and the services industries lead to an increase in domestic demand in private construction works (Ministry of Finance, 1988, p74; 1989, p74; 1990, p91;1994, p87; Lam, 1990, p35);

2. The government's Privatisation Policy. Although Privatisation was first implemented in 1983, the privatisation of infrastructure projects only gained momentum from 1987 after the economy recovers from the 1985-86 recession. The intense privatisation of large-scale infrastructure projects worth billions of Ringgit lead to escalations in construction activities. Table 4.12 shows a list of major privatised infrastructure projects in Malaysia up to 1995; and

3. Vision 2020 and the massive government allocations for physical and socio-economic infrastructures. The OPP2, 1991-2000 commences in 1991. It contains policies to achieve Vision 2020. The Sixth Malaysia Plan, 1990-95 provides the public sector development allocation to operationalise the first five-year of OPP2, in particular to sustain the pace of industrialisation and economic development towards Vision 2020 (Government of Malaysia, 1991, p40-41; Mohd Kassim, 1993, p73).

In summary, the period between 1959 and 1996 saw the construction industry of Malaysia:

- Experiencing four construction cycles, each cycle lasted approximately ten years;
- Transforming from a traditional sector to a modern sector, playing a significant role in the economy including in the socio-political engineering of Malaysia;
- Transforming from a public sector-led industry to a private sector-led industry, notably due to the government's privatisation policy; and
- Very susceptible to the conditions in the total economy: during periods of rapid economic growth construction grew more rapidly and prominently, surpassing the growth in the total economy, but during periods of economic decline construction plunged into the recession and they often occur earlier and last longer than the decline in the economy.

Table 4.12 - Privatisation of Major Infrastructure Projects In Malaysia

Sector and Project	Status	Method[1]
Roads and Ports		
North Klang Straits Bypass	Privatised (1984)	B.O.T
Jalan Kuching/Kepong Interchange	Privatised (1985)	B.O.T
Kuala Lumpur Interchange	Privatised (1987)	B.O.T
North-South Expressway	Privatised (1988)	B.O.T
Seremban-Port Dickson Highway	Privatised (1993)	B.O.T
Shah Alam Highway	Privatised (1993)	B.O.T
Second Link to Singapore	Privatised (1994)	B.O.T
Klang Container Terminal	Privatised (1986)	Divestiture
Rest of Port Klang	Privatised (1992)	Divestiture
Johor Port	Privatised (1993)	Corporatisation
Bintulu Port	Privatised (1993)	Corporatisation
Penang Port	Privatised (1994)	Corporatisation
West Port, Port Klang	Privatised (1994)	Divestiture
Water Supply		
Labuan Water Supply	Privatised (1987)	B.O.T
Ipoh Water Supply	Privatised (1989)	B.O.T
Larut Matang Water Supply	Privatised (1989)	B.O.T
Semenyih Dam	Privatised (1987)	Management Contract
Maintenance of Tube Wells, Labuan	Privatised (1988)	Management Contract
Johor Water Authority	Privatised (1994)	Corporatisation
Pulau Pinang Water Authority	Privatised (1994)	Corporatisation
Utilities and Others		
Syarikat Telekom Malaysia Berhad	Privatised (1990)	Divestiture
Tenaga Nasional Berhad	Privatised (1992)	Divestiture
KTM Berhad (Railway)	Privatised (1992)	Corporatisation
Malaysian Airports Berhad	Privatised (1992)	Corporatisation
Light Rail Transit	Privatised (1992)	B.O.O
National Sewerage System	Privatised (1993)	B.O.T

[1] B.O.T refers to Build, Operate and Transfer method where under a concession agreement, a private firm undertakes to finance and construct a new project, operates it for a designated period, during which it collects user fees, and transfer the facility to the government when the period expires. B.O.O refer to Build, Operate and Own method and is a variation of the B.O.T method. Divestiture refers to the sale of government-owned enterprises to privatised companies. The firms operate under a licence from the government for a specified period, and provide the services during the duration of the concession. Corporatisation is when the government initially incorporates a wholly owned government company, and thereafter divesting its equity in the company to the private sector by way of a public flotation of shares. In the Management Contract method the government continues to finance the service but invites private firms to bid for the right to provide the service under contract.

Source: Naidu (1995, p205, 208-209).

4.5 The Significance of Construction to the Economy of Malaysia

The significance of the construction industry to the economy of Malaysia may be demonstrated in the following manner: (1) the scale of the construction industry, in terms of construction's contribution to GDP, and (2) construction's share to GFCF; (3) construction's share to employment; and (4) the relationship between construction and the other sectors of the economy.

4.5.1 Construction's contribution to GDP

Over the period 1980-96 real growth in construction GDP averaged 7.83 per cent per annum, surpassing the corresponding rate of 7.0 per cent per annum at which the economy expanded. Wells (1986, p25) and others found that as the economies of low and middle income countries expand (in terms of increases in GDP), construction would grow at an even faster rate. The relationship between the real rate of growth of construction and the economy of Malaysia during the period of 1980-1996 appears to support the hypothesis of Wells (1986, p25).

On average, the construction industry of Malaysia accounts for 4.38 per cent of GDP over the period 1973-96. In 1996, construction contributed RM5, 870 millions (in 1978 constant prices) to the GDP or 4.5 per cent.

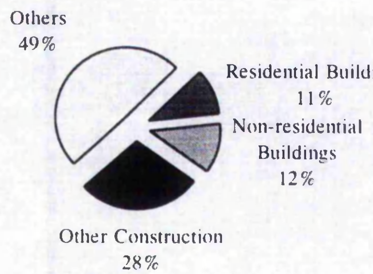
According to Wells (1986, p14-23) the construction industry of middle income developing countries, countries including Malaysia, should contribute at least 5.4 per cent to the GDP. Wells (1986, p23-24, 33) and Ruddock and Lopes (1996, p577) warned that if the level is not achieved inadequate construction capacity may act as a constraint on long term sustainable growth in the economy. In the context of Malaysia, Table 4.9 and Chart 4.5 show that the percentage share of construction to GDP for the period 1967-96 has never surpassed the 5.4 per cent recommended level. This implies that the construction industry of Malaysia is relatively small. It is therefore, likely that the construction industry may be unable to meet the demands of the rapidly growing Malaysian economy. If such a scenario happens, the potential of achieving long term sustainable economic growth as envisaged under Vision 2020 may be threatened.

4.5.2 Construction's share to GFCF

In 1983, construction contributed RM12, 833 millions or 50.9 per cent to the Malaysia's GFCF (United Nations, 1994, p1210). Chart 4.8 shows the breakdown of the GFCF for 1983. However, a time series review of construction's contribution to GFCF in Malaysia is not possible due to the absence of published data. An officer with the Economic Planning Unit of the Prime Minister's Department, in response to the researcher's request for the data on GFCF had in May 1996, confirmed that data on GFCF in construction is not available.

Chart 4.8 - Capital Formation in Construction, 1983

Total GFCF: RM25,213 millions, total construction: RM12,833 millions (in current prices).



Source: United Nations (1994, p1210).

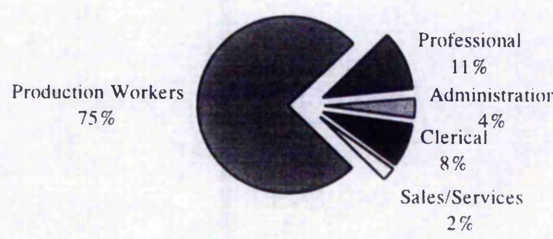
Wells (1986, p23) and others found that investment in construction in most countries accounts for some 50 per cent of the GFCF. On the basis of a single datum on the contribution of construction to GFCF in Malaysia, it is not possible to test the hypothesis of Wells (1986, p23).

4.5.3 Construction's share of employment

Construction is an important employer of the workforce in Malaysia. Over the period 1971-96 employment in construction increased by 6.91 times, i.e. from 102,000 persons in 1971 to 705,100 persons in 1996. In 1996, the construction industry employed 8.3 per cent of the total workforce (1970: 2.7 per cent). Chart 4.9 shows the breakdown of construction employment according to the various categories of occupation for 1995.

Chart 4.9 - Construction Employment in 1995 According to Category of Occupation

Total 638,500[1] persons



[1] The figure differs from the total shown in Table 4.10. This is due to different data source.

Source: Human Resources Ministry in Abdul Rashid (1995, p3 and Table 4).

Table 4.10 and Charts 4.6 and 4.7 show the pattern of employment in the construction industry of Malaysia over the period 1971-96. They indicate that employment in the construction industry can widely fluctuate. The fluctuations appear to follow the conditions in the construction industry (Tables 4.8 and 4.9 and Charts 4.4 and 4.5): the number of persons employed during times of boom is significantly higher than the number of persons employed during times of recession. This indicates the casual nature of construction employment in Malaysia.

The percentage of construction employment, at 8.3 per cent of the total workforce, appears to be higher in Malaysia than in the other middle-income developing countries.

For instance, the World Bank (1984, p20-21) and Wells (1986, p23) suggested that the percentage share of construction to total employment in middle-income countries should be about 7.7 per cent and 6.6 per cent, respectively.

Salih (1992, p4) examined the relationship between value added in construction and construction employment in Malaysia. He suggested that value added in construction per employee contracted from RM 891 in 1970 to RM 765 in 1980 and to RM 717 in 1991, i.e., at the rate of 1.4 per annum per annum, in constant 1978 prices. It suggests therefore, that labour productivity of the construction industry is contracting. Salih (1992, p4) contended that that the contraction in labour productivity over the period between 1970 and 1991 is caused by employment growth in the construction industry exceeding its value added growth. This view concurs with the view of the National Productivity Corporation or NPC (1997, p3). According to the NPC the lower productivity of the construction sector was due to the labour intensive nature of the sector and the relatively low skills of a large proportion of the workforce.

4.5.4 Construction and the other sectors of the economy

Salih (1992, p5) examined the relationship between construction and the other sectors of the economy of Malaysia. He observed that construction has the second largest backward linkages with the other sectors of the economy after manufacturing. Its backward linkage index for 1978 was 67.1 per cent implying that construction purchased about 67.1 per cent of its inputs from the other economic sectors. These linkages with the other economic sectors increased to 68 per cent by 1983. The manufacturing sector was the largest supplier of the construction sector supplying about 48 per cent of construction inputs in 1983. The next largest supplier was the trade and services sector supplying about 13 per cent of construction inputs in 1983. Within the manufacturing sector about 10.5 per cent of construction inputs was purchased from Non-Metallic Mineral Products such as cement and concrete products, ceramic tiles, etc., 9.6 per cent from iron and steel, 9.1 per cent from Non-electrical machinery, 8 per cent from wood-based industry and 5.5 per cent from electrical machinery (Salih, 1992, p5).

In addition, Salih (1992, p5) observed that the construction industry of Malaysia has a high forward linkage with investment. According to Salih (1992, p5) investment demand, demand for construction that can be used to produce goods and services in the future, formed more than 90 per cent of the total demand in 1983 (1978: 86 per cent).

Salih (1992, p8) concluded therefore, that the construction industry of Malaysia has strong backward as well as forward linkages with the other sectors of the economy. The strong backward linkages with the manufacturing sector suggest that growth in the construction industry will induce growth in the manufacturing sector. This aspect of the inter-industry linkages is significant because the manufacturing sector has been identified as the economy's engine of growth in the pursuit of Vision 2020. The strong forward linkages that the construction industry has with investment suggest that an investment-led growth economy will induce growth in the construction industry.

4.6 Vision 2020 and Its Impact on the Construction Industry of Malaysia

One fundamental economic challenge of Vision 2020 is to achieve a target growth in real GDP of 7 per cent per annum over thirty years, i.e., from 1991 to 2020. The target growth requirement has huge impact on the construction industry of Malaysia. According to Anwar Ibrahim (The Star, 3 September 1996), under the Seventh Malaysia Plan, 1996-2000 some RM200 billions worth of construction projects have been identified in order to promote economic growth and to accelerate the process of industrialisation towards Vision 2020.

Salih (1992, p6) suggested that the impact of Vision 2020 on the construction industry could be assessed in the following key areas:

1. Economic growth through industrialisation;
2. Population growth;
3. Urbanisation and economic prosperity;
4. Infrastructure development; and
5. The challenge of sustainable development.

4.6.1 Economic growth through industrialisation

The long-term macroeconomics target of Vision 2020 requires that the economy of Malaysia must grow at 7.5 per cent per annum in 1995, at 7.0 per annum in 2000 through to 2020. The 1990 GDP figure of about RM115 billions will double to about RM230 billions by 2000. The doubling effect will continue through to 2010 and to 2020 to about RM920 billions. The projected GDP based on these assumptions of growth are as shown in Table 4.5.

Economic growth towards 2020 is primarily led by the manufacturing sector (Salih, 1992, p6; Mohd Kassim, 1993, p74-75; Sulaiman, 1993, p176). The share of the manufacturing sector to GDP is projected to increase from 27 per cent in 1990 to 32 per cent in 1995, and rising to 37 per cent in 2000 (Table 4.5). The manufacturing sector is expected to account for about 40 per cent of GDP by 2020 (Salih, 1992, p6; Sulaiman, 1993, p176). The rapid increase in activity in the manufacturing sector implies that the share of agriculture sector and government services to GDP will continue its decline (Salih, 1992, p6; Sulaiman, 1993, p176). Industrialisation is therefore, the unequivocal basis of future growth in the economy.

To sustain the rapid process of industrialisation, the Malaysia Institute of Economic Research or MIER (cited by Salih, 1992, p7) suggests that growth in the construction industry must be maintained at about 10 per cent per annum between 1990 and 2000 and at about 11 per cent per annum from 2000 to 2010. Once the economy becomes fully developed in 2020, construction rate of growth tapers down to about 5 per cent per annum. In addition, the MIER suggests that the contribution of construction to GDP throughout the projection period must remain at about 3 per cent per annum (Salih, 1992, p7). The projected construction rate of growth per annum and its contribution to GDP based on the MIER's assumptions are as shown in Table 4.13.

4.6.2 Population growth, urbanisation and economic prosperity

The total population of Malaysia is expected to be about 32 millions in 2020. The current figure is 18 millions (1990), which will reach 23 millions by 2000 (Table 4.5). The median age of the population structure in 2020 is expected to be 28 years (Sulaiman, 1993, p191).

Table 4.13 - Construction and other Macroeconomics Targets of Vision 2020

	1990	1995	2000	2020
GDP (RM billions)				
In 1978 Prices	79	114	156	630
In 1990 Prices	115	165	230	920
Share of GDP (%)				
Manufacturing	27.0	32.4	37.2	40.0
Construction	3.0	3.0	3.0	3.0
Growth Rate (% per annum)				
Total GDP	6.7	7.5	7.0	7.0
Construction	10.0	10.0	11.0	5.0

Source: Data on construction is abstracted from the MIER's estimate (in Salih, 1992, p7), others from Mohd Kassim (1993, p72).

Urbanisation is characterised by an increasingly higher proportion of urban population compared to the total population (Salleh and Lee, 1997, p5). The process of urbanisation in Malaysia is influenced by a variety of factors including rural to urban migration, natural population growth in the urban areas, socio-economic status and the economic development of the country, a change in economic activities from agriculture to non-agriculture and the change from a traditional to modern society (Salleh and Lee, 1997, p5). In the context of Vision 2020, the level of urbanisation in Malaysia is expected to increase rapidly. According to Salih (1992, p2) the level of urbanisation in 1990 was 43 per cent. The level is expected to increase to 50.2 per cent in 2000, to 60 per cent in 2010, and to 74 per cent in 2020.

The increase in population and level of urbanisation is accompanied by an increase in per capita income. By 2020 the per capita income of Malaysians would be about RM26, 100 as against RM6,180 in 1990 (Table 4.5). Salih (1992, p7) estimates that private consumption will grow at about 12 per cent per annum over the period 1990-2010 before tapering sharply to 4.3 per cent per annum as the economy matures in 2020. The statistics suggest that there would be expansion in domestic consumption demand that is driven by the private sector and this has to be met.

Inevitably, there will be a tremendous increase in demand for housing and the supporting infrastructures including transportation, electricity supply, water supply, sewerage, telecommunications, health care, education, training, etc. Consequently, the impact of the rapid rate of urbanisation, the projected population increase that comprises of relatively young people and the projected rise in income upon the construction industry of Malaysia is likely to be massive (assuming Vision 2020 is on target).

In order to simplify the discussion of the impact of the high rate of urbanisation, projected population increase and projected rise in income on the construction industry of Malaysia, the housing industry has been selected for discussion and illustration. Table 4.14 shows the extent of demand for housing for the period 1991-2000 as envisaged under the Sixth and Seventh Malaysia Plans. As the table shows, about 800,000 units of houses of various types are required between 1996-2000, in order to meet population growth, obsolescence, and changing family structures. From the 800,000 units of houses required about 740,000 units (92.5 per cent) are for new requirements, the remainder are for replacements of existing stocks (Government of Malaysia, 1996, p573).

Table 4.14 - Estimated Housing Needs and Achievements, 1991-2000

	Housing Needs, 1991-2000	
Type of House	**6th Malaysia Plan, 1990-95 Number of Unit**	**7th Malaysia Plan, 1996-2000 Number of Unit**
Low cost	343,800	235,000
Medium cost	200,500	480,000
High cost	28,700	85,000
Total	573,000	800,000
	Housing Completion, 1991-1995	
Type of House	Completion	% of Target (1991-95)
Low cost	261,386	76.03
Medium cost	282,436	140.86
High cost	103,638	350.65
Total	647,460	112.99

Source: Constructed from data in The Seventh Malaysia Plan (Government of Malaysia, 1996, p557, 573).

There is no national housing policy in Malaysia. Policies related to housing development are outlined in the various five-year Malaysia Plans under the provisions for social and macroeconomics objectives (Salleh and Lee, 1997, p19). However, the government supervises and monitors the overall development of houses through the Ministry of Housing and Local Government.

In Malaysia, the private sector plays the primary role in the housing industry (Mohd Zain, 1993, p90; Salleh and Lee, 1997, p18). The government's involvement in the housing industry is relatively small and is focused on the building of public low cost housing (selling price of RM25, 000 or less) for the low-income groups (households with monthly incomes not exceeding RM750) and of government and institutional quarters. For instance, under the Sixth Malaysia Plan, 1991-96, a total of 573,000 units of houses of various types was expected to be built. The private sector was expected to build 399,000 units of houses (69.63 per cent) while the remaining 174,000 units of houses (30.37 per cent) by the public sector. Upon expiry of the Plan period at the end 1996, 647,460 units of houses of various types were completed, thus exceeding the Plan target. The private sector built 562,918 units of houses or 141.1 per cent of the Plan target for the private sector, but the public sector was able to build only 84,542 units of houses or 48.6 per cent of the Plan target for the public sector (Government of Malaysia, 1996, p557). According to the government its reasons for the low achievement include difficulties in obtaining suitable sites as a result of competing demand of suitable land for other development and high costs of both infrastructure and construction (Government of Malaysia, 1996, p558). Under the Seventh Malaysia Plan, 1996-2000, about 800,000 units of houses of various types have been planned. The private sector is expected to construct some 570,000 units of houses or 71.3 per cent of the total Plan target (Government of Malaysia, 1996, p573).

It has been argued that throughout the years the supply of houses has not been able to cope with demand (Mohd Zain, 1993, p94-95). This statement may be illustrated by examining the housing production performance and needs for the City of Kuala Lumpur. In any case, the conditions in Kuala Lumpur are quite representative of those existing in other urban parts of Malaysia. According to the Kuala Lumpur City Hall (in Long Idris, 1993, p25) Kuala Lumpur's housing stock (in various types) in 1980 and

1990 is estimated at around 188,000 units and 249,000 units, respectively. This indicates an increase of around 61,000 units for the period 1980-90 or about 6,100 unit of houses a year. During the same period the housing needs identified by the Kuala Lumpur City Hall was about 156,805 units or about 15,680 units of houses a year. These figures therefore, suggest that the housing production performance for 1980-1990 for the City of Kuala Lumpur is very much below the annual needs of the 15,680 units of houses identified.

In the context of housing for the low income groups, it has been argued that throughout the years affordable houses for the lower income groups have never been met (Agus, 1989, p113; Mohd Zain, 1993, p94-95; Salleh and Lee, 1997, p27). For instance, under the Sixth Malaysia Plan, 1990-95 a total of 573,000 units of houses of various types were planned for construction to meet new requirements and replacement of dilapidated units. From the targeted total, 343,800 units of houses or 60 per cent is expected to be low cost houses aimed at the low-income groups. Although 647,460 units of houses of various types were completed during the period, thus exceeding the Plan target, the number of low cost houses completed was only 261,386 units or 76 per cent of the total Plan target (Table 4.12). According to Yahaya (1989, p68) the private sector is less interested in building low cost houses than in medium and high cost houses because the profit obtained is lower. According to Mohd Zain (1993, p95) the accessibility to housing for the middle and high income groups in Malaysia does not pose much of a problem in view of the availability of various sources of financing and the range of houses in the market. It is the provision of affordable housing to the low income groups of the population that needs more attention and adequate measures. In addition, the private sector sees the building of low cost houses as more of the responsibility of the government. But Yahaya (1989, p69) contended that the government over the years gives low priority towards financial allocation for low cost housing.

On the basis of the scenarios that have been described, therefore, rapid population growth and urbanisation as projected under Vision 2020 suggest that the decades ahead are both highly active and challenging for the construction industry of Malaysia.

4.6.3 Infrastructure development

According to Muhd Salleh and Meyanathan (1993, p27) one key reason that facilitated Malaysia to achieve economic success in the past decades was its steady support of infrastructure. They observed that in every Malaysia Plan some 20 per cent of its development expenditure is allocated for the build-up of the country's infrastructure. Consequently, as the economy expands, Malaysia was able to reduce or alleviate some of the bottlenecks and physical constraints that may hold-up economic activities and increased overhead costs.

However, the rapid and prominent economic growth in Malaysia, has inevitably given rise to higher demand for infrastructure, in terms of both quantity and quality, including road, railway, water, electricity, ports and airport systems (Salih, 1992, p7; Building, 1994, p259; Navaratnam, 1995; Government of Malaysia, 1996, p344). The higher demand for infrastructure may be illustrated by examining statistics on the Road Service Level between 1985-95. The Road Service Level measures total road length to population, total vehicles and per RM100 millions GDP, respectively. The Road Service Level in terms of road length to population over the period 1985-95 increased by 31 per cent, i.e., from 2.46 kilometres in 1985 to 3.22 kilometres of roads per 1,000 persons in 1995. In the case of road length per RM100 million GDP, it increased from 4.92 to 5.39 kilometres over the same period. However, road length per 10,000 vehicles decreased by 15 per cent over the period 1990-95. The decrease in road length per 10,000 vehicles is due to the higher rate of increase in vehicles, which grew by 41 per cent compared to 19 per cent for roads (Government of Malaysia, 1996, p347-349).

Given the fact that a well-developed infrastructure is vital for continued high economic growth (Sulaiman, 1993, p185; Government of Malaysia, 1996, p343) infrastructure development therefore, is expected to grow throughout the Vision 2020 period.

Table 4.15 shows the development allocation for infrastructure for the period 1991-2000. It shows that the value of investment by the private sector over 1996-2000 is expected to be about RM68, 293.8 millions compared to RM19, 230.1 millions allocated for development by the public sector. This suggests that (1) the private sector will take the lead in infrastructure development in the future; and (2) the lower development allocation by the public sector indicates the government's confidence in its policy on privatisation in Malaysia.

Table 4.15 - Development Allocation For Infrastructure, 1991-2000 (RM millions)

Sector	6th Malaysia Plan, 1991-95 Allocation	6th Malaysia Plan, 1991-95 Expenditure	7th Malaysia Plan, 1996-2000 Allocation
Public Sector			
Transport	**12,881.6**	**11,594.7**	**15,484.2**
Roads[1]	8,451.0	7,572.6	9,838.8
Rail	1,802.6	1,735.4	3,370.0
Ports	434.0	410.9	486.8
Airports	1,833.0	1,780.6	1,266.0
Urban	361.0	95.2	522.6
Utilities	**2,876.3**	**2,796.7**	**3,687.3**
Water Supply	2,749.5	2,671.9	3,575.3
Sewerage	126.8	124.8	112.0
Communications	**76.3**	**71.0**	**58.6**
Telecoms & Posts	45.0	39.9	25.5
Meteorological Services	31.3	31.1	33.1
Total	**15,834.2**	**14,462.4**	**19,230.1**
Private Sector (Privatisation)			**Investment**
Roads			17,505.0
Ports			4,241.7
Airports			5,956.0
Telecoms			25,400.0
Posts			260.0
Water Supply			2,571.7
Sewerage			1,759.4
Rail			10,600.0
Total			**68,293.8**
Grand Total			**87,523.9**

[1] Excludes local roads in regional development areas, etc., which have been allocated RM700 millions

Source: The Seventh Malaysia Plan (1996, p381)

According to the MIER (in Salih, 1992, p7) the share of public investment in GDP is estimated to decline from 11.6 per cent in 1990 to about 5 per cent in 2020 as the private sector increases its share in investment in infrastructure.

4.6.4 The challenge of sustainable development

Global concern for the environment and sustainable development has been growing over the past decade. Its importance was apparent in the years prior to the 'Earth Summit' in Rio de Janeiro in 1992 and became intense thereafter.

The implication of the concern for the environment and sustainable development is likely to be great for the future of the construction industry of Malaysia. Areas that are likely to be of high potential for further development include environmental engineering such as in waste management and recycling, energy generation by using alternative sources and energy conservation (Salih, 1992, p7; Kumaran, 1996, in The Star, 7 May 1996). The construction industry will be expected to introduce new concepts of human settlement and architectural designs that are not only efficient but also environmental-friendly.

The responsibility to manage the environment in Malaysia lies with the Department of Environment. Its objectives include to enhance and improve the quality of the environment, in order to achieve a better quality of life, to balance the goals of socio-economic development and environmental control and to promote sustainable development (Ismail and Md. Isa, 1995, p486).

In relation to construction, there are a number of regulations under the Environmental Quality Act 1974 (Amendment) 1995 that are of important in order to ensure environmental factors are incorporated. Perhaps the one most important regulation is the EIA Procedure and Requirements. According to the Department of Environment (1992, p1) EIA is a study to identify, predict, evaluate and communicate information about the impacts on the environment of a proposed project. It also includes details on the mitigating measures prior to project approval and implementation. In short, EIA is a planning tool for making a project environmentally acceptable. Under the EIA Procedure, 19 categories of activities including most of construction works are subject to EIA Approval (Department of Environment, 1992, p20-25).

> "Thus the construction sector ... are not just faced with the prospect of rising demand because of accelerated industrialisation and rising prosperity, but also by the need to maintain environmental balance and sustainable development."
>
> (Salih, 1992, p8).

4.7 The Construction Industry Development Board (CIDB)

In spite of the rapid and prominent growth enjoyed by the construction industry since 1988, the industry is plagued with various issues including (1) shortage of labour, (2) deteriorating quality of works, (3) increase in the number of accidents including fatal accident on construction sites, (4) material shortages, and (5) the fragmentation and segmentation of the construction industry (Yaacob, 1995, p7; Abdullah, 1995, p7).

The government realised the problems faced by the construction industry. The pressure on the government to introduce measures to help solve the problems becomes urgent given the fact that a healthy construction sector is vital in order to spur growth in the economy, a pre-requisite for achieving the objectives of Vision 2020. It is with this concern that the government set up the Construction Industry Development Board or CIDB.

4.7.1 Background to the setting-up of CIDB

The idea of establishing a single body to cater to the needs of the construction industry of Malaysia was first raised in the 1980's. The idea came about in response to the serious fragmentation and segmentation that exist in the construction industry. There was no proper direction and guidance and that the various players in the construction industry implement and carry out separate programmes and activities. There were a number of ministries and government agencies sharing the responsibilities of co-ordinating the construction sector. Consequently, issues related to the construction industry have not been addressed effectively (Yaacob, 1995, p8; Abdullah, 1995, p8).

Studies by various committees (for example the 1991 Working Committee on Construction Sector under the ambit of the Cabinet Committee on Training, the 1993

Dialogue between the Ministry of International Trade and Industry and the Construction Industry, and the Standards and Industrial Research Institute of Malaysia or SIRIM research in 1993; cited by CIDB, 1994) all recommended that a national body was formed to co-ordinate the construction industry of Malaysia. The government acted on these recommendations and in May 1994 the Bill for the formation of CIDB was approved by the Malaysian Parliament. In July 1994 the CIDB Act 520 *Lembaga Pembangunan Industri Pembinaan Malaysia* Act was gazetted. CIDB began operation on 1 December 1994.

4.7.2 Objective of CIDB

The objective of CIDB is to develop the construction industry to be a major contributing sector to the national economy and capable of producing and delivering high quality construction works, with value for money and responsive to the nation's needs.

4.7.3 Functions of CIDB

The functions of CIDB (sub-section 4(1) of Act 520) are as follows:

1. To promote and stimulate the development, improvement and expansion of the construction industry;
2. To advise and make recommendations to the Federal and State Governments on matters affecting or connected with the construction industry;
3. To promote, stimulate and undertake research into any matter relating to the construction industry;
4. To promote, stimulate and assist in the export of services relating to the construction industry;
5. To provide consultancy and advisory services with respect to the construction industry;
6. To promote and stimulate quality assurance in the construction industry;
7. To encourage the standardisation and improvement of construction techniques and materials;

8. To initiate and maintain a construction industry information system;
9. To provide, promote, review and co-ordinate training programmes organised by public and private construction training centres for skilled construction workers and construction site supervisors;
10. To accredit and register contractors and to cancel, suspend or reinstate the registration of any registered contractor; and
11. To accredit and certify skilled construction workers and construction site supervisors.

4.7.4 Organisation structure of CIDB

The CIDB is a statutory body. Membership of the Board consists of a chairperson, six representatives from the private sector and four representatives from the public sector. The representation indicates the prominent role of the private sector in the management of CIDB. A Chief Executive executes the administration and management of the functions of the CIDB.

The organisation structure of CIDB comprises six main divisions, i.e.:

1. Corporate Management: to undertake overall administration of the CIDB;
2. Information Technology: to develop and maintain construction industry information system;
3. Technology Development: to promote new technology, to undertake research and to develop and maintain construction quality standards;
4. Business Development: construction economics, procurement policy and international business development;
5. Registration and Levy: registration of contractor and collections of levy; and
6. Human Resource Development: registration and accreditation of skilled workers and training.

The CIDB is a self-financing body. Its main forms of raising incomes include collections of levy from contractors and revenue generating activities such as training of construction workers. The initial fund required to launch the CIDB was through a grant provided by the government.

As of September 1997 the staff strength of CIDB is 133 comprising of 26 Senior Managers and above, the remainder are supporting staffs. All staff are Malaysians, some senior staff are on secondment from the JKR Malaysia.

4.7.6 Present performance of CIDB

The initial focus of the CIDB is to promote and upgrade quality and safety standards of the construction sector (CIDB, 1997a).

It is still too early to assess the performance of the CIDB. However, several key programmes are already in progress. For instance, up to May 1997 40,607 contractors of various grades and 36,900 skilled construction workers and site supervisors of various trades that fulfil the requirements for registration have been registered. In addition, the CIDB has been active in disseminating current information on the workings of the construction industry of Malaysia (CIDB, 1997b).

4.8 Summary

The economy of Malaysia since independence in 1957 is characterised by relatively uninterrupted rapid growth with relative price stability. It has gone through rapid structural changes, that is, from primary producing economy to an industrialising economy, and from an economy that was driven by the public sector to an economy that is increasingly driven by the private sector. Government policies appeared to have been the primary factor leading to these transformations.

Vision 2020 was implemented in 1991. Its objective is to transform Malaysia from a developing country into a fully developed and industrialised country by 2020 AD. Economic challenges are seen by many to be the most critical factor in making Vision 2020 a success and it has been shown that Vision 2020 is achievable provided Malaysia is able to sustain rapid economic growth and continues to pursue the correct policies.

The construction industry of Malaysia also has experienced rapid structural changes, that is, from a traditional sector to a more modern sector, and from a public sector driven industry to an industry that is increasingly being driven by the private sector.

The significance of the construction industry to the economy of Malaysia is evidenced in the areas including construction's contribution to GDP, to GFCF, to employment and through construction's backward and forward linkages with the other sectors of the economy. But, the contribution of construction to the GDP remains relatively small, on average 4.38 per cent between 1973-96. This suggests that inadequate construction activities may act as a constraint on long-term sustainable growth in the economy of Malaysia.

The implementation of policies aimed at achieving the objective of Vision 2020 has tremendous impact on the construction industry. The impacts may be assessed in the areas including economic growth through accelerated industrialisation, population growth, urbanisation and rising prosperity, infrastructure development and in the environmental challenge of sustainable development. Massive demand for construction is expected in order to satisfy the housing and infrastructure needs of an expanding society that is increasingly prosperous.

This chapter sets out to demonstrate the connection, at macro level, between construction and the economic challenges of Vision 2020. From the review it is concluded that construction is vital to Vision 2020. The industry is expected to establish, within a specific time frame, the infrastructures needs of Vision 2020. Failure to establish the much-needed infrastructure may inhibit economic growth and making the objective of Vision 2020 unattainable.

The Government of Malaysia recognises the vital role that the construction sector plays in the economy of Malaysia. Consequently, the CIDB was set-up in December 1994 with the task of overseeing the development of the construction industry.

The following chapter will review the workings of the construction industry of Malaysia. The focus of Chapter Five is on the processes of construction procurement.

CHAPTER 5

THE PROCESSES OF CONSTRUCTION PROCUREMENT IN MALAYSIA

5.0 Introduction

This chapter has two primary objectives. Firstly, it attempts to fill gaps in construction literature relating to the processes of construction procurement in Malaysia. This is because few studies have been done and available literature on the issue appears to have failed in providing a widespread and in-depth analysis of the manner in which the Malaysian construction procurement processes are handled. Studies by Tan (1996), Sharif (1996, p254-270) and Hashim (1996, p192-198), for instance, are relatively broad and lack up-to-date data. In addition, their works appear to put more emphasis on procurement systems rather than the processes, and furthermore, they probably have limited access to data as encountered by Sharif (1996, p254) in his studies. Also non-Malaysian researchers and writers may encounter language problems as a sizeable proportion of local data, in particular from government sources, is only available in *Bahasa Malaysia*.

Secondly, but more importantly, this chapter serves to provide background information that would facilitate carrying out the present research. The present research endeavours to identify constraints within the processes of construction procurement in Malaysia that may inhibit upon the level of construction output and developing, appraising and validating suitable strategies to remove or to alleviate the constraints identified. It is felt to be instructive therefore, to examine in some detail the processes of construction procurement in Malaysia. The examination will have its base in the framework of the processes of construction procurement and the environment it relates as established in Chapter Three of this thesis.

The author has visited Malaysia during the course of this research and collected up-to-date data from a variety of sources including government publications, non-confidential reports and internal memos and from construction related professionals and contracting institutions, the results of which are included into this thesis.

In examining the processes of construction procurement in Malaysia, this study acknowledges that construction projects are heterogeneous and complex and that it may be difficult to generalise the processes as they occur. However, it is contended that the process of procuring a project goes through the processes that, with some variations, is common to all.

5.1 Initiation/promotion

Sharif (1996, p32) defines the concept of initiation/promotion as:

> "The process of recognising that a new building is required for owner occupation, as an investment, or as a speculative development."

The definition proposed by Sharif (1996, p15) is applied in the context of building procurement systems. However, it is argued that the definition could represent procurement of all types of construction projects: residential and non-residential buildings, civil engineering and specialist works, for a number of reasons including:

1. The scope for investment in construction is not confined to building works only. For example, in Malaysia both the public and private sectors are actively involved in investment in construction notably in physical and social infrastructures such as housing, roads, public transportation, water and sanitation, power, telecommunications, etc. (Government of Malaysia, 1996, p381). At macro level, investment in the physical and social infrastructures is necessary in order to induce and to sustain socio-economic growth and development (Kessides, 1993, pix). In Malaysia it is observed that the private sector's role in providing infrastructure facilities is slowly being increased relative to public expenditure as the government's Privatisation Policy gets underway. Consequently, the public sector's role in the financing and supply of infrastructure is slowly being reduced (Jomo, 1995, p55; Naidu, 1995, p204) which therefore, enables the government to channel its funds to other areas of nation building. For instance, from the total development allocation for infrastructure for the period 1991-2000, RM68,293.8

millions or about 78 per cent is expected to come from the private sector (Table 4.14 in Chapter 4 of this thesis);

2. It is acknowledged that civil engineering work or specialist work departs in many ways from building work, but it may be argued that the process of initiation/promotion for a civil engineering work or a specialist work is broadly similar to the process of initiation/promotion for building work, that is, in each case the process is concerned with identifying a facility that the client is interested to establish. This is evident from the World Bank (Baum, 1982, p6) and the Department of Environment Malaysia (1992, p10) models of project procurement whereby each organisation uses a common model for all projects: buildings, civil engineering and specialist works. In addition, both the World Bank (Baum, 1982, p6) and the Department of Environment Malaysia (1992, p10) place project identification as the first stage in their models. This suggests that project identification is the first step in the overall processes of project procurement, irrespective of types of project to be procured; and

3. It is observed that in recent years developing townships involving mixed development such as comprehensive residential and commercial buildings with a full range of infrastructure facilities and amenities appear to be a popular development philosophy in Malaysia. Evidence of such developments includes the new government administrative centre in Putra Jaya near Kuala Lumpur and the Johor Bharu Waterfront Development Project. In these situations, boundaries between different types of works within a project become less distinct.

Therefore, it is proposed that 'facility' replaces the word 'building' in the definition on initiation/promotion used by Sharif (1996, p32). The word facility, for the purpose of this study, refers to the products of construction works: houses, schools, roads, air and seaports, etc., i.e., those buildings, civil engineering and specialist works. It is contended that the process initiation/promotion for buildings, civil engineering and specialists works go through the processes that, with some variations, is common to all.

Thus, for the purpose of this study it is proposed that the process initiation/promotion refer to the process of recognising the need for a facility for owner occupation, as an investment, or as a speculative development.

5.1.1 The initiator or promoter

According to Wang (1987, p3 and 8), Abdul Rashid (1992, p2) and Tan (1996, p11, 75 and 79) a client is the initiator or promoter who wishes to have a facility constructed. In the context of public sector projects implemented by the *JKR*, the client (the government ministries, departments, agencies, etc.) is the 'originator' and also the final user of the *facility (Ketua Pengarah Kerja Raya*, 1992, p4). In addition, Wang (1987, p8) and Tan (1996, p79) argued that it is the client who has the ownership or has the authority to develop the land on which the required facility will occupy. For instance, Tan (1996, p79) argued that:

> "... anyone who has landed properties and the financial means to develop them can be considered as clients..."

According to Sharif (1996, p29) the client is made up of a heterogeneous group of individuals and organisations and that client may be owner-occupier, an investor or a developer, public or private. Tan (1996, p79) suggested that clients can be from the private sector, quasi-government bodies or the government itself. Wang (1987, p73) divides clients into two broad categories: (1) public sector, and (2) private sector.

In Malaysia, the public sector clients are:

1. Federal government;
2. State governments;
3. Local governments; and
4. The NFPEs, i.e., the public sector agencies, statutory bodies, government owned and/or government controlled companies. (At the end of 1995, there were 32 NFPEs in Malaysia (Government of Malaysia, 1996, p176).

The private sector clients include (Wang, 1987, p73):

1. Individuals;

2. Firms and corporations;

3. Associations, guilds, institutions and societies; and

4. Other private bodies.

In the UK the Construction Client's Forum (1997, p6) estimated that over 96 per cent of construction clients are 'Small or Occasional Clients' (SOCs). The Construction Client's Forum (1997, p8) defined a small or occasional client as:

> An individual owner or person acting as the client for his/her organisation who commissions the design and construction of a new or refurbishment project (not repairs and maintenance) and is from (1) a small or medium sized enterprise (SME) or, (2) an organisation of any size who is a first, second or third time buyer of the construction industry and who does not have access to an in-house construction procurement adviser within the last 10 years."

It is acknowledged that the construction industry in the UK is different from the construction industry in Malaysia in many ways including differences in terms of size of the industries, levels of maturity and levels of clients' expertise and involvement in the processes of construction procurement. But it is believed that similar SOCs also exist in Malaysia. For instance, Small-Time Developer of Petaling Jaya in the Letter to the Editor column of The Star, 2 April, 1996, wrote:

> "There are many like me who are small-time developers: making small project; hoping to make some profits: and also wanting to give the public, in return, some sort of quality houses."

The above view, although expressed in the context of problems faced by developers in the speculative housing sector, confirms that similar SOCs exist in the construction industry in Malaysia. In addition, the Small-Time Developer of Petaling Jaya suggests that there are 'many' SOCs in Malaysia. Probably the number, in terms of percentage of construction clients, may be similar to those that exist in the UK. The argument is based on the factors including that: (1) the construction industry in Malaysia, like in the UK is highly fragmented (Construction Client's Forum, 1997, p6; CIDB, 1995a), and (2) the practices and procedures of the construction industry in Malaysia are similar to those that exist in the UK (Yong, 1988, p285; Sharif, 1996, p255).

According to Wang (1987, p8) the government is the largest single owner and developer of construction projects in Malaysia particularly in infrastructure projects (Wang, 1987, p8). This is evident from the large sum of money allocated by the government for physical and social infrastructures under the successive five-year Malaysia Plans. A review of the Malaysia Plans is provided in Chapter 4, in particular on p13.

In the public sector there are some 55 organisations, at federal government level, that perform the function of initiation/promotion of construction projects. The number of organisations is extracted from the *JKR*'s list of clients for 1996. The *JKR* is the technical arm and the main agency for the implementation of development projects for the government in Malaysia. Their clients include Federal and State Governments' ministries, departments, statutory bodies and the NFPE's.

In terms of public-private sectors' investment in construction, the private sector is more prominent, i.e., the private sector's investment in construction is in excess of two-thirds of total investment in construction in Malaysia (Davis et al., 1994, p147; Government of Malaysia, 1996, p381; see also Table 4.14 in Chapter 4). One key factor for the much higher proportion of private sector's investment in construction in Malaysia is the government's policy on privatisation.

In the context of private sector's property development in Malaysia, Tan (1996, p79) pointed out that the client is also known as the developer. According to the Registrar of Companies Malaysia (1996) the total number of property development companies of various sizes in Malaysia is 26,791 companies. The number is based on the number of property development companies registered with the Registrar of Companies in 1996. As of 12 July 1996, there were 58 property development companies listed on the Main Board of the Kuala Lumpur Stock Exchange or KLSE but none on the Second Board (KLSE, 1996). The pre-requisites of private companies seeking to undertake listing on the KLSE's Main Board or the Second Board, respectively include (in Ministry of Finance, 1995, p256-257):

- Main Board: issued and paid-up capital of not less than RM20 millions, the company should have a track record of 3 to 5 years, should have made reasonable profit throughout the period and achieved an average pre-tax profit of not less than RM4 millions per year.
- Second Board: should have a minimum issued and paid-up capital of not less than RM5 millions but less than RM20 millions, the company should have a track record of 3 years, should have made reasonable profit throughout the period and achieved an average pre-tax profit of not less than RM2 millions per year.

In the areas of speculative housing, a developer who wishes to build 4 or more units of houses for sale requires a housing developer's licence, advertising and sales permits from the Ministry of Housing and Local Government. These requirements are stipulated in the Housing Developers (Control and Licensing) Act and Housing Developers (Control and Licensing) Regulations 1966, amended 1989 (Wang, 1987, p8; Ismail and Md Isa, 1995, p472; Powell-Smith, 1993, p41; Salleh and Lee, 1997, p18). According to the Ministry of Housing and Local Government (1996), the authority responsible for administering and enforcing the Act and Regulations, the number of housing developers in Malaysia registered with the Ministry of Housing and Local Government as of 23 July 1996 was over 6,000 developers.

According to Salleh and Lee (1997, p18) the private sector housing consists of private developers, co-operative societies and individuals or groups of individuals. Amongst them, private developers accounts for almost all private sector housing delivery in Malaysia, i.e., some 96 per cent of the overall private sector housing during the Fifth Malaysia Plan, 1986-90. The Housing Developers' Association of Malaysia (HDAM, 1997) estimated that there are about 3,000 housing developers in Malaysia. As of 20 August 1997 the membership of HDAM stands at 638 housing developers (HDAM, 1997). According to Quek (1989, p52) the members of HDAM contribute some 80 per cent of all the housing construction in Malaysia.

5.1.2 The process of project initiation/promotion

The initiation/promotion process is concerned with identifying projects that the client is interested to establish (Abdul Rashid, 1992, p2). In the context of development projects funded by the World Bank, Baum (1982, p6) places 'project identification' as the first stage in 'The Project Cycle'. The Department of Environment Malaysia (1992, p10) also places 'project identification' as the first stage in its 'Project Planning Cycle'. By placing project identification as the first stage in the project cycle, these organisations therefore, imply that project identification represents a vital process of construction procurement. Turner (1990, p9) viewed the process of project identification as important because:

> "... errors made here probably spell success or failure irrespective of the later phases of development..."

In Malaysia identifying projects for development, especially in the public sector, has often been done within the context of the government's long term and medium term development plans. The plans, notably the OPP1, OPP2, the successive five-year Malaysia Plans, and Vision 2020 describe the strategies, the programmes and projects designed to achieve social and economic growth and development and to achieve national unity. Chapter 4 included a review of literature relating to these development plans. Consequently, the development plans provide the public and private sectors in Malaysia with a framework for planning and for project generation. Clients could identify projects that fit into and support a consistent national development strategy, that meet sectoral objectives, and that they consider viable.

In order to be consistent with Malaysia's overall social and economic growth and development policies and to achieve a more focused development, projects identified by both the public and private sectors are appraised by the Economic Planning Unit (EPU) of the Prime Minister's Department (Muhd Salleh and Meyanathan, 1993, px; Singh, 1994, p33; Hitam, 1996, p3). The procedure is compulsory for all public sector projects but is not a pre-requisite for all private sector projects. According to Kamil (1994, p11) the EPU appraises public sector projects and fixed their budgets. In the context of private sector projects, Singh (1994, p33) indicates that the EPU appraises projects that may be implemented under the privatisation policy or may have impact upon Malaysia's social and economic development. Muhd Salleh and Meyanathan (1993, px) confirmed that the EPU has developed extensive expertise and is the key institution for development planning in Malaysia.

Turin (1973, pC15) in examining the processes of construction procurement in developing countries suggest that the first stage of the process is to assess demand for construction and to study users' requirement. In the context of Malaysia, Mohamad Din (1994, cited by Sharif, 1996, p256) and Tan (1996, p79) suggest that the client's roles in the initiation/promotion process include generating finance, information and authority necessary to embark on the process of obtaining the required facility. In addition, Tan (1996, p100) argued that in the process of initiation/promotion the client must come up with a viable feasibility study and comprehensive design brief. Tan (1996, p100) pointed out that:

> "... feasibility and design brief will spell out his (the client's) ideas, concepts, corporate objectives, terms of reference of his project and necessary details..."

In order to assist clients in the initiation/promotion process, Wang (1987, p36), Tan (1995a, p8), Tan (1996, p127) and Sharif (1996, p314) suggest that clients appoint a project consultant. According to Tan (1996, p123) the criteria to consider on appointing a project consultant may include the size, types, complexity and cost of the project being initiated/promoted. He suggests that for a relatively simple project such as housing scheme appointing an in-house Project Manager may be economically desirable. However, for large projects or projects of highly a specialised or complex nature such as airports, hospitals, or mixed development such as a township (comprising buildings, civil engineering and specialised works) and the likes Tan (1996, p123) suggests that it would be more appropriate to appoint an experienced and qualified external project consultant.

From the above review, it may be concluded that the key activities in the process of initiation/promotion in Malaysia are (1) feasibility study, and (2) preparation of project brief.

5.1.2.1 Feasibility study

Cik (1995, p38) examined the process of a property development in Malaysia and suggest that the initial process involves some form of research. In the context of Malaysia, the research may take the form of a feasibility study (Mohd Ali, 1986, p55; Wang, 1987, p36; Government of Malaysia, 1991, p74; Kamil, 1994, p11;

Ministry of Finance, 1995, p167; Tan, 1995a, p8; Tan, 1995b, p10; Tan, 1996, p100).

According to Tan (1996, p97) a feasibility study is a proposal to determine whether a project is viable or feasible from both the business and technical point of view. Wang (1987, p36) suggests that a feasibility study is commissioned by the client and that its objective is to investigate the feasibility of a proposed project in relation to social, economic, technical and financial aspects.

Tan (1995a, p8) argued that a feasibility study can be quite complex as it may encompass wide-ranging issues. The issues to be considered in the study may include (Mohd Ali, 1986, p55; Wang, 1987, p36; Kamil, 1994, p12; Tan, 1995a, p8-13; Tan, 1996, p100-113):

1. Identifying and assessing the suitability of site;
2. The economic and market analysis that may include the type of facility likely to be suitable, its potential demand and likely competition, interest rates, capital injection, user fees and/or selling price;
3. Estimates of the time needed for the project and likely range of cost; and
4. Authorities' policies in relation to the proposed development.

According to Tan (1995a, p10) a feasibility study must be comprehensive if success is to be enhanced and mistakes due to lack of research and short-sightedness is to be avoided. He suggested that the following activities might be performed in order to arrive at a more comprehensive feasibility report:

1. Preliminary investigation;
2. Preliminary site visit;
3. Preliminary layout plan;
4. Economic and market analysis;
5. Research and data collection;
6. Socio-economic study;

7. Population catchment, neighbourhood and occupational survey;
8. Macro and micro development pattern study;
9. Checking with the relevant authorities;
10. Land title search;
11. Development studies;
12. Valuation study;
13. The National Land Code requirements (notably in matters relating to land development, changes in land use, division and sub-division of land title). A review of this issue is in Section 5.4; and
14. Foreign Investment Committee (FIC) requirements (that is if the proposed development involves foreign investors and that the purchase of land exceeds the amount stated in the FIC guidelines).

In the context of EIA procedure, project identification is the stage when the client needs to consider issues related to the environment. The issues include consideration on whether a project is environmentally sound or otherwise (Department of Environment, 1992, p10). The Department of Environment (1992, p8) encourages clients to submit an EIA Report at the commencement of the project identification stage because it would:

> "... give an opportunity to project planners to exhaust environmental issues and to find solutions to them prior to project implementation."

Wang (1987, p36) argued that a feasibility study is a project management function and therefore it should be performed by a project manager. However, Wang (1987, p9) acknowledges that: (1) project management, as a profession is new in Malaysia, and (2) no authoritative definition of the functions of project management has yet been evolved. Tan (1996, p89) confirmed that currently there is no institution governing the registration and practice of project management in Malaysia.

Kamil (1994, p11) pointed out that clients would normally appoint consulting quantity surveyors to conduct feasibility studies. He suggests the variables to be studied by the consulting quantity surveyor may include:

> "... interest rates, capital injection, percentage occupancy, payments to authorities, rental rates and/or selling prices, and development period."

Kamil's (1994, p11) argument concurs with the provisions of the Registration of Quantity Surveyors Act 1967 (*Lembaga Juruukur Bahan Malaysia*, 1996, pW11). The Act states that: "... preparation of feasibility studies including income /expenditure cash flow" is one of the services of consulting quantity surveyors.

Tan (1996, p100) argued that the economic aspect of a feasibility should be performed by a valuer while a land surveyor could be engaged to study site physical conditions and location in relation to its surrounding. In order to co-ordinate the activities of the various parties, Tan (1995a, p12; 1996, p120) suggests that the client appoint a project consultant.

Mohd Ali (1986, p55) examines the processes of construction procurement under the turnkey system in Malaysia and argued that clients may appoint turnkey contractors to conduct feasibility studies. In the context of Malaysia, a turnkey contractor refers to an organisation that undertakes the design, procurement, construction and commissioning of a facility in line with the owner's intention for a fixed price (Mohd Ali, 1986, p54). A feasibility study performed by a turnkey contractor may include assessing: (1) the suitability of the site, (2) the type of building likely to be suitable and (3) estimates of the time needed for the project and the likely range of cost (Mohd Ali, 1986, p55).

According to the Ministry of Finance (1995, p169) the NFPEs constantly employed foreign consultants to undertake feasibility studies on specialised infrastructure projects, i.e., projects such as power stations, telecommunications, port and oil and gas exploration. In a study conducted by the Ministry of Finance (1995, p167-170) it suggests that the NFPEs employed foreign consultants because Malaysian consultants lacks expertise, skills and experience in the areas of specialised infrastructure and utilities projects. Most of the foreign consultants are imported mainly from the UK, the US, Australia and Holland. The study also suggests that the continued dependence on foreign services have an adverse impact on the services' account of the balance of payments. In order to address the problem, the study's recommendations included that: (1) every effort must be made to reduce services import including giving increasing opportunities to Malaysian consultants, (2) Malaysian consultants should enhance their efforts to in order to benefit from the increased opportunities, and (3) there should be more collaboration between foreign and Malaysian firms through the formation of joint ventures which would accelerate and facilitate the transfer of technology to local consultants.

5.1.2.2 Preparation of project brief

According to Turin (1973, pC15), the *Ketua Pengarah Kerja Raya Malaysia* (1992, p9), Tan (1995b, p10), Tan (1996, p100, 127) and Sharif (1996, p314-317) the process initiation/promotion includes studying the users' requirements. The users are those who will ultimately use the completed facility. They include either: (1) the initiator/promoter of the project, (2) the customers' of the initiator/promoter, or (3) the initiator/promoter and the customers. According to Turin (1973, pC16) and Tan (1996, p127) the users' requirements form the basis on which the client expresses his needs to the designer.

Sharif (1996, p315) argued that client's brief is crucial to the ultimate success of a project. He pointed out that the brief is essentially a statement of the needs of the client, and how the proposed facility will be used. In addition, Sharif (1996, p315) suggests that a brief should define the client's requirements in terms of concept, time, cost and functionality. Tan (1996, p127) suggests that a project brief spells out the terms of reference of a project requirements and its objectives. Abdul Rashid (1992, p2) and Tan (1996, p127) argued that the project brief is crucial as it serves as a vital tool in communicating the client's goals and visions to the designers. Further, Tan (1996, p127) contended that a well prepared project brief will save a lot of time and energy in attempting to understand and interpret the client's needs.

According to Mohd Ali (1986, p54) and the *Ketua Pengarah Kerja Raya* (1992, p13) a project brief should be prepared by the client. Tan (1996, p127) indicates that each project brief is unique and therefore its formulation is dependent on the types of projects and the nature of the client's needs. The *Ketua Pengarah Kerja Raya* (1992, p14) suggested the elements of a project brief may include:

1. The requirements of the project as to the end product (normally expressed in terms of area of floor space, type and number of units of quarters, number of classrooms, number of hospital beds, etc.);
2. Target date for completion;
3. Design feature; and
4. The amount of money allocated for the project.

In order to understand and interpret the client's needs and to finalise details before project implementation may proceed, there would normally be a series of meetings between the client and the designer (*Ketua Pengarah Kerja Raya*, 1992, p14).

Mohd Ali (1986, p55) contended that under the traditional procurement system a project brief could be very detailed and comprehensive. In contrast, he argued that under the design and build or turnkey procurement system the project brief, also known as 'need statements', could be prepared by the client in a broad and general term. In addition, Mohd Ali (1986, p55) argued that the extent of information contained in the need statement is a matter of 'check and balance', i.e., on the one hand it is:

> "... a very tedious and time consuming activity which requires great expertise and knowledge of the projects by the personnel who prepare them ..."

But on the other hand:

> "... a brief which is not detailed enough can be subjected to a lot of interpretation and understandings which could make the whole exercise futile and certainly not to the best interest of the client."

The client normally enlists the services of project consultants (normally architect or engineer or both) to prepare a project brief (Mohd Ali, 1986, p54; Baden-Powell, 1993, p123). Wang (1987, p32) and Tan (1996, p127) suggest that a project manager could facilitate the process of preparing the project brief by acting as a co-ordinator between the various consultants.

5.1.3 Summary on the initiation/promotion process

1. A project is initiated/promoted by the client. The client could be an individual, an organisation or groups of individual or organisations, owner occupier, investor or developer, public or private who has the ownership or has the authority to develop the land on which the required facility will occupy and who has the financial means;

2. The initiation/promotion is a process whereby a client identifies the need for a facility. It involves two key elements namely the preparation of a feasibility study and a project brief. Both elements are crucial in the overall processes of construction procurement because the future of the project, in terms of its potential to succeed or otherwise, is dependent on a comprehensive feasibility report and project brief; and

3. There may be more than one party that clients may enlist in order to provide advice throughout the initiation/promotion process. Clients would normally enlist the services of a project consultant to assist in co-ordinating the activities of the various advisors.

5.2 Funding

Sharif (1996, p32) defines funding as:

> "The provision of the finance required in order for the project to be undertaken."

According to Tan (1996, p201) project funding is concerned with both identifying the sources of funds and the method of funding a project.

Many researchers and writers regard funding as a critical element of construction procurement. For instance, Turin (1973, pE19) and Bennett (1991, p56) pointed out that the construction and completion of a facility will not happen unless someone come up with the necessary finance and that the finance must be adequate to fund the construction of the facility and its up keeping once the facility is up and running. Tan (1995b, p13) put it simply as:

"... financing is crucial for the successful completion of a project."

5.2.1 Sources of funds

Many researchers and writers including Turin (1973, pE19), Wang (1987, p11), *Ketua Pengarah Kerja Raya* (1992, p13, 24), Tan (1995b, p13), Sharif (1996, p318) and Tan (1996, p100) indicate that it is the client who finances the procurement of a project. For instance, Tan (1995b, p13) contended that it is a pre-requisite for any person who wishes to initiate/promote a project to have sufficient funds. According to Turin (1973, pE19) sufficient funds are needed in order to:

> "... span the gap between the inception of the project and the time when it begins to yield its social or economic benefit."

In the context of Malaysia, Wang (1987, p11) argued that construction projects have grown in magnitude and scope and therefore involve large sums of money. Tan (1995b, p13), however, contended that financing requirements are project specific and are dependent on factors including the project costs, anticipated cash inflow from sales proceeds (in the case of a speculative development) or from rental incomes and the client's liquidity. In the context of funding provided by the World Bank in developing countries, Baum (1982, p5) argued that because projects are heterogeneous in nature, lending has to be tailored to each individual project's circumstances.

Tan (1995b, p13) pointed out that in Malaysia construction projects are financed either through internally generated funds or through external borrowings. The latter may be sourced from banks and/or other financial institutions: finance companies, credit corporations and leasing companies (Wang, 1987, p11). In the case of construction projects in the public sector, the government, through the Treasury, provides the necessary finance (Wang, 1987, p11).

Sharif (1996, p256) indicated that in Malaysia the government is the principal financier of public sector construction projects whereas in the private sector the principal financiers include commercial banks, finance companies and merchant banks. Quek (1989, p50, 53) and Rahok (1992, p4) confirmed that construction projects in the private sector in Malaysia are traditionally financed by banks.

However, Rahok (1992, p3) observed that non-banks, i.e., the finance companies, building societies and insurance companies, are becoming more involved in financing construction projects in the Malaysian private sector. Other non-banks that provide project financing for the private sector includes the Employees Provident Fund (EPF) (Karto, 1993, p49, 57). According to Karto (1993, p49, 57) the EPF, a statutory institution of social security primarily providing for old age retirement to workers, and building societies provide finance for private sector housing.

The Ministry of Finance identified the major sources of finance for construction projects in Malaysia. In the private sector the sources of funding include (Ministry of Finance, 1994, p126-127; 1995, p190-208):

1. Commercial banks;
2. Islamic banking;
3. Finance companies;
4. Merchant banks;
5. Development Finance Institutions, i.e., those government agencies specialising in the provision of medium and long-term loans to finance capital investment of new industries as well as entrepreneurs in the industrial sector; and
6. Local capital market

In the public sector the sources of funding for construction projects may be domestic or foreign. Domestic funding may be obtained from sources including:

1. Government revenue, disbursed through the Treasury;
2. Government borrowings from the domestic financial market;
3. Government borrowings from the Provident and Pension Funds. The Provident and Pension Funds include the Employees Provident Fund (EPF), the Social Security Organisation (SOCSO), the Armed Forces Fund (AFF), and the Pension Trust Fund (PTF). Traditionally, these organisations provide fund for development projects initiated by the public sector (Ministry of Finance 1995, p202); and

4. Privatisation (funding obtained by the company that won the concession may be sourced locally or from abroad or combination of both).

The sources of foreign funding for construction projects in the public sector include:

1. Government borrowings from and/or assistance provided by foreign governments under various aids, bilateral and multilateral programmes; and
2. Borrowings and assistance from international bodies such as the World Bank, the Asian Development Bank (ADB) and the Islamic Development Bank (IDB) (Ministry of Finance, 1989, p52-54).

The international funding agencies also provide funding for those projects initiated/promoted by the private sector (Baum, 1982, p7; Ministry of Finance, 1989, p54) that contribute towards socio-economic growth and development.

According to the Ministry of Finance (1989, p52-54) foreign funding in the public sector in 1988 totalled US$235 millions, the bulk of the loan was from the World Bank (US$180.8 millions), while the ADB and the IDB contributed US$29.5 millions and US$24.7 millions, respectively. The funding was utilised by the government in the financing of agricultural, infrastructure, social and industrial projects. However, infrastructure development dominates Malaysia's foreign borrowings (Ministry of Finance, 1989, p53).

Malaysia's dependence on foreign funding is relatively small in comparison with the other developing countries. For instance, total cumulative borrowing from the ADB represents 5.5 per cent of its total lending to the ADB's developing member countries (Ministry of Finance, 1989, p53). According to the Ministry of Finance (1989, p54) the reasons for the relatively small borrowing from the international funding agencies include: (1) the government's austerity drive following the recession years of 1985-87 which saw cutbacks in development expenditure, thus reducing the number of projects available for external funding. (2) Malaysia's relatively high income per capita means that it is not eligible for her to obtain 100 per cent financing, (3) because of potential foreign exchange fluctuations, Malaysia views the risks associated with obtaining funding from the international funding agencies as high and therefore are more cautionary, and (4) the relatively well developed domestic funding institutions offering cheaper funds reducing the need for the Malaysian public and private sectors to seek assistance from the foreign funding agencies.

Tan (1995b, p13) and Tan (1996, p201-204) identified the types of project funding in Malaysia to be either term loans, bridging finance, end finance, syndicated loans or debenture stocks. Malaysian developers may also consider getting foreign partners to provide debt or equity financing (Quek, 1989, p53). Under present Exchange Control Policy, non-residents are permitted to undertake investment in Malaysia without seeking approval from the Controller of Foreign Exchange and that procedures are uniformly applied to transactions with all countries (Ministry of Finance, 1995, p262). It appears therefore that Malaysia's Exchange Control Policy is liberal.

Among the financial instruments available for construction projects in Malaysia, funding under the Islamic banking approach is considered unique. In Islam, both paying and receiving interest are not permitted. In the *al-Quran, surah al-Baqarah* verse 275 (in Abdul Rahman, 1993, p77) states:

> "Those who devour usury will not stand except As Stands One whom The Evil One by his touch Hath driven to madness. That is because they say Trade is like usury but God hath permitted trade."

Thus, loans offered under the Islamic banking, unlike loans offered under the conventional banking, are interest-free. In Malaysia, Islamic banking operates the Interest-free Banking Scheme or IBS. According to the Ministry of Finance (1995, p192) as at end of July 1995 there were 8 commercial banks, 6 finance companies and one merchant banks offering IBS. The IBS services are available to all, both Muslims and non-Muslims. Abdul Rahman (1993, 75-79) outlined two types of project funding available under the IBS:

1. Equity financing in the form of profit sharing contract of either the *al-musharakah* (joint venture profit sharing) or the *al-mudharabah* (trustee profit sharing); and

2. Debt financing in the form of contracts of exchange or the *al-Bai*.

According to Abdul Rahman (1993, p79) the *al-Bai* approach is widely used to finance house-end purchaser, i.e., in the form of *al-Bai Bithaman Ajil* (deferred sale) and *Bai-al-Istisna'* (sale on order). Understanding the concept of Islamic Banking and its differences as against the conventional banking requires detailed study, such studies are not within the scope of this study. But the following section provides a brief review on the process of obtaining funding under the IBS in Malaysia.

Rahok (1992, p4) predicted that more innovative products and services are expected from the Malaysian banks and the other financial institutions as a result of rapid technological advancements and the ever competitive environments.

According to Majid (1993, p67) financing housing development projects in Malaysia is relatively attractive to banks and the other financial institutions due to factors including:

1. It offers a steady flow of income at reasonable spread and low risk of loss; and
2. Its attraction is enhanced by the presence of a secondary mortgage market, established in 1986, which allowed housing loan to be securitised, i.e., banks and the other financial institutions can refinance their housing mortgages by issuing private debt securities, e.g., long term bonds. Consequently, banks and the other financial institutions are able to partially eliminate both the liquidity and interest rate risks associated with the loan and to increase the availability of finance for housing ownership.

In addition, Majid (1993, p68) observed that the commercial banks in Malaysia is the largest source of end-financing for housing development projects, accounting for more than one-third of loans granted to the housing sector from various sources.

In terms of funding construction projects through privatisation, Jomo (1995, p43) argued that Malaysia's concept of privatisation is broad. For instance, the Government of Malaysia (1991, p72) states that privatisation includes:

> "... partial or total divestment of several Government companies, corporatisation of selected government departments, leasing of several government facilities to the private sector, management of government-owned installations by private sector management contract and construction of new projects through Build-

> Operate (BO) or Build-Operate-Transfer (BOT) arrangements and through management-buy-outs of existing Government companies or facilities."

One area where privatisation is prominent in Malaysia is in infrastructure development. Naidu (1995, p217) claimed that:

> "... a fairly significant segment of the infrastructure sector of Malaysia has been privatised, in one form or another."

The government used to be the single largest financier of infrastructure projects in Malaysia. However, its role in funding infrastructure projects began to taper off since the Privatisation Policy became intense after 1987. Naidu (1995, p199) contended that the private sector, in recent years, not only 'complements the public sector', but it also 'supplants' the public sector in many areas of infrastructure. In addition, Naidu (1995, p199-200) contended that the private sector's role in the development and in the operation of infrastructure in Malaysia could grow (Naidu, 1995, p199-200).

Speaking in the context of the Association of South East Asian Nations or ASEAN, Hashim (1995) argued that privatisation allows governments to proceed with infrastructure development without diverting scarce public funds from other priority projects. He observed that BOT is a popular method to construct and commission independent power generation, toll roads and other projects involving new construction. In addition, Hashim (1995) identified the sources of funds for privatised infrastructure projects in ASEAN to include domestic capital market, debt provided by commercial banks, multilateral and bilateral agencies, and export credit agencies. Further, Hashim (1995) observed that in Malaysia, the government has introduced a new scheme that allows direct listing of new infrastructure projects with strong cash flow and project viability on the KLSE. In terms of sources of funds from outside the ASEAN region, Japan is the most active nation providing finance for infrastructure development projects, both in the public and privatised development projects (Hashim, 1995).

5.2.2 The process of obtaining funding

The process of obtaining funding for construction projects in Malaysia is a specialised area and is complex. For instance, Tan (1995b, p13) argued that:

> "Financing is a specialised field best left to financial managers, fund managers, accountants, bankers and financial controllers and consultant."

In addition, Quek (1989, 55) argued that obtaining project finance in Malaysia is difficult and slow disbursement of loan amounts has been identified as being among the causes of delays in project implementation.

In the context of obtaining funding from the international funding agencies, for example, the World Bank, ADB and IDB, each funding agency has its own set of criteria in assessing applications. For example, Baum (1982, p3) explained that the World Bank only provides funding for development projects that are specific, "carefully selected and prepared, thoroughly appraised, closely supervised, and systematically evaluated." In addition, Baum (1982, p5) pointed out that every project funded by The World Bank must "contribute substantially to development objectives and be economically, technically, and financially sound." The Guidelines Procurement under IBRD Loans and IDA Credits, published by the World Bank (1992), requires that the proceeds of any loan are used for the purposes for which the loan was granted, with specific considerations to economy and efficiency and without any influence from political or other non-economic considerations. Other criteria include the applying country's level of economic development (normally expressed in terms of per capita income) (Ministry of Finance, 1989, p54) and its capacity to repay the loan (Baum, 1982, p3). The robust approach adopted by the World Bank and the other international funding agencies are to ensure that "funds are invested in sound, productive projects that contribute to the development of a borrowing country's economy as well as its capacity to repay the loan" (Baum, 1982, p3).

In general, the international funding agencies do not provide 100 per cent finances (Ministry of Finance, 1989, p54; World Bank, 1992, p7), the amount of financing is dependent upon the level of economic development of the country applying the loan. The Ministry of Finance (1989, p54) indicated that the higher the country's per capita income, the less financing it may receive. Understanding the lending criteria and procedures of the international funding agencies requires detailed study on its own right and is not within the scope of this study.

The process involved in obtaining funding for speculative property developments may illustrate the complexity of obtaining funding from banks and the other financial institutions in Malaysia. According to Quek (1989, p53) clients may have to provide proof that they would be able to achieve substantial sales. In addition, banks and the other financial institutions require clients to provide adequate collateral before their applications for project funding would be considered (Quek, 1989, p53; Rahok, 1992, p4). The forms of collateral acceptable include the land and building to be procured for the total amount of the financing (Abdul Rahman, 1993, p81).

Rahok (1992, p4) argued that the high risks that banks and the other financial institutions undertake in funding construction projects means that they have to increase their capital bases. In addition, the banks and the other financial institutions have to re-examine their long-term objectives and to review the quality of their credit standards from time to time. Consequently, the costs of financing become higher, which in turn would attract higher interest margins and service charges.

The recession years of 1985-87, when the construction sector in Malaysia was badly hit with losses running into billions of Ringgits (for example, Quek, 1989, p50, estimated the losses in the housing sector alone to be as high as RM3.5 billions), prompted banks and other financial institutions to become more selective and more prudent in their approach towards financing construction projects. Consequently, they place more emphasis on credit analysis for development financing, notably the financial projections and sales, as well as other factors including more equitable gearing and management capability (Rahok, 1992, p4). Rahok (1992, p4) warned that:

> "One can expect financial institutions to institute more control covenants to ensure the project succeeds for the betterment of all."

In the context of the IBS end-financing for house purchase, Abdul Rahman (1993, p79) outlines the activities involved in processing a loan application:

1. The bank first determines the requirements of the customer in relation to his period and nature of repayment;

2. The bank purchases the asset concerned; and

3. The Bank subsequently sells the relevant asset to the customer at an agreed price which comprises: (1) the actual cost of the asset to the bank, and (2) the Bank's profit margin and allows the customer to settle the payment by instalments within the period and in the manner so agreed.

The Bank also appraises the application in areas including: (1) eligibility of the applicant (including age and repayment capacity), (2) collateral (for example, financing to be secured against first legal charge on land and building to be procured for the total amount of the financing), (3) security deposit, (4) repayment period, and (5) mode of payment. The Bank charges processing fee (Abdul Rahman, 1993, 79-84).

It has been argued by Bennett (1991, p58-59) that when finance is required for construction projects, considerations must be given to the inherent risk associated with the project and other risks such as interest rates, inflation rates, business confidence, tax regulations and costs, etc. In addition, Rahok (1992, p4) argued that financing for development projects "are direct exposures and carry maximum risk weightage." In Malaysia and on the one hand, the rigorous approach adopted by the banks and the other financial institutions appear to be consistent with the view expressed by Bennett (1991, p58-59). On the other hand, the rigorous approach adopted by the banks and the other financial institutions has been labelled as "ultra-conservativeness" and drawn criticisms from various quarters, including those in the government (Quek, 1989, p50). Quek (1989, p53) commented that:

> "Banks should not be too obsessed with the availability or adequacy of collateral before coming to a decision to lend."

5.2.3 Summary of the process of funding

1. Funding is a critical element within the processes of construction procurement;

2. There are various organisations, domestic and foreign, that provides funding for construction projects. The private sector appears to be taking the lead in financing

construction projects in Malaysia, notably in the areas of infrastructure and housing developments;

3. There are various financial instruments for financing construction projects. However, the Interest-free Banking Scheme (IBS) provided by the Islamic banking system is considered unique because loans offered under the Scheme are interest-free; and

4. The processes of obtaining funding for construction projects are highly specialised and complex. The complexities arise, in parts, due to the funding bodies' strict lending regimes.

An equally important aspect in the funding process is the financial resource associated with the constructors. This aspect will be reviewed under the construction production process in Section 5. 6.

5.3 Design

Sharif (1996, p32) defines design as:

> "The translation of the verbal or written requirements of the initiator/promoter into drawings and specifications, prepared to facilitate construction."

The design process may be divided into 3 stages (Sharif, 1996, p32), i.e., (1) schematic design, (2) detailed design, and (3) specialist design.

- Schematic design:

> "The process of translating the requirements of the initiator/promoter into a basic design form, indicating the general design in terms of shape, size and function of the building."

- Detailed design:

> "The production of detailed drawings and specifications, from the concept/schematic designs, detailing and describing each element of the building so that it may be constructed."

- Specialist design:

  "The development of detailed drawings and specifications for a specific component or element within the structure, which requires specialist technical knowledge to design and construct such as Mechanical. Electrical, Heating and Ventilation systems."

Sharif (1996, p32) applied the above definitions in the context of building design process. However, it is contended that the design process of a type of construction project goes through the processes that, with some variations, is common to all. For instance, Turin (1973, pC18) in his examination of the design and construction processes in developing countries, suggested that the differences in procedures in the design and construction processes between building and civil engineering works exist but are not felt to be significant. Therefore, for the purpose of this study, it is proposed that the definitions on the design process to be applicable for all types of construction projects: buildings, civil engineering and specialists works.

5.3.1 The designer

From literature relating to the processes of construction procurement in Malaysia (including Hashim, 1986, p7; Wang, 1987, p3; Yong, 1988, p6; Wang, 1991, p90; the *Ketua Pengarah Kerja Raya*, 1992, p5-7; Davis, et al., 1994, p146-148; Kamil, 1994, p11-12; Sharif, 1996, p257-259; Tan, 1996, p119-127; Chew, 1996, p6) leading professionals involved and a brief account of their key roles are:

1. The architects: to provide services in architectural design and in general pre-contract and post-contract administration;
2. The engineers: civil and structural, mechanical and electrical engineers. Civil and structural engineers are responsible for designing the structural aspects of the facility. They are also responsible for the design, supervision and construction of roads, drains, sewerage, and other civil works. Mechanical and electrical engineers are responsible for the design, supervision and construction of services including air-conditioning, ventilation, lifts, electrical services, fire fighting, building automation system, plumbing and sanitary services, etc. as well as the external infrastructure services associated with public utilities to the development; and

3. The quantity surveyors: to act as a financial controller throughout the duration of the project. Other functions of the quantity surveyor include preparing estimates, preparing tender documents, to call, evaluate and to award tenders to successful contractors, to evaluate and to recommend progress payments and to finalise contracts' accounts.

Others that may be added on to the list of designers include land surveyor, town planner, interior designer, landscape architect and specialist consultants in the areas such as geo-technical, environmental engineering, traffic planners and acoustics engineering.

In addition to the above listed consultants, project management consultants are being employed by the clients on relatively large and/or complex projects (Wang, 1987, p9; Tan, 1996, p119-123, Chew, 1996, p6). The project management consultant's duties during the design process include co-ordinating works of the designers, evaluating designs and acting as the client's agent. Currently in Malaysia the specific roles and functions of a project management consultant are not clear. This is because (1) project management as a profession is new in Malaysia, and (2) no authoritative definition of the functions of project management has yet been evolved (Wang, 1987, p9). At the time of writing, there is no institution or Board governing the practice and registration of project management consultants in Malaysia.

The practice of almost all consultants in Malaysia is governed by the respective professional institutions and is subjected to various statutory rules and regulations administered and enforced by the respective Boards. For example, in terms of ethics and code of professional conduct of members, etc. the respective professional institutions provide the guidelines. Thus, the architects are governed by the provisions drawn by the *Pertubuhan Arkitek Malaysia* (PAM), the engineers by the Institute of Engineers Malaysia (IEM), the quantity surveyors (including estate, building and land surveyors) by the Institution of Surveyors Malaysia (ISM), the town planners by the Malaysian Institute of Planners (MIP), etc. In addition to the professional institutions, the practice of the consultants (both the individual and firm) is subject to statutory rules and regulations that are administered and enforced by the respective Boards. The rules and regulations covers such areas as registration, de-registration and re-registration requirements, scale of fees, consultancy services and practices, etc. Only individuals and firms registered with the respective Boards are permitted to provide professional consultancy services in Malaysia. There are the Board of Architects (the Architect Act 1967); Board of Engineers (the Registration of Engineers Act 1967); Board of Quantity Surveyors (the Registration of Quantity Surveyors Act 1967); the Board of Land Surveyors (Licensed Land Surveyors Ordinance 1958) and the Board of Town Planners (The Town Planner Act 1996).

Table 5.1 shows the numbers of registered architects, engineers and quantity surveyors and the numbers of registered architectural, engineering and quantity surveying firms in Malaysia.

Table 5.1 - Registered Architects, Engineers and Quantity Surveyors and Registered Architectural, Engineering and Quantity Surveying Firms in Malaysia, 1996

Profession	Individuals[1]	Firms
Architecture	1,987[2]	661
Engineering	12,233	250
Quantity Surveying	1,263	178

[1] Total membership in the categories of Honorary, Fellow, Member and Graduate.
[2] As of July 1997.
Sources: *Pertubuhan Akitek Malaysia* (1997, p7; 1995/96, p77-107); The Institution of Engineers, Malaysia (1996, p42); *Lembaga Jurutera Malaysia* (1996) and *Lembaga Juruukur Bahan Malaysia* (1996, p73-275).

5.3.2 The design process

Many researchers and writers including Hashim (1986, p7), Yong (1988, p285), Chong (1990, p51) and Sharif (1996, p257) claimed that the practices of the Malaysian construction industry including its design process are similar to those of the UK. The reasons they offered for making such a claim include that: (1) Malaysia was once colonised by Britain therefore, various practices of the construction industry were modelled on those of the UK, (2) the education system in Malaysia is very similar to the one in the UK, and (3) a large proportion of Malaysian construction professionals received their education and training in the UK and many continue to do so. Sharif (1996, p257) commented that in Malaysia:

> "The function of design is organised in a similar way to the UK construction industry which is a consequence of the continual links between the two countries, especially in education and professional affiliation."

In an attempt to simplify the discussion on the design process in Malaysia the following approach will be adopted: (1) the design process is broadly divided into three stages, i.e., schematic design, detail design and specialist design (see Sharif, 1996, p257); and (2) the practice of the *JKR* is selected for discussion and illustration. In any case the design process adopted by the *JKR* is quite representative of those existing in other public sector organisations and those existing in the private sector. The *JKR* is the oldest and largest technical organisation (the latter in terms of numbers of projects implemented and professional staff, and has offices in every state and district throughout the country) and has a sophisticated and a more comprehensive system of project implementation. Its system of project implementation is well documented, such as in the *Panduan Pentadbiran Kontrak Kerja Raya, Edisi Kedua* (A Guide on the Administration of Public Works Contracts, Second Edition) by the *Ketua Pengarah Kerja Raya* (1992).

5.3.2.1 Schematic design

The initial stage in the design process is preparing the schematic design. It involves activities including surveying the site and conducting site and soil investigations. Subsequently, the designers prepare the project's preliminary design and site layout plans. According to Tan (1996, p129) schematic design comprises drawings such as layout plan, elevations, typical cross-sections and relevant data including on gross built-up, net built-up, circulation areas, services, etc., in a sketchy manner. At this stage, the project's broad design ideas and concept emerged. From the preliminary design and site layout plans the quantity surveyor produces a preliminary estimate.

In the *JKR*, preliminary estimates are presented in a format known as 'Preliminary Detailed Abstract' or PDA. A PDA contains the project's estimate broken down into various key components. For instance, an estimate for a building project is broken down into the following components:

1. Cost of each building, broken down into elements, excluding internal services;
2. Internal services;
3. External works, broken down into different types of work;
4. Price fluctuations;
5. Tender advertisement;
6. Supervision;
7. Contingencies; and
8. Fees for professional services.

It is observed that the characteristics of buildings' designs in Malaysia include that: (1) projects' designs are often 'one-off'' and (2) designs often advocate extensive wet production techniques such as in-situ reinforced concrete for structural frames and floor slabs and brickwork for non-load bearing walls (Lim, 1994; Tapsir, Ali, Haron and Yusof, 1996). The former is evident from Baden-Powell (1993); Macneil (1994) and Ithnain (1994, p2) who indicated that clients have a wide variety of design taste, ranging from traditional Malay to Islamic and to modern concepts. It is believed that a variety of factors including multi-racial, multi-cultural and a nation with rich historical past but with a vision to become a fully developed nation contributed toward this phenomenon. However, there are exceptions notably, the standard school buildings for the Ministry of Education, standard office buildings for government ministries and departments and the 'nucleus' district hospital projects (the latter were implemented under a turnkey system with funding assistance from the British Government, see Macneil, 1994).

Together, the preliminary design and site layout plans and the preliminary estimate are submitted to the client for approval. For public sector projects, obtaining the client's approval often takes time (*Ketua Pengarah Kerja Raya*, 1992, p15). This is because the client has to submit the preliminary drawings, the PDA, schedule of rooms and finishes, etc., and a brief report on specialist services to the EPU, the agency responsible for approving allocations and co-ordinating the implementation for all projects in the public sector. These documents are relied upon by the EPU in its function to fix Cost Limit for the project. The design team may have to provide a formal presentation to the client and the EPU. A series of discussions between the client, EPU and the design team would normally ensue and adjustments made to the preliminary design and estimate. Consequently, the EPU will fix a Cost Limit for the project and approve a budget for its implementation.

5.3.2.2 Detail design

Once the budget for the project and the preliminary design and site layout plans has been approved the designers will proceed into detail design stage. At this stage co-ordination of the works of various designers is vital. In the *JKR*, an architect or an engineer performs design management for building or civil engineering works, respectively. In addition, the presence of the architect or civil engineer acting as a project manager co-ordinating the design process provides the check and balance plus feedback and review of the designs.

Along with the development of the detailed design, cost checks are made by the quantity surveyor to ensure that the approved allocation is not exceeded. In situations where the budget may be exceeded, the quantity surveyor prepares a revised estimate. Based on the revised estimate the client will decide either to provide additional funds or to review the project so as to maintain the budget already approved. In public sector projects, obtaining additional allocation would normally involve the clients having to go back to the EPU with a revised PDA (Kamil, 1994, p11).

In preparing detailed drawings, the architects and engineers are assisted by architectural and engineering assistants, respectively. Likewise, the activities of the quantity surveyors are assisted by quantity surveying assistants. Broadly, there are two grades of architectural, engineering and quantity surveying assistants: (1) the technical assistants, i.e., holders of technical diploma obtained from local universities and other training institutions, and (2) the technicians, i.e., holders of technical certificate obtained from local polytechnics and other training institutions.

In Malaysia, the group comprising the technical assistants and the technicians is usually referred to as 'semi-professionals'.

Sharif (1996, p257) suggested that one special characteristic of the Malaysian construction industry, in the context of the design process, is that its rate of growth is greater than the supply and capacity of indigenous consultants and specialists. Consequently, the industry continues to import foreign consultants and specialists. The top three major sources of importation in 1995 were Japan, the UK and France with market share of 43.2 per cent, 15.1 per cent and 15.1 per cent, respectively. Other leading suppliers include the US, Singapore, and South Korea (Ministry of Finance, 1995, p166). The Ministry of Finance (1995, p167) identified the types of consultancy services sourced from abroad are mainly in the fields of electrical, mechanical, civil and geo-technical services.

In the detail design stage the requirements of the authorities: planning, utilities, environment, etc. are incorporated into the design. The detailed design is subjected to approval of the various authorities. A review of the processes of statutory approval is in Section 5.4.

5.3.2.3 Specialists design

Specialist design refers to the development of detailed architectural and/or engineering designs to incorporate various services' installations. Considering type and complexity of the facility to be built, internal services installations in a building may include horizontal and vertical transport, electrical, air-conditioning and ventilating systems, fire-fighting, communications, plumbing and sanitary services, etc. External services may include infrastructure services associated with public utilities to the development. In civil engineering works, specialist design works may include geo-technical engineering, environmental engineering, traffic flow systems, road/highway furniture and fittings, etc. The design of building services installations is normally performed by the electrical and mechanical engineers and the designers of specialist civil engineering works, depending on types of project, may include specialist consultants in areas such as geo-technical, environmental engineering, traffic planners, etc.

5.3.2.4 Design process under non-traditional procurement systems

Under the design and build or turnkey procurement system, a client engages a single firm (the contractor) to undertake the design and the construction of a proposed project. The client as well as the design and build contractor may appoint consultants. According to Kumarasivam (1985, p36, cited by Sharif, 1996, p265) the roles of consultants employed by the client may include preparing tender documents, concept design, processing of tender, contract administration and quality control. A majority of design and build contractors do not have their own in-house designers. Consequently, they employ design consultants to prepare detailed designs and specifications (Sharif, 1996, p265). According to Hashim (1996, p194):

> "For the turnkey contractor, the roles of the design professionals, architects and consulting engineers will be integrated together with that of the contractor, while on the other side the design professionals, either architect or consulting engineer, will check and audit the construction process as independent consultant on behalf of the owner to see that the end product is that as conceived by the client."

Mohd Ali (1986, p56) argued that design and build contractors are very rarely committed to producing complete and comprehensive proposals for fear of not getting the project. Most of them would only be committed once they received indication that they would be awarded the project, because preparing a good proposal may cost a considerable amount of time and money. Such heavy financial exercise could be wasted should they failed to secure the project.

Under the management contracting procurement, a management contractor is appointed by the client to manage and co-ordinate the project on his behalf. His duties during the design process may include appointing and the administration of the design and other consultants for a fee. Responsibility for the design remains with the designers (Hashim, 1996, p194; Sharif, 1996, p267).

5.3.3 Summary on the process of design

1. There are three main stages in the design process: schematic design, detailed design, and specialists design;

2. Leading parties involved in the design process are the architects, engineers and the quantity surveyors. The client appoints them. The practice of the architects, engineers and the quantity surveyors are governed and regulated by the respective professional institutions and Boards; and

3. Project management consultants are appointed by the client to perform project management functions on projects that are relatively large in scale or complex.

5.4 Statutory Approval

Wang (1987, p84-96) studied the statutory control and approval on construction in Malaysia and suggested that its objectives include: (1) to achieve proper use of land, (2) the appropriate planning of towns and cities, and (3) the regulating of standards of buildings including fire prevention and provision of services, the standards of roads, drains and lighting. Wang (1987, p84) argues that the growth in construction activities in Malaysia has given rise to the need for more sophisticated statutory controls in order to ensure systematic and orderly development.

Statutory control on construction is derived from current laws, by-laws and regulations. It is observed that in Malaysia, the evolution of the current system of statutory control on construction spans over her entire history. For instance, Arbi (1985, p91) reported that modern town planning practice was introduced by the British colonial government to Peninsular Malaysia toward the end of the 19th century and that the first town planning legislation was enacted in 1932. Alwi (1995, p48) reported that the earliest provision on building controls for the city of Kuala Lumpur was made after independence in 1958. In 1976, the Town and Country Planning Act No. 172, 1976 was enforced and a new era in town and country planning practice began in Malaysia (Ngah, 1998, p1).

Literature relating to statutory control on construction in Malaysia (including Wang, 1987, p84-96; Arbi, 1985, p91-146; the Department of Environment Malaysia, 1992; Davis et al., 1994, p148-149; Alwi, 1995, p48-53; Tan, 1996, p141-155) shows that statutory control on construction and the process of obtaining statutory approval involve various authorities: public and private. The former comprises of three levels of governments - local, state and federal. In addition, different sets of statutory control and approval are applicable at different stages of the procurement process.

Derived from the literature and for the purpose of this study, it is suggested that statutory approval be defined as:

> "Obtaining permissions from the relevant authorities to initiate and to construct a facility and upon its completion to occupy and use the completed facility."

5.4.1 Statutory control and standards

The laws, by-laws and regulations relating to statutory control and standards on construction in Malaysia may be divided into two broad categories: (1) statutes that directly effect construction, and (2) statutes that have indirect effect on construction. The first category of laws, by-laws and regulations impose strict control on construction activities including the processing and approving of plans from change of land use, sub-division and amalgamation, Development Order, Building and Services Plans approval to issuance of Certificate of Fitness for Occupation and therefore they have direct effect on construction activities. The second category of laws, by-laws and regulations has indirect effect on construction activities because they govern and control the administration of the authorities and the practising professionals in architecture, engineering, surveying and the activities of property developers (Wang, 1987, p85-86).

The current laws, by-laws and regulations relating to statutory controls and standards that have direct effect on construction activities include:

1. Town and Country Planning Act No. 172, 1976;
2. Federal Territory (Planning) Act No. 267, 1982;
3. National Land Code, Act No. 56, 1965;
4. Environmental Quality Act 1974; and
5. Uniform Building by-laws and Street, Drainage & Building Act No. 133, 1974.

The current laws, by-laws and regulations relating to statutory controls and standards that have indirect effect on construction activities include:

1. Local Government Act No. 171, 1976;

2. Architects Act 1967 (Revised 1973);

3. Registration of Engineers Act (Revised 1974);

4. Registration of Quantity Surveyors Act 1967 (Revised 1989);

5. Licensed Land Surveyors Ordinance 1958; and

6. Housing Developers (Control and Licensing) Act 1982.

In addition, various amendments, by-laws and regulations are in force to operationalise the above Acts. The authorities including the private bodies use the above law, by-laws and regulations in exercising control on and granting approval for construction activities.

In spite of the laws, by-laws and regulations being national in its jurisdiction, their enforcement by the local authorities have been done only partially (Arbi, 1985, p91; Alwi, 1995, p49). For instance, Alwi (1995, p49) in referring to the Uniform Building by-laws, pointed out that:

> "Although the Uniform Building by-laws ensure that there will be a set of uniform regulations for the whole country, their usage has not been widely accepted. Certain procedures or the implementation and conformation of the by-laws are not specified."

In addition, there appear to be inconsistencies in the application of the laws, by-laws and regulations between public and private construction activities. For instance, Wang (1987, p84) and Alwi (1995, p48) pointed out that public buildings are normally exempted from the existing statutes and are therefore not strictly subject to the statutory control, but Wang (1987, p84) argued that designers of public works usually include the prevailing statutes into considerations.

5.4.2 The process of obtaining statutory approval

The function of submitting applications for statutory approval to the relevant authorities is the responsibility of the Architect and/or Engineers for full compliance of the laws, by-laws and regulations (Tan, 1996, p143).

Different researchers and writers concurred that in Malaysia procedures for obtaining statutory approval for construction are not standardised. The procedures vary from one project to another depending on its nature, size and complexities; from one department to another within a local authority; and from one local authority to another within Malaysia (Monerasinghe, 1985, p54; Arbi, 1985, p91-146; Agus, 1989, p110-111; Davis et al., 1994, p149; Tan, 1996, p43).

In an attempt to simplify the discussion of statutory control and approval in Malaysia, procedures for statutory control and approval on building projects practised by the Kuala Lumpur City Hall has been selected for discussion and illustration. Wang (1987, p84-85) in his study on statutory control and approval on construction in Malaysia contends that the Kuala Lumpur City Hall's system is the most sophisticated and more comprehensive in the country and in any case the legal framework and the system of processing and approving plans are quite representative of those existing in other local authorities.

Statutory control and approval for construction may be divided into four key stages:

1. Development Order;
2. Building and Services Plans;
3. Construction; and
4. Certificate of Fitness for Occupation.

Chart 5.1 shows a flow chart of a typical process of obtaining statutory approval for a building project in the City of Kuala Lumpur.

CHART 5.1- Statutory Approval Process: Kuala Lumpur City Hall

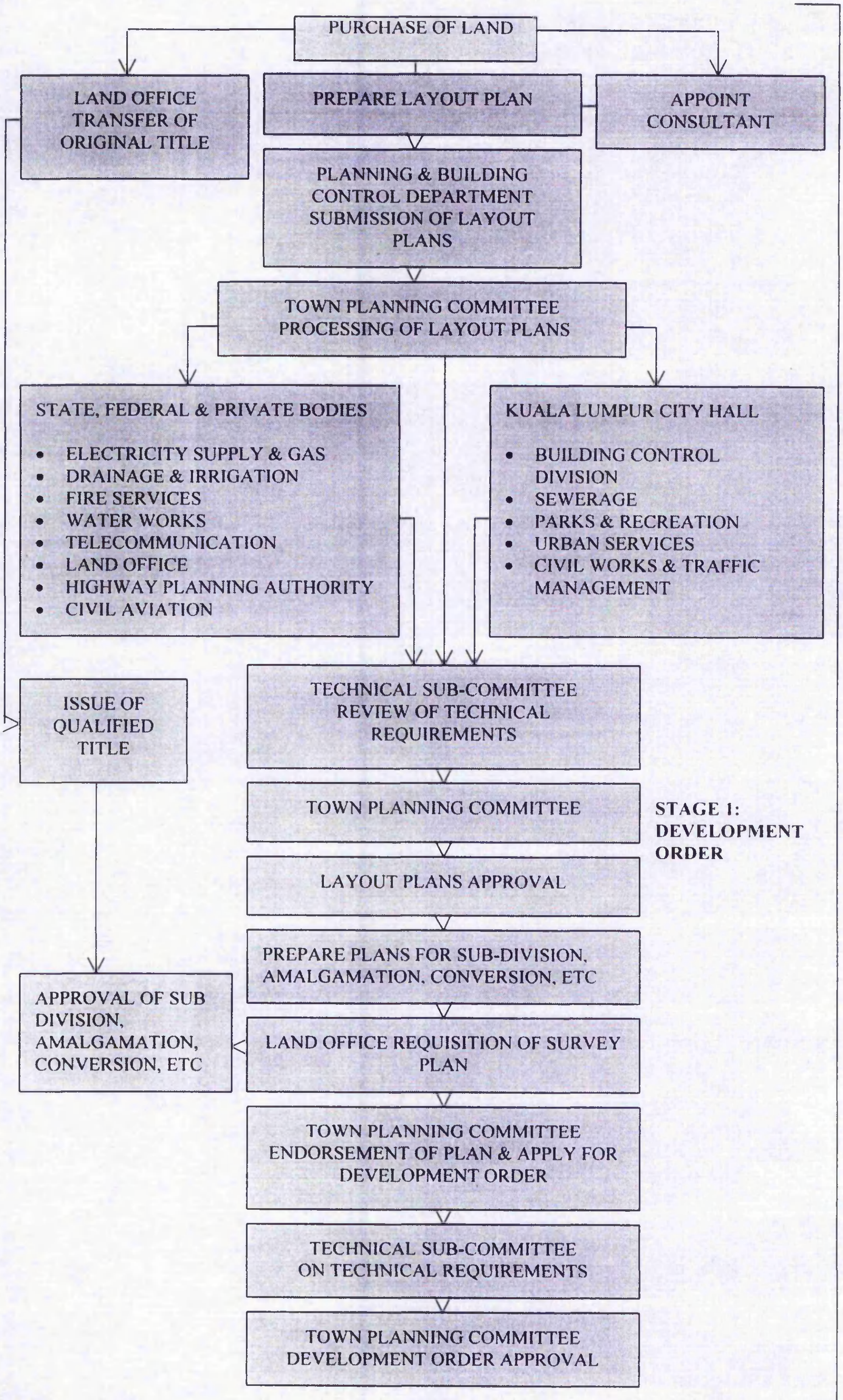
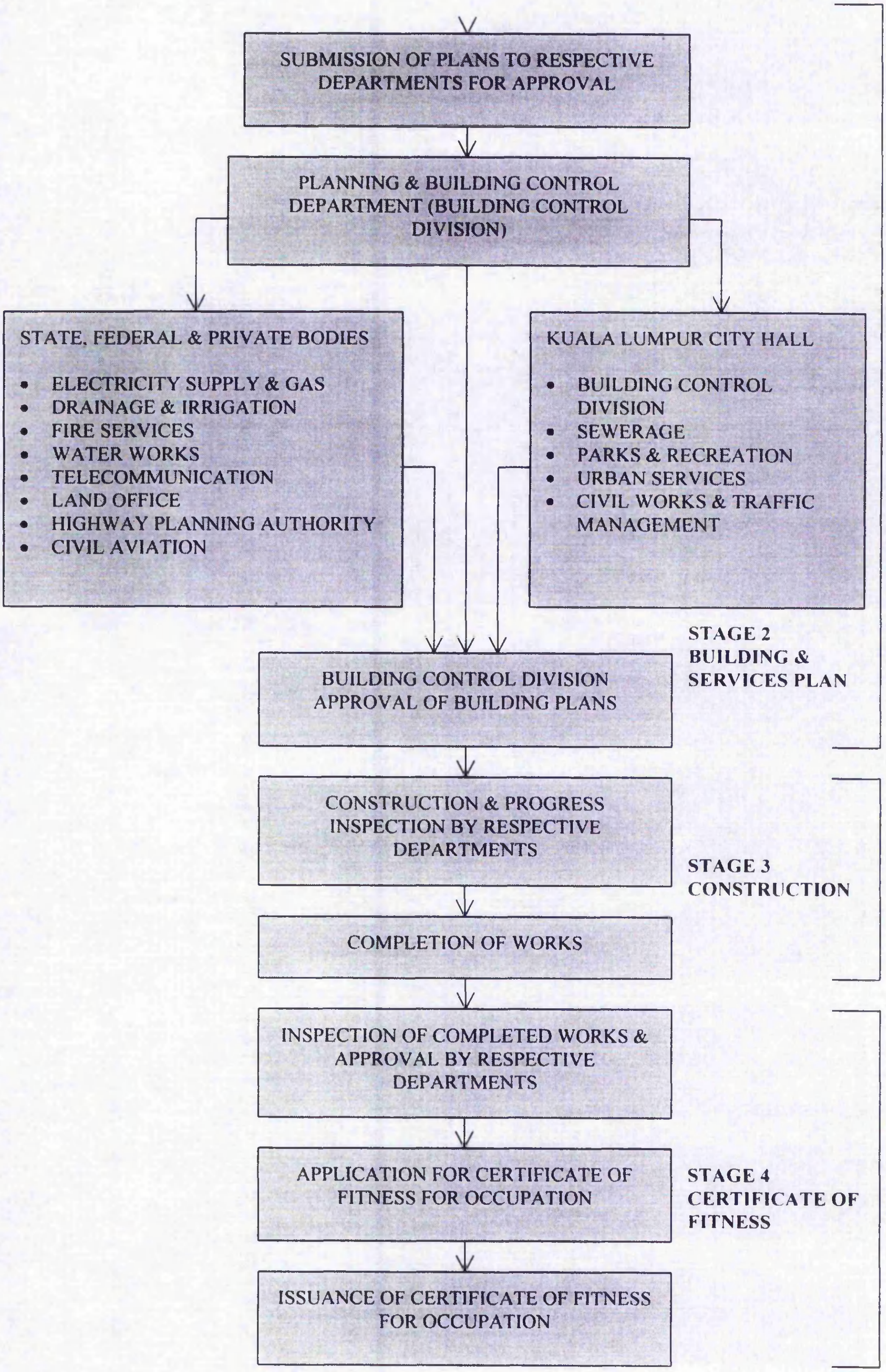


CHART 5.1- Statutory Approval Process: Kuala Lumpur City Hall (Cont'd)



Source: Modified from Wang (1987, p92-93) and Tan (1996, p147-148).

5.4.2.1 Development Order stage

Development Order is the first stage in a series of activities for statutory approval for construction. Broadly, it involves four key activities, i.e., (1) approval pertaining to land matters, (2) approval for Environmental Impact Assessment (EIA), (3) planning permission, and (4) application for Development Order Approval.

Firstly, statutory approval pertaining to land matters. A client must have the authority to develop the land. Application for the transfer of original title deed should be made to the Kuala Lumpur City Hall's Land Office all in accordance with the provision of the National Land Code Act 1965. According to *Bank Negara Malaysia* (1992, p71) land matters in Malaysia are complex due to factors including: (1) land matters are governed by customs and history, and (2) high demand for land due to the rapid process of industrialisation. Prior to the enactment of the National Land Code, Act 56, in 1965, land is an individual state's matter and therefore its legislation is not standardised throughout Malaysia. Also under the old system, ownership of land could be divided into divisions and sub-divisions and could be held in joint names. The National Land Code, Act 56, 1965 (although the rights and powers over land matters remain under the State Government) provides uniformity in law and policy pertaining to land throughout Peninsular Malaysia including land tenure, registration of titles to land, transfer of land, leases and charges, easements and other rights and interests in land (Arbi, 1985, p103; Davis et al., 1994, p148). It divides land use in Malaysia into three categories: (1) agriculture, (2) building, and (3) industry. Under agriculture category the State Government may spell out the type of crop to be cultivated and limit the maximum area of land to be used for dwellings or other buildings. Under building and industry categories the State Government may impose:

1. The area or proportion of the land to be built upon;
2. The type, design, height and structure of any building to be erected on the land, and the type and quality of the materials used in its construction;

3. The dates on or before which the building is to be commenced or completed; and

4. The use of the building.

Development would inevitably involve the conversion of land use and the subdivision of title and could sometimes necessitate the combination of adjoining lots into one lot to be held under a single title (Arbi, 1985, p103). Any changes to land use must be approved by the Kuala Lumpur City Hall's Land Office. The *Bank Negara Malaysia* (1992, p72), Monerasinghe (1985, p54) and Agus (1989, p110) contended that in Malaysia the processes of obtaining approval for land development, conversion, sub-division and issuance of titles may take a considerable amount of time. The whole process may take 8 months (*Bank Negara Malaysia,* 1992, p72) or anything up to 10 years, although the average period may vary between 3 to 4 years (Monerasinghe, 1985, p54). The rapid rate of industrialisation in Malaysia has given rise to much higher demand for land particularly land for industrial purposes (*Bank Negara Malaysia*, 1992, p71). The high demand for land in general and particularly land for industrial purposes has given rise to the number of applications for the conversion of land use, especially from agriculture to industrial (*Bank Negara Malaysia,* 1992, p71). Consequently, the high demands for land for industrial purposes and the prolonged delay in obtaining the necessary approval for land development, conversion, sub-division and issuance of titles have resulted in an increase in the relative market value of land, reflecting market forces and the inevitable land speculation (*Bank Negara Malaysia,* 1992, p72).

Secondly, under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987, EIA Report is required for most land development projects of 50 hectares or more. Clients should prepare and submit EIA Report to the Director General of Environmental Quality for approval. Malaysia's strategy on balancing economic growth with sustainable development stressed on anticipating environmental problems rather than address their impact at a later date (Chin, 1994). The EIA procedures comprise three main stages: (1) preliminary assessment, (2) detailed assessment, and (3) review (Department of Environment, 1992, p2). The preliminary assessment stage relates to the initial assessment of impacts arising from the proposed construction activities. It must be initiated at the feasibility study stage of the procurement process. Project options are identified at this stage and any significant residual environmental impacts are made known. For projects where significant residual environmental impacts have been predicted in the preliminary assessment stage, a detailed assessment is necessary and therefore will require a detailed EIA Report. The detailed EIA Report must be submitted to the Director General of Environmental Quality for approval prior to the giving of approval by the Kuala Lumpur City Hall for the project. A review of the EIA Report is carried out by the Department of Environment and recommendations arising out of the review are transmitted to the Kuala Lumpur City Hall for their considerations in making decision on the project.

Thirdly, the Town and Country Planning Act 1976 prescribes that planning permission is required for all types of development. Application for planning permission should be submitted to the Kuala Lumpur City Hall's Planning Department. The initial process involves the client or his/her agent applying for approval of the layout plan of the proposed development. Details required in the submission include the proposed layout plan, indicating among others: number and types of proposed buildings, open spaces, schools and community reserves where required, all utility services' reserves such as electricity, water, sewerage disposal, existing contour lines and proposed formation levels and existing natural water courses and drainage proposals.

After the layout plan is approved, the client or his/her agent should submit the application for conversion of land use and subdivision of title as required under the National Land Code Act 1965. Approval of land conversion or transfer of title, granting of lease by the Kuala Lumpur City Hall's Land Office, etc. would depend upon the EIA Report being approved by the Director General of Environment Quality.

If the proposed development is a housing project comprising more than four (4) units of houses, the developer must submit an application for a housing developer's license from the Ministry of Housing and Local Governments as required under the Housing Developers (Control and Licensing) Act 1982.

The fourth and final stage of the development order involves the client or his/her agent submitting an application to the Kuala Lumpur City Hall's Planning Department for Development Order Approval. Documents required in the submission include the site and sketch plans, relevant application forms and submission fees and copies of title deeds. The site and sketch plans must show details including number and types of proposed buildings, proposed roads, footpaths and drains, utilities' reserves, open spaces and school and community reserves. The document is assessed by the Technical Sub-Committee prior to deliberations by the Town Planning Committee. The latter makes approval based upon the recommendation of the former. The Town Planning Committee comprises heads of governments' departments, statutory and private bodies, each responsible for town and country planning, electricity, water, sewerage, roads and drains, telephones, etc. Once the Town Planning Committee approves the application, a Development Order is issued. The Development Order usually spells out several conditions of approval to which the client must comply in the subsequent stages of the work.

5.4.2.2 Building and Services Plans stage

The objective of statutory control over buildings is to ensure that buildings are designed, constructed and maintained free from failure, defects or nuisance which may jeopardise their utilisation or endangers life and health, during and after construction (Alwi, 1995, p49).

After planning permission is obtained, application for approval of the building and services plans must be made to the Building Control Division of the Kuala Lumpur City Hall. The basis for building regulation within the City of Kuala Lumpur is governed by the Building (Federal Territory of Kuala Lumpur) by-laws 1985 and the Uniform Building by-laws and Street, Drainage & Building Act No. 133, 1974. The application involves the client or his/her agent submitting detailed architectural, engineering and specialist designs to the Kuala Lumpur City Hall's Planning and Building Control Department. Detailed designs must be prepared and signed by registered Architects for building works and by registered engineers for engineering works. Detailed designs must also be submitted to other governments' departments, statutory and private bodies responsible for different utilities and services for their approval. They include for example: Kuala Lumpur City Hall's Civil Works and Traffic Management Division for earthwork, road and drainage approval; Fire Services Department for fire facilities and fire prevention approval; Waterworks Department for the supply of water, piping system, water storage tanks and reservoirs approval, *Tenaga Nasional Berhad* for electrical supply approval, *Syarikat Telekom Malaysia Berhad* for telecommunication approval, etc. In carrying out its functions the Kuala Lumpur City Hall's Planning and Building Control Department co-ordinates with these other bodies in ensuring that their requirements are complied with (Alwi, 1995, p49).

Approval of the building and services plans depends upon: (1) the plans comply with various Laws, by-laws and Regulations that are currently in force, or waivers granted to some specific areas of non compliance due to allowable reasons, and (2) the various departments within the Kuala Lumpur City Hall, federal government departments, statutory and private bodies giving their approval of the various utilities requirements.

The Building Control Division of the Kuala Lumpur City Hall's Clients Charter Agreement provides that the process of approving building and services plans will take 3 months, i.e., from the day the plan is deposited until it is approved (Alwi, 1995, p50). However, Alwi (1995, p50) argued that such a time frame is only possible if the plans submitted are in order and that delays in obtaining building and services plans approval often occur. For instance, Alwi (1995, p51) claimed that due to the large volumes of plans submitted (the Kuala Lumpur City Hall receives and processes an average of 1,500 building plans annually) and due to the nature and size of some of the projects, about 30 to 40 per cent of applications cannot be approved within a year. According to Alwi (1995, p50) the causes that might contribute to delays in obtaining statutory approval include:

1. Plans submitted are often not in order, which mean that amendments have to be made in order to comply with the minimum standard requirements of the by-laws and the administrative requirements of the Development Order;
2. Increase in volume of plans submitted and lack of skilled technical staff to scrutinise and process large volumes of plans;

3. Careless, ignorant or the unprofessional attitude of the submitting person; and
4. Delay in getting approval from other related state, federal and private bodies.

Upon approval of the building and services plans, clients may commence work on site. However, actual work could only starts after a notice of intention to commence work on site is approved by the Kuala Lumpur City Hall. The notice must be submitted 4 days prior to starting works on site.

5.4.2.3 Construction stage

During construction, the contractor is responsible for observing the various laws, by-laws and regulations concerning construction activities such as Local Government, Health and Safety, Factories and Machinery (Building Operation and Works of Engineering Construction), etc. The objective of these statutes is to ensure that construction works are monitored and disciplined. There would be site inspections by different authorities including the Kuala Lumpur City Hall's Building Control Division, Health Department, Fire Services Department and Factories and Machinery Department to ensure that construction sites are safe, clean and free from pollution, fire, health and safety hazards to workmen, property and the neighbouring areas.

5.4.2.4 Certificate of Fitness stage

It is mandatory that a Certificate of Fitness or CF be obtained before a completed facility can be occupied and used (Alwi, 1995, p50). In applying for CF to the Kuala Lumpur City Hall's Building Control Division the client or his/her agent must submit among others final and complete as-built drawings for the building works and services and giving notice for final inspection on the completed project. The Building Control Division and the various authorities will scrutinise the as-built drawings and will inspect thoroughly the completed project to ensure that it complies with all relevant Laws, by-laws and Regulations and the conditions stipulated in the Development Order Approval and/or Building and Services Plan approvals. The CF is issued by the Kuala Lumpur City Hall's Building Control Division once it receives clearance from all the governments' departments, statutory and private bodies involved.

In situations where a full CF is not possible due to certain requirements not being met the Kuala Lumpur City Hall's Building Control Division may at its discretion issue a Temporary CF. The Temporary CF is normally valid for 3 months and the items that have not been complied should be rectified within that period. Otherwise, the process of applying and approval for a CF will have to be repeated (Wang, 1987, p91). According to Alwi (1995, p50) a common situation where a Temporary CF is issued is when requirements related to land matters were not met. In such a situation the safety of occupants, user and the general public which have access to the building has to be protected in terms of accidental damage. One of the criteria to enable Temporary CF to be issued is to have the developer provide a third party liability insurance. Other means may include compartmentation with physical barricades, protective hoarding and warning signs (Alwi, 1995, p50).

5.4.3 Effects of statutory control on construction procurement

Wang (1987, p91) argued that there are two contrasting effects of statutory control on construction procurement in Malaysia. On the one hand, it facilitates achieving proper use of land, appropriate planning of towns and cities, regulating of standards of buildings, etc. so that planning and construction of building can be carried out in a systematic and orderly manner.

On the other hand, statutory control on construction has imposed institutional rigidity and produced complex procedural formality and bureaucracies, the results of which may include delay, difficulties and hardship on the processes of construction procurement. Wang (1987, p91-95) listed the adverse effects of statutory control on construction. They include:

1. Delay in planning and implementing construction projects;
2. Requires a great deal of time and manpower to meet procedural requirements and bureaucracies;
3. Uncertainty in programming projects;
4. Increase in holding charges;
5. Increase in financing charges;

6. Creating cash-flow problems;
7. Dislocating demand and supply of commercial, industrial and housing needs of society; and
8. Causing properties to increase in prices.

Consequently, the whole process of development may take a considerable period of time. For instance, Wang (1987, p94) observed that:

> "... if a proposed housing project of a sizeable magnitude is intended to be implemented on an agriculture land, the process of change of land use, planning permission, building and services approval to completion for habitation, the time required may well be from 5 to 8 years."

5.4.4 Summary on the process of statutory approval

1. One of the key objective of statutory control on construction is to ensure systematic and orderly development;
2. The process of obtaining statutory approval is complex and relatively slow. It involves various authorities: public and private, the former comprises three levels of governments: local, state and federal. In addition, different sets of statutory control and approval are applicable at different stages of the procurement process; and
3. The procedure for obtaining statutory approval is not uniform. It varies from one project to another, from one department to another within a local authority and from one local authority to another within Malaysia.

5.5 Tendering

Tendering refers to the process or procedure that is used to obtain offers leading to a contract between a client and contractor, a client and consultant or a contractor and subcontractor, and so on (Turner, 1990, p104).

According to Turner (1990, p104) prior to starting a tendering process a decision on the contract arrangements that will have to be entered into on acceptance of a tender will need to have been made. Tendering and contract therefore, are two distinct concepts but are closely related in practice (Turner, 1990, p104).

5.5.1 Tendering for consultancy services

According to Davis et al., (1994, p148), Kamil (1994, p11) and Tan (1996, p119) in Malaysia a client appoints consultants. Tan (1996, p119) argued that:

> "It is not encouraged for consultants to be appointed by other consultants (including the architect) because each consultant is governed by their own respective professional bodies and therefore they cannot be held responsible for the performance of other consultants. There is also the question of 'Conflict of interest'."

Tan (1996, p119) however, suggested that clients may seek the advice of a project management consultant on the suitability of each consultant.

Notwithstanding the types of construction projects to be built or consultants to be appointed by the client, the method used in selecting and appointing consultants is broadly the same (Davis et al., 1994, p148). In the public sector, the criteria for selection would normally include quota, track record, experience and fees payable. The quota system is to ensure that projects are fairly distributed among firms. In the case of quantity surveyors, Kamil (1995, p12) pointed out that the Ministry of Finance stipulated a minimum of ten years experiences before one can be considered for government projects. Firms wishing to be considered for government projects must register with the Ministry of Finance's Procurement for Professional Services Section (Kamil, 1995, p12), the government body responsible for appointing consultants for projects in the public sector. The registration requirements include that both the firm and its proprietor (or proprietors) must be registered with the respective Boards. In the private sector the criteria used by clients in selecting consultants would normally include track record, personal contacts and fees payable (Davis et al., 1994, p148).

Tan (1996, p119) suggested that the process of selection and appointment of consultants normally began with the client (or the project manager acting on the client's behalf) calling for quotations from designers with experience in projects similar to the one being initiated/promoted. From the quotations a list of potential consultants is prepared. A series of interviews and negotiations with the short-listed consultants will follow in order to agree on terms including consultancy fees payable, style of payment and other considerations. The appointment of a successful consultant is finalised once the client and consultant signed a formal contract.

Each professional Board provides guidelines on the procurement of its members' services and their appointment. These are contained in documents such as the Board of Architects Scale of Fees and Conditions of Engagement; the Board of Quantity Surveyors Scale of Fees and Conditions of Engagement, etc. However, in practice the fee scales, although mandatory, are often ignored (Davis et al., 1994, p148). Clients instead request fee discount or prepared their own scale of fees (Davis, et al., 1994, p148; Kamil, 1994, p11). For instance, Kamil (1994, p11), in the context of fees for quantity surveying services, claimed that:

> "... even for government jobs, the Treasury has applied for a discount..."

Kamil (1994, p11) warned the possible effects of reduction in fees include that consultants may not be able to provide the same level of services compared to jobs on full fees. He suggests clients and the consultants should come to an agreement on a modified level of service if the fee is too low.

5.5.2 Tendering for contractors' services

In Malaysia, construction projects are almost always constructed by contracting firms selected and employed by the client through a tendering process. The most common methods of tendering are:

1. Open tendering;
2. Selective tendering; and
3. Negotiated tender.

5.5.2.1 Open Tendering

Open tendering refers to the procedure of inviting offers from registered contracting firms (there is a national contractors' registration scheme in Malaysia, see Section 5.5.3) through tender advertisements normally in the general press. A tender advertisement provides information such as outline details of the work, its scale and programme, tendering period, class of registration of contracting firms eligible to tender and other relevant matters. In open tendering all eligible contractors have the opportunity to tender and maximum competition may be achieved.

5.5.2.2 Selective Tendering

Selective tendering refers to the procedure of inviting offers from a limited number of registered contracting firms, normally through the client's personal contact, recommendation from consultants or third parties known to the client. In the public sector, the names of contracting firms are drawn from the list of registered contractors (with both the CIDB and the *PKK*) that have proven experience and track record in constructing projects similar to the one being tendered. Mohd Ali (1986, p55) claimed that selective tendering is a common approach in the selection of successful contractor in a design and build tender.

5.5.2.3 Negotiated tender

In open tendering or selective tendering, a contracting firm makes an offer to the client as a result of the former's assessment of aspects including commercial and technical, based upon available information at the time of tendering. The offer is then either accepted or rejected by the client. In a negotiated tender, there are provisions in the conditions of tendering for a negotiation or a series of negotiations to be held between tenderers and the client. It is not known whether there is a procedure that is acceptable by the construction industry for negotiated tenders in Malaysia. In general a client would carry out parallel negotiation with the lowest two or three contracting firms whose bids meet the technical details and specifications. Normally the key issue in the negotiation is the tender price.

In design and build or turnkey system, negotiation may become essential in order to facilitate evaluating incomparable offers since contractors may be required to offer competition in both design and prices. Mohd Ali (1986, p55) studied the application of turnkey system in Malaysia and in the context of tendering, he observed that:

> "Though there has been few cases where one to one negotiations with Turnkey contractor are made before award but generally, most clients who always sought

better value for money, tendering among short-listed contractors seem to be the common approach to selection of successful contractor."

5.5.3 Registration of Contractors

In the past and prior to the setting up of the *PKK* the *JKR* is the authority in the registration of contracting firms for public works. Other government departments and agencies and private body such as the PAM also maintains their own system and method of registering contractors.

In 1984 the government established the *PKK*. The key function of *PKK* is to centralise the registration of contractors for public works. In December 1994 the government set up the CIDB. The functions of CIDB include accrediting and registering contractors in Malaysia. Following the enforcement of the Act on 22 July 1996, only contractors registered by CIDB are allowed to participate in tender exercises and to build and construct in Malaysia.

5.5.3.1 Registration of contractors by the *PKK*

Arahan Perbendaharaan No 9 of 1987 detailed the *PKK* scheme of registration of contractors for public works. Briefly, a contractor is registered into a class, into one or more categories and into one or more areas of specialisation as outlined in Chart 5.2. The criteria in registering and assessing contractors into the appropriate class, categories and areas of specialisation include:

1. The firm must first be registered with the relevant bodies such as the Registrar of Business (for sole proprietorship or partnership) or Registrar of Companies (for body corporate);

2. The firm must have minimum capital and financial capability. The minimum amount required for each class of registration is as shown in Table 5.2;

3. The qualification of the firm's staff and management. For Classes A to BX, the firm management staff must have a technical degree or professional qualification, and a technical diploma for Class C. For class D to F, the firm's management staff must have sufficient knowledge and experience in the respective field of construction;

4. The firm's track record and plant and equipment; and

5. The firm's equity structure.

Registration is valid for 2 years unless cancelled or suspended or revoked earlier by the *PKK*. The *PKK* may suspend or revoke a contractor's registration due to factors such as submitting false information in the application for registration or delay in completing projects or poor quality of work or failure to complete projects or the holder of the registration certificate is declared bankrupt (Jonid, 1994, p5-8). A registered firm may apply for upgrading of class or for additional category or for additional area of specialisation. The *PKK* reviews the status of each registration each time new information becomes available and consequently may downgrade a firm's class or reduce the categories or areas of specialisation. Registered contractors must submit an application for renewal before the validity period expires and the whole process of registration is repeated.

Table 5.3 shows the numbers of Malaysian contractors registered with the *PKK* according to classes of registration as of December 1994. The table shows that there are 16,366 *PKK* registered contractors, an overwhelming majority (66.56 per cent) is Class F contractors (the lowest class of registration).

5.5.3.2 Registration of contractors by the CIDB

Sub-section 25(1) of the CIDB Act 520 stipulates that it is mandatory for all contractors and builders to be registered with CIDB and that no person shall undertake to carry out and complete any construction works unless he/she is registered with the CIDB. Sub-section 29 of the Act stipulate the penalty for a person who was found guilty of carrying out construction works without being registered with the CIDB being liable to a fine not exceeding RM50, 000.00. The registration requirements became mandatory from 22 July 1996 (The Star, 21 July 1996).

The procedure of registration with the CIDB is detailed out in "Registration Requirements and Procedures" (CIDB, 1995b). Briefly, a contractor is registered into a grade, into one or more categories and into one or more areas of specialisation as outlined in Chart 5.3. The criteria in registering and assessing contractors into the appropriate class, category or categories and area or areas of specialisation is outlined in Table 5.4 and the registration procedure for Malaysian firms is outlined in Chart 5.4.

Registration is valid for 3 years unless cancelled or suspended or revoked earlier by the CIDB. The CIDB may suspend or revoke a contractor's registration due to factors such as the holder of the registration certificate has been adjudicated a bankrupt or a winding-up petition in relation to the holder is presented or the holder of the certificate fails to comply with any relevant provisions of the CIDB Act or the holder of the certificate has abandoned any construction works undertaken or the firm's registration with the Registrar of Business or Registrar of Companies (which ever is applicable) has expired (CIDB, 1995b, p15-17). A registered firm may, after a year of being registered, apply for upgrading of grade, for additional category or for additional area of specialisation. The CIDB reviews the status of each registration each time new information becomes available and consequently may downgrade a firm's grade or reduces the categories or areas of specialisation. Registered contractors must submit application for renewal within 60 days before the validity period expires and the whole process of registration is repeated.

In the case of foreign contractors, either an individual firm or a firm in joint venture with a Malaysian firm (s), registration is project specific. It is valid only for the period of tender and if successful, registration is extended for the period of construction until the work is completed (CIDB, 1995b, p18-21, 36).

Table 5.5 shows the numbers of Malaysian contractors registered with the CIDB according to grades of registration as of May 1997. The table shows that there are 40,607 CIDB registered contractors, an overwhelming majority (57.34 per cent) is Grade G1 contractors (the lowest grade of registration).

5.5.3.3 Registration of Contractors in Malaysia: An Appraisal

One key argument against open tendering has been that the procedure could lead to contracting firms tendering without the necessary resources and/or expertise. The basis of the argument is that in open tendering virtually any firm responding to the tender invitation could submit a bid (Turner, 1990, p105). However, in Malaysia such an argument may not be entirely valid. This is because under the CIDB contractors' registration scheme (CIDB Act 520, 1994) only contracting firms possessing the minimum level of resources, experience and expertise appropriate to their class of registration may participate in tender exercises and permitted to build and construct. In addition, the *PKK* contractors' registration scheme offers further control on contracting firms tendering, building and constructing public works. Both the CIDB and the *PKK* registration schemes together with the registration of professional consultants help to bring about professionalism and quality commitment in the Malaysian construction industry. In the case of contractors' registration schemes operated by private bodies, Wang (1987, p75) observed that the systems are less organised and therefore lack credibility.

Detailed examination of the CIDB and the *PKK* contractors' registration schemes revealed that both schemes are broadly similar in the sense that they are concerned with credibility and quality of contractors. They consider contractors' capabilities particularly in the areas of resources: financial, personnel, management and plant and equipment; technical experience and technical expertise as being critical registration requisites. The one distinct difference between the two registration schemes is in the area of authority: the CIDB registration scheme is a licensing system empowered by statute and is mandatory for all contractors but the *PKK* registration scheme is an accreditation system applicable only to contractors for public works.

There appear to be overlapping of activities between the CIDB and the *PKK* contractors' registration schemes and information on contractors and their performance could not be shared between the two bodies. Consequently, having two separate but broadly similar registration schemes may lead to problems such as unnecessary administrative red tape, ineffective use of resources and additional costs to all parties particularly to the public sector side of the construction industry since the government is the largest single owner and developer of construction projects (Wang, 1987, p8). For instance;

1. Contractors seeking to participate in tenders and to build and construct public works must posses both the CIDB and the *PKK* registrations. This may increase administrative costs in terms of preparing and submitting applications for registrations, fees for processing applications for registrations, fees for

registrations, fees for renewals, etc. These additional costs need to be recovered by the contractors from successful projects.

2. The government has to operate two separate registration bodies, the CIDB and the *PKK*, that perform functions that appear to be similar. This could increase administrative costs in terms of the provision of resources: personnel, financial, hardware and software to equip and to run both bodies effectively and efficiently.

3. In calling tenders and in contract supervision clients must ensure that contractors adhere to the requirement on the registration of contractors. In the case of public clients, the requirement that contractors must be registered with the CIDB and with the *PKK* mean that additional resources must be employed to ensure that both registration requirements are followed. Staff may have to spend more time in processing and in evaluating tenders from contractors and contractors may have to endure additional administrative red tape. Consequently, these factors may prolong the overall period of procurement.

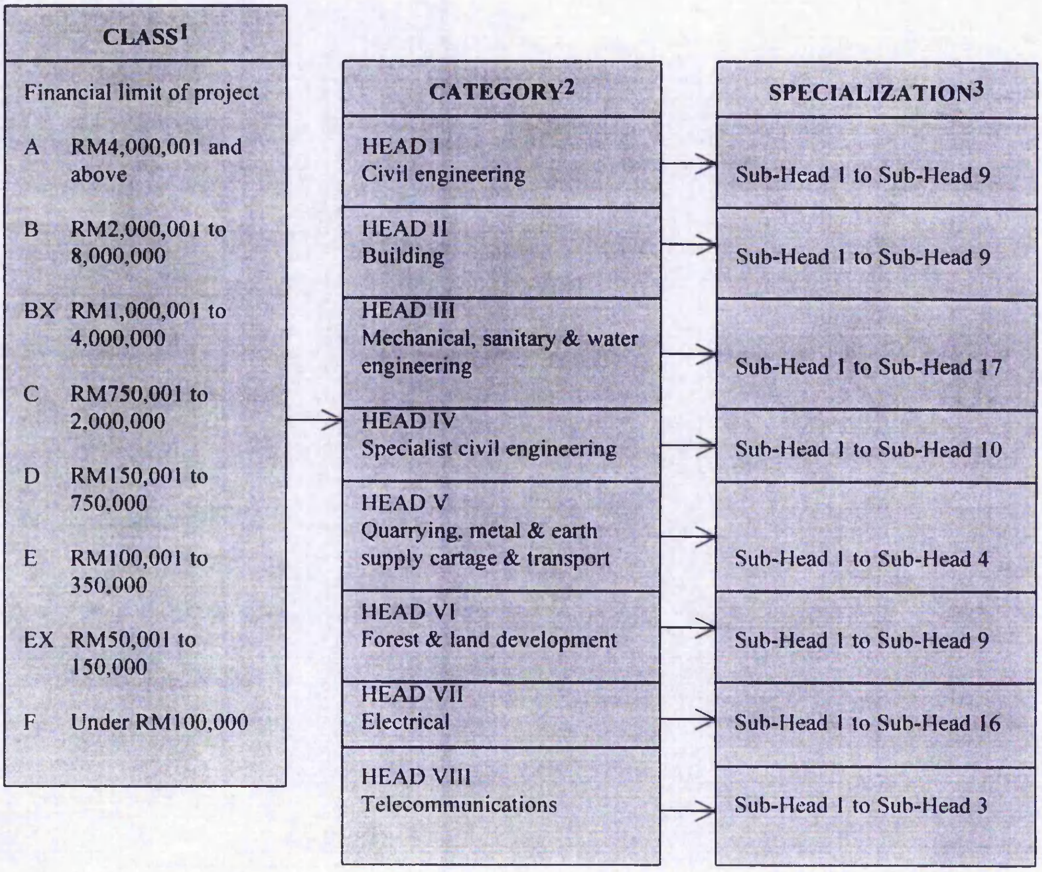
Therefore, it is thought to be more effective if the government should consider merging the CIDB and the *PKK* contractors' registration schemes into one central registration system and performed by one single authority, probably the CIDB. This is because the CIDB has the statutory authority under the CIDB Act 520 of 1994 to accredit and to register all contractors. The advantages of having one central registration system may include:

1. One stop services for all contractors. Contractors would only need to apply for registration once in order to be allowed to participate in all public and private sectors tenders;

2. Centralised monitoring of contractors. The performance of registered contractors would be assessed based upon standard set of criteria and the information could be centrally monitored and shared by the relevant bodies; and

3. Saving in resources by both the government and the construction industry as a whole.

Chart 5.2 - The *PKK* Scheme of Registration: Class/Category/Specialisation



[1] A firm can only be registered into one class of registration at any one time. Each Class represents the tender value, which a registered contractor is capable of executing.

[2] A firm may be registered into one category or more.

[3] A firm may be registered into one area of specialisation or more. For example, Head I has 9 areas of specialisation or Sub-Head 1 to Sub-Head 9.

Example: A firm may be registered as Class A, Head 1, Sub-Heads 1 and 2. It means that the firm is registered to build and construct civil engineering works (Head 1) in the areas of general civil engineering (Sub-Head 1) and bridges, jetties and marine structures (Sub-Head 2) to the value of RM4,000,001 millions and above (Class A). A full description of the areas of specialisation is available in *Ketua Pengarah Kerja Raya*, 1992, p133-138.

Source: Chart constructed from *Ketua Pengarah Kerja Raya* (1992, p133-138).

Table 5.2 - Capital Requirement for Each Class of Registration with the *PKK*

Class of registration	Minimum Capital (RM)
A	600,001
B	400,001
BX	200,001
C	100,001
D	35,001
E	17,501
EX	7,501
F	5,001

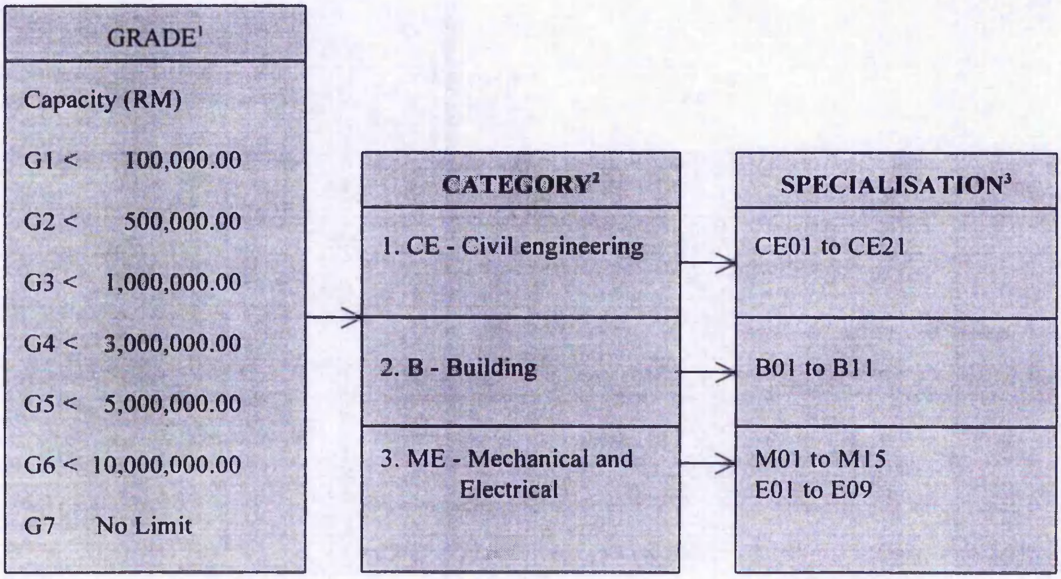
Source: Jonid (1994).

Table 5.3 - Contractors Registered with the *PKK* (according to Class of Registration, 1994)

Class of registration	No	%
A	498	3.04
B	303	1.85
BX	575	3.51
C	567	3.47
D	2,279	13.92
E	726	4.44
EX	525	3.21
F	10,893	66.56
Total	16,366	100.00

Source: Jonid (1994).

Chart 5.3 - The CIDB Scheme of Registration: Grade/Category/Specialisation



[1] A firm can only be registered into one grade of registration at any one time. Each grade represents the tender value, which a registered contractor is capable of executing.

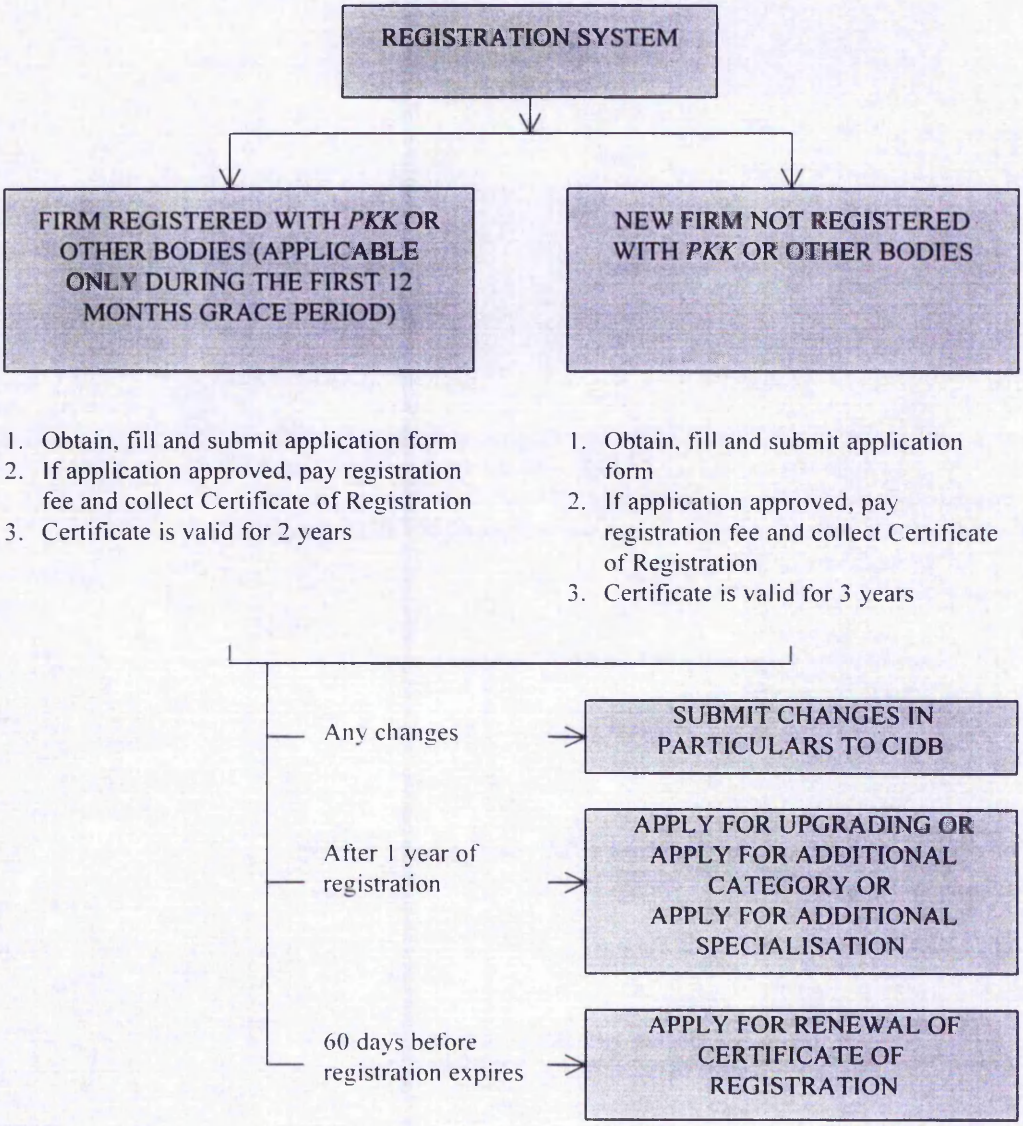
[2] A firm may be registered into one category or more.

[3] A firm may be registered into one area of specialisation or more. For example, Category 1, CE has 21 areas of specialisation, i.e., CE01 to CE21.

Example: A firm may be registered as Grade G1, Category and Specialisation CE01 and CE02. It means that the firm is registered to build and construct civil engineering works (CE) in the areas of road and pavement construction (CE01) and Bridge construction (CE02) to the value of not exceeding RM100,000.00 (Grade G1). A full description of the areas of specialisation is available in CIDB, 1995b, p23-31.

Source: CIDB (1995b, p22-31).

Chart 5.4 - CIDB Registration Procedures for Malaysian Firms



Source: CIDB (1995b, p35).

Table 5.4 - CIDB Registration Requisites

Grade	Capacity (RM)	Experience (A)	(B)	Capital (RM)	Minimum personel[1]
G1	< 100,000	100,000	75,000	5,000	One group C with 2 years experience
G2	< 0.5 m	0.5 m	375,000	25,000	One group B with 3 years experience
G3	< 1.0 m	1.0 m	750,000	50,000	One group A with 2 years experience or 2 group B, one of whom must have 3 years experience
G4	< 3.0 m	3.0 m	2.25 m	150,000	One group A with 5 years experience
G5	< 5.0 m	5.0 m	3.75 m	250,000	Two group A, one of whom must have 5 years experience
G6	< 10.0 m	10.0 m	7.50 m	500,000	Two group A, one of whom must have 8 years experience
G7	No Limit	15.0 m	11.25 m	750,000	Three group A, one of whom must have 10 years experience

(A) Average Annual Value of Work for 3 years (RM)
(B) Largest Project Value During Last 3 Years (RM)
[1] Group A - Degree holder in construction related fields
Group B - Diploma holder in construction related fields or other degree holder with experience in construction works
Group C - Others who are involved in technical activities on site with experience in construction works and accepted by the CIDB

Source: CIDB (1995b, p34).

Table 5.5 - Contractors Registered with the CIDB (according to Grade of Registration, 1997)

Grade of registration	No	%
G1	23,286	57.34
G2	6,661	16.40
G3	4,419	10.88
G4	1,658	4.08
G5	1,332	3.28
G6	2,152	5.30
G7	1,099	2.71
Total	40,607	100.00

Source: Figures obtained from CIDB.

5.5.4 The Process of Tendering

It is contended that in the public sector, the tendering procedures to be followed are much more structured and formalised in contrast to the relatively less organised and more fragmented private sector. In the public sector, the tendering procedures to be followed are governed by factors such as source of funding and type, nature and estimated cost of projects. Thus:

1. It is mandatory to let projects estimated to cost more than RM50,000.00 each through open tendering (*Pekeliling Perbendaharaan* No 180 in Ketua Pengarah Kerja Raya, 1992, p122; *Arahan Perbendaharaan* No. 3 of 1986; Abdul Rashid, 1992, p7). Only in specific circumstances, such as urgency of the work and/or for security reasons, is selective tendering or negotiated tender allowed. The office intending to invite selective tendering or negotiated tender must seek prior approval from the Ministry of Finance (*Arahan Perbendaharaan* No 3 of 1986; *Ketua Pengarah Kerja Raya Malaysia*, 1992, p125; Abdul Rashid, 1992, p8).

2. It is mandatory for all tenders for works funded by the Government's own source of funds to be opened to Malaysian contracting firms only. The exceptions to this rule are: (1) where it can be ascertained that Malaysian contractors are not capable of undertaking certain works because of factors including inadequate resources, inexperienced, complexity of the project foreign contractors may be allowed to

tender with prior approval of the Ministry of Finance; and (2) for civil engineering works estimated to cost more than RM50 millions each, tenders can be invited from Malaysian contractors and joint venture firms of Malaysian and foreign contractors selected through a pre-qualification exercise (*Pekeliling Perbendaharaan* No 180 in Ketua Pengarah Kerja Raya, 1992, p122; *Arahan Perbendaharaan* No 15 of 1986; *Arahan Perbendaharaan* No 7 of 1989; *Ketua Pengarah Kerja Raya*, 1992, p122; Abdul Rashid, 1992, p7). However, the Malaysian government's policies on open tender and Malaysian contractors only are not applicable for projects funded by the international funding agencies such as the World Bank, ADB, IDB, etc. Tendering for projects funded by these bodies are subject to the conditions of the loan agreement and procurement procedures lay down by them. Briefly, the international funding agencies would normally require that pre-qualification exercise be performed (for example, the ADB requires that pre-qualification of contractors to be performed for all projects estimated to cost more than US$7 millions each), that contracting firms from member countries must be informed through tender advertisements and by way of a letter to their respective consul in Malaysia, that no preferential treatment should be given to indigenous contracting firms, construction materials and goods, etc. (Abdul Rashid, 1993, p5). A review of tendering procedures for projects funded by the international funding agencies requires detailed study, the studies of which is not within the scope of this thesis.

3. Bills of quantities are mandatory for each project estimated to cost RM500,000.00 and above (*Arahan Ketua Pengarah Kerja Raya* No 13 of 1987; *Ketua Pengarah Kerja Raya*, 1992, p33). Projects estimated to cost less than RM500,000 each may be tendered on the basis of completed drawings and specifications. The use of bills of quantities, based upon completed drawings and specifications, in tendering indicates that the traditional system is the principal procurement method used by the public sector. However, Yong (1988, p285) and Hashim (1996, p194) pointed out that the public sector also practise the design and build or turnkey procurement method. Sharif (1996, p263-279) and Hashim (1996, p192-194) suggest that the dominant procurement systems in Malaysia are (in order of most frequently used method): traditional, design and build or turnkey system and

management contracting. A review of the dominant types of procurement systems in Malaysia is in Section 5.7.

5.5.5 Tender documents

In an attempt to simplify the discussion on tender documents, the practice of the *JKR* has been selected for illustration. The *JKR*'s practice is relatively representative of those existing in other public sector organisations and in the private sector. In addition, *JKR* being the largest single organisation in project implementation in Malaysia, its policy of tendering, has, therefore far reaching effect on the processes of construction procurement in Malaysian in one way or the other.

For a public work tender for a contract based on Bills of Quantities, the tender documents would normally comprise the following (*Ketua Pengarah Kerja Raya*, 1992, p35-37):

1. Letter of invitation to tenderers;
2. Check list for submission of tenders;
3. Articles of Agreement and Conditions of Contract ;
4. Form of Tender;
5. Form for details of tenderer's registration as a contractor and of organisation, and particulars of ten jobs completed and jobs in hand;
6. Letter of Acceptance;
7. Bank and insurance guarantee forms for Performance Bond;
8. Bank and insurance guarantee forms for advance payment;
9. Specifications;
10. Bills of Quantities; and
11. Relevant drawings.

For a public work tender for a contract based on drawings and specifications, the tender documents shall comprise all of the above except that Bills of Quantities is replaced by a Summary of Tender and Schedule of Rates and that a full set of drawings are included. The conditions of contract used for public works are the PWD 203 Standard Form of Contract.

Under the design and build or turnkey system of procurement, the client outlines his/her requirements in broad terms which sometimes referred to as 'need statements' (Mohd Ali, 1986, p54). Under the practice adopted by the *Unit Pelaksanaan Projek Turnkey* (Turnkey Implementation Unit) of *JKR*, the client and *JKR* prepare the need statements and together with other relevant documents become what is known as 'pre-bid documents'. Contractors basing on the pre-bid documents submit complete proposals for the design, construction, equipping and commissioning of the projects usually on a lump sum fixed price fixed time basis (Mohd Ali, 1986, p54; Yong, 1988, p288).

In the private sector the tender documents are relatively similar to those in the public sector but the conditions of contract frequently used is either the PAM Standard Form Contract for Building Works or the *Federation Internationale Des Ingenieurs-Conseils* or FIDIC (Wang, 1987, p74; Wong and Ow, 1990, p173-176; Davis et al., 1994, p148). The FIDIC Form is used where tenders are open to international contracting firms and especially for projects funded by the international funding agencies (Wong and Ow, 1990, p175).

Tender period under the traditional procurement system is normally between three to five weeks. Throughout the duration of the tender period a copy of the tender documents (known as TTD or Tender Table Documents) is displayed in the office calling the tender. The office calling tender usually organises a mandatory visit to the proposed project site.

Tender evaluation and recommendation is normally performed by the quantity surveyor. The *JKR* adopts an objective system in tender evaluation (*Pekeliling Pengarah Kerja Raya* No 5 of 1991). The system awards points to key criteria such as tender price and construction period offered by the tenderers, financial capacity of the contractor in term of availability of working capital for the project, technical capability in terms of management and technical staff, availability of plant and equipment and track records. In almost all the cases, a tender that scored the highest points from among those that meet the minimum requirements of the project is recommended for acceptance.

In the case of tender evaluation for a turnkey project, Mohd Ali (1986, p56) claimed that the process is rather tricky, somehow like when one considers trying to compare a Mercedes with a BMW. In addition, Mohd Ali (1986, p56) argued that evaluating a design and build tender is complex because the process attempt to try to bring all the proposals together to a common factor so that reasonable recommendations could be made. He listed some of the salient points that warrant considerations when evaluating design and build proposals, i.e.,

1. Scope and extend of works;
2. Limits of liability and responsibility;
3. Planning and design concepts;
4. Quality and suitability of materials used;
5. The extent of mechanical and electrical services and equipment and its maintainability; and
6. Maintenance and warranty.

Decision on the successful tender is normally made by a tender committee based upon the quantity surveyor's recommendation. In the case of a private individual client, he/she alone will make that decision. The successful bidder will be responsible for the actual construction of the projects as the main contractor under the contract. The full set of tender documents submitted by the successful bidder will become the basis of the contract documents.

The processes of inviting tenders for specialist works and services to be done by nominated sub-contractors are broadly similar to those for the main contract. The sub-contractors' contractual responsibilities are towards the main contractor.

5.5.6 Summary on the process of tendering

1. The criteria for selection of consultants normally include track records, personal contact, experience and fee payable. Consultants must be registered with their respective Boards;

2. Tendering for contractors' services could either be by open tendering, selective tendering or negotiated tender. Open tendering appears to be the most frequently used method particularly for public works;

3. It is mandatory for contractors to be registered with the CIDB. In addition, contractors for public works must be registered with the *PKK*. The registration requisites for both the CIDB and the *PKK* include contractors' capabilities in terms of resources, technical experience and expertise;

4. It is contended that having two broadly similar registration schemes operated by two separate bodies is highly inefficient and unproductive. It is proposed that the two separate registration schemes to be combined as one scheme and its responsibilities performed by one single authority, preferably the CIDB; and

5. The process of tendering in the public sector is more structured than in the private sector.

5.6 Construction

Sharif (1996, p32) defines construction as:

> "The process of physically fitting the various components of a building together, to form a final structure".

Clearly the definition applies specifically to building projects. It is acknowledged that civil engineering works depart in many ways from a building project. However, in terms of the general process of construction, Turin (1973, pC5 and C18) contended that the differences between building and civil engineering works are only marginal. Perhaps, such contention may also apply to specialist works. Therefore, it is suggested that the above definition is extended to cover the construction process for all types of projects: building, civil engineering and specialists work.

Sharif (1996, p32) divides the construction process into two elements, i.e.,

1. Management of construction;

2. Construction production.

5.6.1 Management of construction

The management of construction has been defined by Sharif (1996, p32) as:

> "The management of the construction process for the initiator/promoter."

Sharif (1996, p361) suggested that in Malaysia general contractors often assume the function of manager of construction. In his studies of dominant procurement systems in Malaysia, Sharif (1996, p360) found that there were constraints in the availability of qualified and experienced managers of the construction function in Malaysia. According to Sharif (1996, p361) the lack of qualified and experienced managers arise because management training for contractors has traditionally been neglected in the Malaysian construction industry. Most contractors have established and developed management skills through experience with little formal training. A large number of contracting firms are family owned business where skills are passed from the senior family members to the juniors. In addition, Sharif argued that the lack of qualified and experienced managers has restricted the use of management oriented procurement systems in Malaysia.

Architects or civil engineers usually perform the function of supervising buildings or civil engineering works, respectively. In the public sector the architect or engineer appointed to supervise construction works is known as Superintending Officer (*Pegawai Penguasa*) or S.O. (Wang, 1987, p74; Abdullah, 1989, p1; Davis et al., 1994, p147). Wang (1987, p74) pointed out that:

> "The contract usually names a person described as the Architect or Engineer or Superintending Officer who is entrusted with the duty to administer the contract signed between the employer and the contractor."

Abdullah (1989, p1) defined S.O. as:

> "... a person appointed in a contract and is empowered to make decisions, to issue instructions and to give approvals to the contractor implementing construction projects."

Administration of a contract requires the S.O. to ensure that it is executed according to the articles of agreement and the conditions of the contract and within the framework of Malaysian laws and the practices of the construction industry (Wang, 1987, p74; Abdullah, 1989, p6). Although the Architect or Engineer or S.O. is employed and his fees paid by the client, he/she is supposed to act impartially and free from any influence from the client (Wang, 1987, p74). In order to achieve this the S.O. must be conversant with the agreement and the conditions of contract, with the practices of the construction industry and the laws relating to construction and in particular the S.O. must possess a very high standard of professionalism (Wang, 1987, p74). Wang (1987, p74) contended that the numerous disputes arising from construction contracts suggest that at present there are shortcomings in this aspect of contract administration.

Abdullah (1989, p3-4) analysed the roles and responsibilities of S.O.s when administering public works contracts in Malaysia. He observed that there are several issues and constraints that could lead to inefficient and ineffective contract administration, such as:

1. Failure of some S.O.s to execute their functions effectively and in the most efficient manner;
2. S.O.s that do not posses the requisite qualifications and experience to manage construction works;
3. S.O.s that possess limited power under the contract to manage construction works;
4. Poor and ineffective system of communication within project structure;
5. Incomplete tender and contract documents;
6. Interference from parties not forming part of the contract;
7. Delay in disbursement of project funding; and
8. Incompetent and inexperienced contractors.

Consequently, Abdullah (1989, p7) argued that the general attitude of blaming contractors whenever time overrun occurs must change because time overrun could also be due to the Architect or Engineer or S.O.'s failure to execute his/her functions effectively and in the most efficient manner.

One issue that Abdullah (1989, p8) viewed to be most critical in the administration of public works contract is the system of appointing S.O. based on public post but not based on expertise and experience. For instance, in the *JKR* the *Ketua Pengarah Kerja Raya* (1992, p193-194) stipulates that an S.O. shall be appointed from either the Director General of Public Works or the State Director of Public Works or the District Head of Public Works or Head of *JKR*'s Special Unit, depending on value and location of a project. The officer's current work load, technical and management capabilities and experience in managing construction works are not criteria to be taken into consideration although there are provisions in the circular for the S.O. to appoint other(s) to be his/her representative for the day to day running of the project.

According to Wang (1987, p74) and the *Ketua Pengarah Kerja Raya* (1992, p193-198) the Architect or Engineer or S.O. is given a large measure of discretionary power. Powers vested upon an S.O. in managing a contract include approval of materials and workmanship, certifying payments, instruction for variation works, granting extension of time, determination of the employment of the contractor, imposition of liquidated and ascertained damages, issuing Certificate of Practical Completion and nomination of subcontractors and/or suppliers.

A contractor is required to prepare a programme of works showing the activities to be performed and their duration *(Ketua Pengarah Kerja Raya*, 1992, p199-200; Tan, 1996, p176). The Architect or Engineer or S.O. uses the contractor's programme of works in monitoring progress of the works. Other management tools used in monitoring progress of work include: (1) site meetings, usually on a monthly basis, (2) Gantt charts, showing achieved progress as against scheduled progress, and (3) expenditure graph or the S-Curve, showing cumulative project costs against time. These management tools facilitate the Architect or Engineer or S.O. in identifying problems arising from the execution of works and the task of resolving them.

According to Mohd Ali (1986, p56) under the design and build or turnkey system, the contractor is responsible for managing the works including providing all necessary supervision by qualified professionals for the proper fulfilment of the contract. Mohd Ali (1986, p56) identified 2 problems in management of construction under the design and build or turnkey system:

1. Contractors are reluctant to appoint expert consultants, instead they attempt to rely too much on their in-house teams. This approach would enable them to maximise their profits through saving in consultancy fees; and

2. Clients, in trying to ensure that their interest in the projects are secured, tend to appoint their own site representatives. The functions and duties of these site representatives may often conflict with the interest of the design and build contractor, making the concept of one-point responsibility meaningless.

Under the management contracting procurement system, a management contractor manages the construction of the project for the client for a fee (Hashim, 1996, p194; Sharif, 1996, p267). The roles of the management contractor include ensuring that the works contractors adhere to the requirements of the designs and specifications prepared by the designers. According to Sharif (1996, p361) the lack of qualified and experienced managers have restricted the use of management oriented procurement systems in Malaysia.

5.6.2 Construction production

Construction production has been defined by Sharif (1996, p32) as:

> "The physical construction of all or part of the structure for the initiator /promoter, in accordance with the detailed designs."

Newcombe, Langford and Fellows (1990, p8) suggested that construction production is the dominant process of converting construction inputs into outputs performed by contracting firms. The contractors (Sharif, 1996, p74 also use the term constructors) have the task of converting the inputs: human, physical and financial, into the process.

In the Malaysian construction sector, there are two main types of contractors: (1) main contractors and (2) sub-contractors.

5.6.2.1 Main contractors

Main contractors normally specialise in either building works or civil engineering works or both. A main contractor is selected through a tendering process and enters into a contract with the client for the execution and completion of the work. The main contractor may enter into further contracts with sub-contractors and/or suppliers. In the case of nominated sub-contractors and nominated suppliers, the main contractor is responsible for their due performances under the main contract.

5.6.2.2 Sub-contractors

There are three main types of sub-contractors:

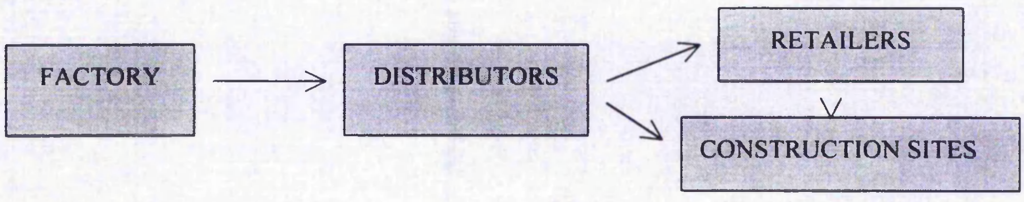
1. Nominated sub-contractors - they are normally specialists contractors nominated by the client but enter into a contract with the main contractor;
2. Domestic sub-contractors - they are the main contractor's own sub-contractors. It is common for the main contractor to employ several sub-contractors to execute different parts of the works; and
3. Labour only sub-contractors - they are individuals or firms employed by the main contractor to supply workers for the work.

5.6.3 Inputs into construction production

Contractors and sub-contractors require sufficient and timely supply of various inputs, most dominant amongst them being construction materials, plant and equipment, manpower, finance, etc. They procure the inputs and organise them together in appropriate ways in the construction production process.

Almost all of construction inputs are procured from other sectors of the Malaysian economy. Chart 5.5 shows a typical, albeit over simplified, processes of procuring construction material in Malaysia. From the chart, the different economic sectors involved in the process of procuring construction materials may be identified. They include the manufacturing sector where construction materials are produced, the distributing and retailing sectors, the transport sector for delivering the construction materials from their original place of production to the final destination, i.e., the construction sites, and the financial services sector in which buying and selling transactions and credit arrangement take place.

CHART 5.5 - Typical Process of Procuring Construction Material



Source: Cement & Concrete Association of Malaysia (1997).

5.6.3.1 Construction materials

Wang (1987, p76) and Abdul-Rahman and Alidrisyi (1994, p415) estimated that construction materials constitute more than 50 per cent of the cost of most construction works. They stressed the importance of sufficient and timely supply of construction materials and their efficient use and management. In addition, Abdul-Rahman and Alidrisyi (1994, p415) indicated that efficient use and management of construction materials have a significant impact on a contractor's profitability and performance of a construction contract.

The DTI UK (1990, p8-9; 1995, p16) indicated and the Ministry of Finance Malaysia (1995, p93; 1996, p80-81; 1997, p77-78) reported that most construction materials are manufactured locally. For instance, the DTI UK (1990, p8) estimated that 95 per cent of building materials needed for the Malaysian construction industry are produced locally. However, higher quality materials such as fittings, hardware items and sanitary ware are often imported (DTI UK, 1990, p9; 1995, p16).

The construction boom in Malaysian in recent years had inevitably strained the supply capacities of certain construction materials, in particular cement, and increased the prices of others (Ministry of Finance, 1995, p93; MBA, 1995; HDAM, 1995; Federation of Malaysian Manufacturers Concrete Products Industry Group, 1996). To ease the seasonal shortages of construction materials, contractors resort to importing them from abroad. For instance, about 300,000 metric tonnes of cement was imported in 1995 to ease the then cement shortages (Ministry of Finance, 1995, p93) The CIDB estimated that in 1996 2,539,274 metric tonnes of cement was imported into Malaysia. Table 5.6 shows the cement production and consumption in Malaysia between 1995-97.

Table 5.6 Cement Production and Consumption in Malaysia, 1995-97

Year	Production (metric tonnes)	Consumption (metric tonnes)
1995	11.09 millions	11.29 millions
1996	12.71 millions	15.19 millions
1997 (estimate)	15.50 millions	17.80 millions

Source: Figures obtained from Cement and Concrete Association of Malaysia.

In order to protect both the clients and contractors against variations in the basic prices of construction materials, most standard forms of contract in Malaysia provide variation of prices clause. For instance, the Form PWD 203 Standard Form of Contract used in public works contracts provides a special provision for variation in prices of materials. Adjustments, either upwards or downwards shall be made monthly and included in the interim certificates of payments and finally to the Contract Sum if there shall be any variation in the Cost Indices. The Cost Indices, compiled monthly by the Department of Statistics, are deemed to reflect any changes in the prices of selected materials. The materials that come under this special provision are listed in Table 5.7.

Table 5.7 – Key Construction Materials

1. Cement: All cement for use in concrete, mortar, paving and plastering
2. Steel: Mild and high tensile steel bars and fabric reinforcement
3. Aggregates: All coarse aggregates for use in concrete
4. Sand: All sand and fine aggregates for use in concrete, mortar paving and plastering
5. Bricks: All bricks including concrete blocks for use in brickwork and blockworks
6. Timber: All timber and plywood for use in joinery and carpentry works including those for formwork
7. Roofing materials: All roofing materials
8. Ceiling materials: All ceiling sheet materials
9. Steel and metal section: All non-structural steel and metal sections
10. Plumbing materials: All plumbing materials for water and sanitary installation
11. Floor and wall tiles: All floor and wall tiling materials
12. Sanitary fittings: All sanitary fittings and appliances
13. Ironmongery: All iromongery items
14. Glass: All glass for glazing works
15. Paint: All painting materials
16. Automotive gas oil (diesoline)
17. Fuel oil (light and medium)
18. Bitumen

Source: *Ketua Pengarah Kerja Raya* (1992, p62-75).

The MBA (1995), the Cement and Concrete Association of Malaysia (1995, p5) and the HDAM (1995) argued that transportation costs are another factor that affects construction works. Since there is always a distance between sources of construction materials and construction sites, an effective and efficient transport system is vital. These institutions observed that in recent years there has been a constant increase in transportation cost that lead to increases in prices of construction materials and concurred that the increase in transportation costs is linked to statutory controls affecting the transportation sector. For instance, restriction on heavy lorries could decrease the number of trips they can make. In order to compensate the likely loss in revenue, the lorry operators are compelled to increase their charges, which in the end, would be passed on to the clients through increased in prices of construction materials.

The concept of material management refers to a planned procedure that includes the purchasing, delivery, handling and minimisation of waste with the aim of ensuring the requirements are met (Illingworth and Thain, 1988, cited by Abdul-Rahman and Alidrisyi, 1994, p413). Abdul-Rahman and Alidrisyi (1994, p415) indicated that efficient and effective material management practices boost the profitability of contractors and performance of a construction contract.

In the context of material wastage during construction production, a study by Abdullah (1985, cited by Abdul-Rahman and Alidrisyi, 1994, p414) of the issue in Malaysia suggested that material wastage was usually due to one or a combination of the following factors:

1. Poor workmanship;
2. Setting out error;
3. Orders not meeting specifications;
4. Excessive use of material, especially concrete;
5. Materials not meeting requirements;
6. Breakage in handling materials;
7. Improper storage methods; and
8. Misdemeanour.

To overcome the problems, Abdullah suggested the following options:

1. Visual inspection to reveal instances of damages and deterioration of materials;
2. Better documentation in the issue and reconciliation of orders, receipts, issues and uses, and stocks; and
3. Measurement of work to quantify the amount of material used.

Abdul-Rahman and Alidrisyi (1994, p416-421) studied the material management practices in Malaysia. The respondents to the study were 152 contracting firms of various sizes. The study's findings included that:

1. About three-quarter of the respondent contractors prepare and monitor material schedules. The most common form of material schedule used is the bar chart;
2. About half of the respondent contractors experienced material shortage "sometimes'. The single largest contributing cause for a shortage of construction material was the failure of the supplier to supply the materials on time due to poor communication between the contractors and the material suppliers;
3. About 60 per cent of the respondent contractors use physical forms of security measures to protect materials on construction sites. The most common approach is employing security guards on site; and
4. In general, respondent contractors do not adopt systematic methods to record and control materials during construction production

To improve material management practices in Malaysia, Abdul-Rahman and Alidrisyi (1994, p421) suggested that contractors should:

1. Prepare, monitor and update material schedules on all projects;
2. Record the usage and inventory of materials during construction;
3. Perform material variance analysis; and
4. Establish a better working relation with material vendors to improve planning and co-ordinating of material orders and transportation and delivery of materials.

5.6.3.2 Manpower

According to Wang (1987, p10) the availability of sufficient manpower in quality and quantity to the contractors and sub-contractors is among the factors that determine the capacity and productivity of a construction industry. Wang (1987, p10-11) divides manpower in the construction production process in Malaysia into five categories: (1) unskilled labour, (2) semi-skilled labour, (3) skilled labour, (4) technicians and (5) technologists (Wang, 1987, p10-11).

1. Unskilled workers - are those who do not possess skills in any construction trades. They perform basic tasks such as carrying, loading and unloading materials, clearing debris, and other general tasks as directed on the site.

2. Semi-skilled workers - are those who possess skill of one or more construction trades but their levels of skill have not reached those of skilled labour. They assist skilled labour and may perform some skilled work independently.

3. Skilled labour or craftmen - are those who possess skill of one or more construction trades.

4. Technician - are those who holds technical diploma or certificate qualifications from local universities or training institutions. They assist the contractor's engineers, quantity surveyors, etc., and work as technical assistants, works-supervisors, foremen-of-works, etc.

5. Technologists - are those who holds technical degree qualification from local or foreign universities and have the experience required for membership of professional institutions. They are the contractors' construction managers, project or site engineers, project or site quantity surveyors, purchasers, etc.

Under the CIDB Act 520 of 1994, Section 32, all skilled workers and construction site supervisors shall be accredited and certified by the CIDB. Section 33 of the Act requires the CIDB to maintain a register containing names, addresses, trades skills and other particulars of the accredited skilled workers and construction site supervisors. The Third Schedule of Act 520 listed fifteen categories of skilled construction workers and construction site supervisors currently accredited and certified by the CIDB. The types of skills are listed in Table 5.8.

The CIDB accreditation and certification of skilled construction workers and construction site supervisors are not mandatory. Its objectives include: (1) to produce and sustain indigenous human resources for the construction industry with high quality workmanship, and (2) to compile data on construction workers and so as to enable the CIDB to determine what skills the industry requires most. The CIDB accreditation and certification programme, launched in 1996, encompass skills training and development, safety measures and competency grading. Table 5.9 shows the numbers of skilled construction workers and construction site supervisors that have applied for accreditation and certification and that have received accreditation and certification as of 31 August 1997.

Table 5.8 – Skilled Labour (by Trade)

1. Concretor
2. Bar-bender
3. Carpenter
4. Bricklayer/mason
5. Plasterer/pavior
6. Tiller
7. Painter
8. Joiner
9. Metalworker
10. Drain-layer
11. Glazier
12. Welder
13. Construction plant operator
14. Plumber
15. Licensed electrician

Source: CIDB Act 520 (Third Schedule, p30).

Table 5.9 - Numbers of Skilled Construction Workers and Construction Site Supervisors Registered with the CIDB as of 31 August 1997

Number	Skilled Workers	Site Supervisors	Total
Applications received	43,740	27,098	70,838
Accredited and certified	41,209	26,971	68,180

Source: CIDB (1997).

The fact that the Malaysian economy is virtually in full employment and the construction boom in Malaysian in recent years had inevitably strained the supply capacity of indigenous construction workers. The construction industry is heavily dependent on foreign workers, predominantly from the neighbouring countries of Indonesia, Thailand, the Philippines, Pakistan, etc. Table 5.10 provides the breakdown of construction production workers by skill and citizenship for 1995. It shows that from the total of 478,875 construction production workers employed by the construction industry, an overwhelming majority of 66.66 per cent were foreign workers. The foreign workers were the overwhelming majority in the categories of skilled and semi-skilled and unskilled workers, their proportion in these categories were 68 per cent and 96 per cent, respectively. According to Lee (1996) the overwhelming majority of foreign workers in Malaysia is partly due to the reluctance of Malaysians to take up menial low-paying jobs.

Table 5.10 - Construction Production Workers By Skill and Citizenship in 1995

Category	Malaysian	Foreign	Total	% of Foreign workers
Supervisors	84,375	11,400	95,775	11.90
Skilled and semi-skilled	68,144	147,350	215,494	68.38
Unskilled	7,106	160,500	167,606	95.76
Total	159,625	319,250	478,875	66.67

Source: Abdul Rashid (1995, p10).

Sharif (1996, p418) argued that the shortage of indigenous construction workers arises from inadequate formal training schemes. He claimed that the lack of formal training schemes to train construction workers acts as a constraint on the development and sustaining of construction producers' competencies within the Malaysian construction industry. Sharif (1996, p360) also argued that the lack of skilled labour acts as a major constraint on all building procurement systems. However, it is not known as to the extent of construction labour shortage and the types of skill that are in constraint because most literature addressed the issue in a relatively broad way and does not provide empirical data.

Referring to Tables 5.9 and 5.10, they show that there is a large difference between the numbers of skilled construction workers and construction site supervisors that have applied for and that have been accredited and certified by the CIDB (Table 5.8) and the numbers of skilled construction workers and construction site supervisors employed by the Malaysian construction industry (Table 5.9). The big difference between these figures suggests that response towards the CIDB accreditation and certification scheme has been poor. Abdullah (in The Star, 29 October 1996) indicated that the poor response could be due to lack of awareness on the importance of being registered. In addition, Abdullah claimed that foreign workers are not interested in registering with the CIDB. Abdullah states that the CIDB would organise a campaign to create awareness among construction worker of the importance of registering with the CIDB. The Minister of Works (in The Star, 29 October 1996) pointed out the importance of registration with the CIDB include upgrading the image of construction workers whose jobs had always been associated with dirt, danger and without prospects.

Abdullah (1985, cited by Abdul Rahman, Alidrisyi and Harun, 1990, p128) studied the performance of construction workers in Malaysia and suggested the factors affecting their performance. They include:

1. The human capacity to work - these include level of workers maximum age, nutrition, temperature, humidity, hygiene, sanitation and acclimatisation, etc;
2. The competence of site management - if workers observe that site management is poor, unfair or corrupt, then the morale, motivation and consequently productivity will be reduced; and
3. Motivation of workers - workers are motivated in their work by a variety of causes, including fear, discipline and job satisfaction and financial incentives.

Abdullah (1985, in Abdul Rahman et al., 1990, p128-129) suggested the measures to improve labour productivity to include:

1. Peak capacity for physical work is generally reached between the ages of 20 to 35. For older person, especially in skilled jobs, experience and efficiency compensate for lower work capacity;
2. Establish project canteen to provide balanced meals and talks on nutrition;
3. Start work at first light and avoid working during the heat of the day;
4. Enforce strict hygiene, arrange talks on hygiene and sanitation; and

5. Unpractised workers would initially have a lower productivity, which would improve as they become acclimatised to the work and are instructed in the best methods of working

Abdul Rahman et al., (1990, p134) argued that an effective labour management system in construction is vital to ensure labour is used and managed efficiently because the lack of proper labour management system could influence a contractor's profit margin. In a study on the issue involving contractors as the respondents, they suggested that labour management in Malaysia is relatively inefficient and improvement in the following areas may boost its efficiency:

1. The practice of starting work before final design drawings are available may only be performed once the contractor obtain guarantee from the owner that the final design will not vary from the design drawing already in hand;
2. Making use of labour use schedule in the distribution of labour, in wages, etc;
3. Greater usage of monetary and non-monetary reward systems to boost workers morale;
4. Overtime work during construction;
5. Method of measuring labour productivity;
6. Method of distribution of workers; and
7. Greater use of computers to monitor project's requirement, especially in managing labour activities and costs.

5.6.3.3 Plant and equipment

According to YTL Corporation (1995) the use of construction plant in Malaysia began as early as the 1950's with the use of tower cranes in the construction of high rise buildings in and around Kuala Lumpur. Wang (1987, p76-77) observed that the use of sophisticated and labour saving construction plant such as tower cranes, construction lifts, concrete mixers, etc. has been popular since the 1980's in Malaysia, particularly in the big cities, due to the rise in demand for high rise and complex buildings. The use of heavy plant such as bulldozers, pavers, graders and tractors, in civil engineering works is a common feature in Malaysia. Lam (1990, p37) observed that modern construction plant was in greater use in the big cities than in the less developed parts of Malaysia. Table 5.11 shows the types of plant and equipment commonly used in the construction industry of Malaysia.

Table 5.11 – Basic Mechanical Plant (by Type)
1. Mobile crane
2. Tipping vehicle
3. Dumper
4. Backhoe
5. Air compressor
6. Pneumatic concrete breaker including tools and hoses
7. Electric, steam, petrol, diesel or other pump of any type
8. Concrete mixer
9. Electric welding machine
10. Road roller/grader
11. Bulldozer
12. Excavator with face showel
13. Generator
14. Piling plant
15. Spare parts
Source: *JKR's* Contract Documents.

One common attitude among contractors in Malaysia is that they are relatively reluctant to invest in fixed capital including in plant and equipment. According to Wang (1987, p77) the reasons for the attitude may include:

1. Construction in Malaysia is considered a high-risk business. Historical records suggest that construction booms were accompanied by price increases in the major construction inputs: construction materials, plant and equipment, wages of workers, etc. Contractors with contracts that had no price fluctuation provisions or those only applicable to limited items were burdened with price increases and suffered losses. Others suffered losses due to lack of expertise and experience or poor management. Some of those who made profits, instead of investing in

equity capital, preferred to diversify into other businesses they perceived to be more stable;

2. The lack of continuity of work means that contractors that have invested large sums of money in plant and equipment in a project may have to sell them since prospects of utilising the plant and equipment on other similar projects in the near future are relatively slim. Getting on to the next project is dependent upon the firms' success in winning future tenders; and

3. Most contracting firms, because of their humble origins including having developed from the traditional system of family business, do not have a large sum of equity in paid-up capital.

Consequently, many contractors prefer to employ workmen to perform construction tasks and hire the basic plant and equipment needed for the job. The apparent shortages in indigenous labour do not deter them because of the availability of relatively cheaper foreign labour from the neighbouring countries.

Salih (1992, p4) studied the capital intensity of the construction industry and the manufacturing industry in terms of fixed assets per unit of value added produced between 1985 and 1989. The capital intensity of the construction industry was 0.538 and 0.477 in 1987 and 1989, respectively. In contrast, the capital intensity of the manufacturing industry was 1.727 and 1.333 in 1987 and 1989, respectively. He suggested that the capital intensity of the construction industry was far smaller than the manufacturing industry.

According to the Deputy Prime Minister and Finance Minister, Anwar Ibrahim (1996) Malaysia is dependent on the import of new plant and equipment for the construction industry in spite of the existence of a large number of abandoned and unused plant and equipment that can be reconditioned and used subsequently. In order to promote indigenous plant and equipment industry, the government encouraged the activity of reconditioning unused and abandoned plant and equipment and provided incentives under the Promotion of Investment Act 1986. Companies that undertake activities listed under the Act are eligible for incentives including tax allowances.

In recent years there have been calls from different quarters including from the CIDB for contractors to up grade their financial, technical and management capabilities including investing in plant and equipment. For instance, the CIDB urged contractors to 'go hi-tech' in order for them to stay competitive, to increase productivity and to enable them to provide the level of services befitting an increasingly industrialised country (Abdullah, in The Star, 22 June 1996). According to Fernandez (1996) Malaysia has had its fair share of industrial progress but has been unable to make too much progress because of lack of skilled labour.

The pressure on contractors to shift from labour intensive to capital intensive construction operations intensified since the government, in the light of continuous labour shortages and in particular in its quest towards achieving the objectives of Vision 2020, has in 1995, shifted its policy on employment, i.e., from one of employment generation to capital and technology intensive processes in order to achieve a productivity driven economy (Mahathir Mohamad, 1996; Anwar Ibrahim, 1996). Among the strategies introduced by the government to promote capital and technology intensive processes include that labour intensive industries would no longer be encouraged. Consequently, more stringent controls have been imposed on the employment of foreign workers including leave to stay and employed in approved sectors only for a maximum period of 3 years and increasing the levy on foreign workers payable by employers. There have also been speculations that the government are only considering to import workers with proven technical skills (Fernandez, 1996). The government contends that through greater capital intensity of production there would be savings on the use of labour and subsequently reducing the reliance on foreign labour (The Star, 7 May 1996).

5.6.3.4 Finance

The practice in Malaysia is that contractors are expected to finance the early stages of the construction production processes. For instance, in public works contracts, the first interim certificate for payment of works done will only be made after the total value of the works, including delivery to or adjacent to the works of any unfixed materials or goods for use in the works reached the minimum sum, currently stated as 10 per cent of the builder's work or RM200,000.00, whichever is the lower

(Clause 47 (a), Form *JKR* 203A. Rev.10/83). Further interim certificates for payment of works done will be made on a monthly basis, again depending upon the minimum value of works reaching the minimum sum, currently stated as 25 percent of the monthly average value of work to be executed or half of the minimum value for the first Interim Certificate, whichever is the lower (Clause 47 (a) Form *JKR* 203A Rev.10/83). These procedures mean that contractors require working capital throughout the duration of the project to finance mobilisation costs, costs of labour, materials, plant, etc., required in the works. Turin (1973, pE20) in his studies of the procurement processes in developing countries estimated that a working capital of between 2 per cent and 10 per cent of annual turnover is required. The *Ketua Pengarah Kerja Raya* (*Cawangan Kontrak dan Ukur Bahan*, 1993, p4) estimates the minimum working capital required is 3 per cent of builder's work based on the *JKR*'s estimate.

Wang (1987, p77) claimed that most of the contracting firms in Malaysia lack a large sum of equity in paid-up capital. They usually belong to the traditional system of family business or sole proprietorship or partnership basis. These firms therefore, could not raise the required working capital as their equity in paid-up capital is small. They might have to rely on other sources to finance their projects. Wang identified the other sources of funds for contractors to include:

1. Loan from financial institutions such as banks and finance companies;
2. Loan from friends or other private sources;
3. Deferred payment and or credit extended by suppliers of building materials and or construction plants; and
4. Interim payments from employers.

For the larger contracting firms (companies with limited liability under the Companies Act 1965 or those companies that are listed on the Kuala Lumpur Stock Exchange) equity capital would be an alternative source.

From the above sources of funds, Wang (1987, p77) suggested that credit facilities offered by suppliers " for a fixed period is a definite and reliable form of finance." However, Wang (1987, p77) contended that relying on interim payments from employers for construction financing is impractical as:

> "... too much dependence on progress payments is relatively unsafe as many factors can interfere with its smooth operation such as inclemency of weather, delay on the job caused by reasons beyond the contractors' control or due to the inefficiency and inadequacy of the contractors' own organisation to produce the anticipated work."

According to Quek (1989, p53) there were cases where employers could not raise the required funds to bridge projects. In such cases, financially capable contractors may want to use their own funds to provide bridging finance. Bridging finance refers to the finance required to fill the gap between the realisation of adequate funds from partial sales of the project and the initial expenditure for construction when sales have either yet to be launched or are insufficient (Tan, 1996, p202). However, Quek (1989) suggested that funds provided by contractors are likely to be more expensive and that the number of contractors capable of providing bridging finance would likely be small.

In public works contracts, the government provides advance payment, currently a maximum of 15 per cent of builder's works or RM 5 millions, whichever is the lower; to main contractors. The advance payment is secured by a irrevocable bank or insurance guarantee in equal amount. The amount advanced is payable in instalments by deduction from the Interim Certificates (*Arahan Perbendaharaan* No 12 of 1985; *Arahan Ketua Pengarah Kerja Raya* No 10 of 1981).

Quek (1989, p50) indicated that the complex process of obtaining funds from financial institutions as experienced by the project initiators/promoters, discussed in Section 5.2.2, is also experienced by the contractors. This is evidenced from the comment by the Minister of Works Malaysia that banks have not been doing enough to help contractors (The Malay Mail, 11 August 1988, in Quek, 1989, p50).

5.6.4 Summary on the process of construction

1. The process of construction may be divided into 2 elements: (1) the management of construction, and (2) construction production. General contractors often perform the management of the construction process and either the architects or

engineers or the S.O usually performs construction supervision. The process of construction production is almost always performed by the main contractors;

2. Most construction materials in Malaysia are locally produced. The boom times in recent years had strained the supply capacities of cement and other basic construction materials;

3. The process of construction production in Malaysia is labour intensive. Like the supply of some construction materials, the boom times had also strained the supply capacities of indigenous labour. The CIDB has implemented an accreditation and certification scheme for skilled construction workers and construction site supervisors, the objective of which include to upgrade the image and quality of construction workers; and

4. Most contracting firms in Malaysia do not have sufficient funds in paid-up capital. Contractors therefore, may have to rely on other sources to finance the process of construction. In public contracts, the government provides advance payment to assist contractors finance the early stages of the process.

5.7 Risk allocation

Risk in general and as a subject associated with the processes of construction procurement in Malaysia is an area that requires detailed study on its own right, such a study is not within the scope of this thesis. However, it is acknowledged that risk is a factor of consideration in all construction projects irrespective of the project type, location, procurement system used, the project team, etc. although Morris (1992, p1) indicated that civil engineering projects are far riskier than building projects.

Sharif (1996, p72) defines risk allocation as:

> "The susceptibility of each of the generic functions (in the procurement process) to varying degrees of risk. The degree of risk is dependent upon the type of procurement system implemented and the individual functional roles."

5.7.1 Types and sources of risks

Morledge and Sharif (1996, p25) refer to risk in the context of construction procurement as:

> "... uncertain future events, which may have significant effects, e.g. extra cost, delay or damage to the performance of the finished project."

They claimed the uncertainties of time, cost and performance as the three main risks that are present in every project and listed those that may have a major effect on construction projects, i.e.,

1. A project which will not function in accordance with the client's needs;
2. A project which is of inadequate quality;
3. A project which is completed later than required deadlines; and
4. A project which costs more than the client's budget or ability to pay

Sharif (1996, p37), after analysing secondary data relating to building procurement, identified five types of risks that he considered to be primary and applicable to all procurement systems. They are risks associated with: (1) construction time, (2) product price, (3) design apportionment liability, (4) project finance, and (5) effectiveness of the building in operation and quality of workmanship. Table 5.12 provides the definitions of each of these primary risks.

According to Raftery (1994, p15-17) risks associated with the processes of construction procurement may be divided into two categories: (1) project based risks, i.e., risks that are directly related to the project such as project size, complexity, novelty, speed of design and construction and project site and location, and (2) external risks, i.e., risks that are outside the project's boundary and that are not within the authority of the project such as inflation, market conditions, price escalations on construction inputs, political instability and weather.

Table 5.12 - Definition of Primary Risks in Construction Procurement

Risks	Definition
Construction time	Risk to the party who gives certainty of the completion date for the project. Timing of the project is considered in terms of the project being completed before completion date, or on the stipulated completion date, or after the completion date.
Product price	Risks in terms of total project price and price escalations. The use and uncertainty of cost estimates is significant in the allocation of this risk
Design apportionment liability	The responsibility for design and design standards in the project. The issues include the reliability and durability of the designs
Project Finance	The risk involved in providing the funding for the proposed project and the potentiality for loss
Effectiveness of project in operation	Risks associated with the completed project not fulfilling the requirements stated in the brief. These risks are considered in terms of whether the project meets the stated requirements, can perform its proposed function, and is suitable for its intended purpose
Quality of Product	Risk of the project being of unsuitable quality. Quality is a very subjective issue and is a risk to the party who is responsible for the quality of workmanship and materials in the construction process

Source: Sharif (1996, p37).

In Malaysia, issues on risks or problems associated with construction procurement have been discussed by different researcher and writers including Wang (1987, 77), Quek (1989, p50), Abdul Rahman, Alidrisyi and Harun (1990, p12), Rahok (1992) Buckley (1992) and Hashim (1996, p193). From analysing the literature, the common risks associated with construction projects in Malaysia have been identified. These include risks: (1) in cost and/or time overrun, (2) of abandoned projects, (3) of the inability of clients to sell the completed units in a project, (4) of labour and construction materials problems at work sites, and (5) of poor works' quality. The Highland Tower incident, where a multi-storey apartment block collapsed in late 1993 with major casualties, highlighted the consequence of poor works' quality in Malaysia.

Omar (1989, p7-10) studied the different types of risks associated with construction projects implemented under the BOT system in Malaysia. According to him, the risks affecting the processes of construction procurement in BOT projects include (1) project commercial risks, (2) country commercial risks, and (3) political risks.

Firstly, project commercial risks are risks that are directly related to the project. Under this general category, there are three types of risk, i.e., development risk, realisation risk and operating risk. Each exists at a different stage of the procurement process. Development risks are risks associated with the process of tendering, i.e., risk of losing the tender to another competitor or in the case of a BOT project including risk of failure to sign the concession contract resulting in the loss of development expenditure. Realisation risks are risks related to the physical construction process such as failure to complete the project as scheduled or failure to complete the project in accordance with the terms of the contract, force majeure, etc. Operating risks refer to risks arising from variations in revenue, costs of operation, material supply, etc. Risks associated to costs in a contract are affected by the technical and managerial inputs whereas supply risks depend on the availability of an adequate and timely supply of, and price of, materials.

Secondly, country commercial risks refer to risks associated with the convertibility of revenue from the project into hard currencies, risks of foreign exchange and interest rate fluctuations, and inflation.

Political risks are risks associated to the internal and external political stability, the government's policies relating to the construction industry, to the socio-political aspects of the economy, changes in regulations, integrity of government, etc.

The main sources of risks that are considered to be relevant to the processes of construction procurement in Malaysia are as follows (modified from Sharif, 1996, p35):

1. Client/government/regulatory agencies: bureaucratic delays, changes in regulations;

2. Funding/fiscal: changes in government funding policy, liason between several funders;
3. Project organisation: authority of project manager, involvement of outside bodies;
4. Design: adequacy to meet need, realism of design;
5. Permanent plant supply: degree of novelty, damage and or loss during transport;
6. Construction contractors: experience, financial stability;
7. Construction materials: availability of an adequate and timely supply of materials, excessive wastage, reliability of quality;
8. Construction labour: availability of an adequate and timely supply of labour, industrial relations, multiracial labour force;
9. Construction plant: availability of an adequate and timely supply of plant, resale value, spares available, availability of skilled operators; and
10. Logistics: remoteness, access to site.

5.7.2 Allocation of risk

Risk therefore cannot be eliminated in construction projects but may be allocated among the parties involved with the procurement process. The allocation of risk should take into consideration the ability of each of the parties to manage that risk and the incentives available for absorbing the risk. Omar (1989, p8) indicated that success of a project is to a large extent dependent upon risks associated with the project being allocated efficiently among the parties involved.

The allocation of risk among the parties in the process of construction procurement may be done in different ways (see for example in Chapman, Ward and McDonald, 1989, p10-11; Omar, 1989, p8-10; Flanagan and Norman, 1993, p61 and Morledge and Sharif, 1996, p26). From analysing the literature, the common methods of allocation of risk have been identified. These include:

1. Risks could be transferred in whole by the client to another party or parties in the procurement process;

2. Risks could be transferred in part by the client to another party or parties in the procurement process and the client retains the rest;

3. Risks could be reduced. Risks could be reduced by the client by adopting several measures such as preparing a thorough and adequate project feasibility study, project brief, site and soil investigations, allowing for adequate design and cost estimates, selecting and employing suitably qualified and experience designers, constructors, etc., and

4. Risks could be contained such as through performance bonds, completion guarantees, warranties from manufacturers of equipment and materials, operating guarantees. For instance, in Malaysia and in most private works contracts but certainly in all public works contracts, a contractor is required to provide a irrevocable performance bond amounting to 5 per cent of the contract sum. The bond may be in the form of cash, a bank guarantee or an insurance guarantee. The performance bond provides guarantee that the contractor will honour his obligations on the construction and completion of the project, all in accordance with the contract. There is no retention sum in public works contracts in Malaysia.

Sharif (1996, p360) studied the availability of the various generic and specific competencies required to execute the local procurement systems in Malaysia. In relation to competency in risk allocation he suggests that the competency available was not sufficient. He argued that standard forms of contracts currently used in Malaysia were imported from the UK with little modifications to suit local conditions and contracting environments.

The allocation of risk in a construction contract is a function of the system of procurement as the latter determines the relationship of parties involved in the procurement process. In some procurement systems there may be a direct contractual relationship between the contractor, sub-contractors and the consultants on the one hand and the client on the other hand, while in others there may not. In addition, in some procurement systems there may be no direct contractual relationship between the contractor, sub-contractors and consultants on the one hand and the clients on the other hand but there may be a direct contractual relationship between themselves.

The contractual relationship indicates the types of risk for which each party will be responsible and the reward for doing so in the processes of construction procurement.

5.7.3 Dominant procurement systems in Malaysia

Hashim (1996, p192) claimed that there is a common belief among many clients in Malaysia, in particular those new to the construction industry, that it is possible to build a top quality facility at breakneck speed for a knock-down price. She argued that clients should be made aware of the importance of balancing the three key priorities of time, cost and quality in the procurement process. The desired way in which the priorities could be balanced is determined by the procurement system chosen by the client.

In Malaysia there are several types of procurement systems in use. Sharif (1996, p263-279) and Hashim (1996, p193-194) identified the dominant procurement systems to be:

1. Traditional Lump Sum System
2. Design and Build or Turnkey System
3. Management Contracting

A detailed study of the above procurement systems, in the context of the Malaysian procurement process, is not within the scope of this research. However, a brief review on the characteristics of each procurement system including key advantages and disadvantages and ways in which risks are being allocated, follows.

5.7.3.1 Traditional lump sum system

The traditional lump sum system seems to be most frequently used procurement system in Malaysia. The system is sequential in nature and starts with the client appointing design consultants to prepare complete design and tender documents before tender invitation is made. The tender could either be based on complete sets of drawings and specifications, commonly known as lump sum tender or based on bills of quantities, often referred to as Bills of Quantities or BQ tender. BQ tenders are widely used and they could be either firm BQs or approximate BQs. In public works contracts, BQ tenders are mandatory for projects estimated to cost more than RM500, 000.00 (*Arahan Ketua Pengarah Kerja Raya* No 13 of 1987).

The successful contractor enters into a direct contract with the client to build the facility in accordance with the design details. The contractor may enter into several sub-contracts for specialised works with sub-contractors nominated by the client. In addition he may enter into several sub-contracts for the supply of construction materials, components or equipment with suppliers nominated by the client. The main contractor is responsible for the performance of the nominated sub-contractors and/or nominated suppliers and for the entire construction and completion of the work.

The main advantages of the traditional lump sum system include that it allows price to be fixed in advance of construction and the designer has full control of the design process subject only to the design being approved by the client.

The disadvantages of the traditional lump sum system include that being sequential, particularly the inability to overlap the design and construction processes, the system could lead to a much longer development period and that the system appears to encourage adversary between the client and consultants on the one hand and contractor and sub-contractors on the other.

Table 5.13 shows the distribution of risks among the parties involved in the processes of construction procurement under the traditional lump sum system in Malaysia.

5.7.3.2 Design and Build or Turnkey System

The design and build or turnkey system was first introduced in Malaysia in 1983. Mohd Ali (1986, p54) and Yong (1988, p285) indicated that the lengthy and adversarial nature of the traditional lump sum system and the increase in project complexity prompted the use of the design and build or turnkey system in Malaysia. The system's use in Malaysia was pioneered by the public sector and a special unit known as The Turnkey Unit was established in the *JKR* to co-ordinate and manage all turnkey projects for the public sector. Mohd Ali (1986, p54) defined the turnkey system as:

> "Turnkey in its purest form is a single source contract with a fixed price for the design, procurement, construction and commissioning of a facility in line with the owners intention. In this system, there exist only two parties, i.e., the client and the contractor."

Under the turnkey system, consultants may be employed by the client as well as by the turnkey contractor. Consultants employed by the client will be involved in assisting the client in preparing the needs statement and the pre-bid documents (Mohd Ali, 1986, p54). The tenderers, basing on the pre-bid documents will submit complete proposals for the design, construction and commissioning of the project. The successful contractor enters into a direct contract with the client to undertake the design and construction of a project for a lump sum fixed cost fixed time basis. Hashim (1996) claimed that the lump sum price is usually subjected to a penalty/bonus clause for the late/early delivery of the completed project.

Since the system is relatively new in Malaysia and that majority of turnkey contractors do not have their own in-house designers, turnkey contractors employ design consultants to prepare detailed designs and specifications. According to Yong (1988, p285) only contractors with a high level of financial, technical and management capabilities would be able to provide turnkey contracting services in Malaysia.

The main advantages of the design and build or turnkey system include single point responsibility for both the design and construction processes, i.e., the turnkey contractor; price is fixed in advance of construction, overlapping of design and construction processes could result in shorter development process (in contrast to the traditional system) and the turnkey contractor could incorporate the concept of buildability into the design which in turn would facilitate speedier and economical construction production.

The disadvantages of the design and build or turnkey system include the project's costs could be higher than the traditional system (Sharif, 1996, p266), projects often lacks aesthetic values since contractors stressed buildability and price minimisation factors and the system is not very accommodative to changes since any changes to the original needs statement are considered to be substantially expensive in contrast to the traditional system.

Table 5.14 shows the distribution of risks among the parties involved in the processes of construction procurement under the design and build or turnkey system in Malaysia.

5.7.3.4 Management contracting

Mokhtar (1993, in Hashim, 1996, p194) identified that management contracting is increasingly being used in Malaysia. Hashim (1996, p194) states that:

> "In concept management contracting puts the client, the design team and the management contractor into one team with shared and understood objectives of quality, time and cost."

Under management contracting the roles of the management contractor include managing and co-ordinating the project for the client, to appoint design consultants and to administer the design and other consultants. The management contractor has a direct contractual relationship with the client and receives management fees for his services. Works are divided into packages and each package is let out separately on competitive tenders. Each works' contractor enter into a direct contractual relationship with the management contractor.

The advantages of management contracting include that it allows overlapping of design and construction processes, this in turn enables early start on site that may result in shorter overall development period. In addition, the system is adaptive to design changes during the construction production process, promotes buildability, and there is potential savings in costs as the works are being divided into packages and let out separately on competitive tenders.

The disadvantages of the management contracting system include that price is not known in advance of construction until all the works' packages have been let out. In addition, the system is not suitable for those clients who lack experience as management contracting demands a sophisticated management structure to facilitate decision making.

Table 5.15 shows the distribution of risks among the parties involved in the processes of construction procurement under the management contracting system in Malaysia.

Table 5.13 - Distribution of risk under the traditional lump sum procurement system in Malaysia

Risk	Client	Funder	Designer	Contractor
Time				√
Price				√
Schematic design			√	
Detailed design			√	
Specialist design			√	
Project finance		√		
Effectiveness of projects in operation			√	
Quality				√

Source: Sharif (1996, p273).

Table 5.14 - Distribution of risk under the design and build or turnkey procurement system in Malaysia

Risk	Client	Funder	Designer	Contractor
Time				√
Price				√
Schematic design			√	
Detailed design				√
Specialist design				√
Project finance		√		
Effectiveness of projects in operation	√			√
Quality				√

Source: Sharif (1996, p275).

Table 5.15 - Distribution of risk under the management contracting procurement system in Malaysia

Risk	Client	Funder	Designer	Contractors
Time				√
Price				√
Schematic design			√	
Detailed design			√	
Specialist design			√	
Project finance		√		
Effectiveness of projects in operation			√	
Quality				√

Source: Sharif (1996, p278).

5.7.4 Professional indemnity and works insurance

Professional indemnity and works insurance are the two common types of insurance in the construction industry of Malaysia. Firstly, almost all designers and other professionals take out professional indemnity insurance to cover them against risks of professional negligence. According to the Malaysia British Assurance Berhad (1994) a professional may incur legal liability under a contract or in tort. In either case, the legal liability arises as a result of a breach in duty to exercise skill and care. The designers or other professionals involved in the processes of construction procurement owe the duty of care primarily to the client and to other persons they may be acting in collaboration with.

Secondly, contractors often sought contractors' all risks insurance to cover the works against loss and damage by the various factors of risks including fire, lightning, flood, burglary and theft, etc. and damages to the contractors' property and third party liability (Malaysia British Assurance Berhad, 1994). The policy covers the client, main contractor and subcontractors.

According to the DTI, UK (1995, p4) there are weaknesses in Malaysia's insurance sector that could lead to problems in obtaining adequate insurance facilities to cover risks. The problems may include complex and bureaucratic procedures and inability of insurance companies to provide the necessary covers despite the contractors' or consultants' ability to pay the costs of premium charged.

5.7.5 Contract documents

Contracts dictate the obligations, duties and responsibilities of the different parties involved in the processes of construction procurement. They also indicate the risks each party will carry and the rewards for doing so.

Researchers and writers such as Yong (1988, p285) and Sharif (1996, p363) argued that contract documentation in Malaysia is similar to contract documents in the UK. They claimed that the standard forms of contract used in Malaysia such as the PAM Standard Form of Contract for Building Works were imported from the UK with little modifications to suit local conditions and contracting environments. It appears there are some foundations to the above claims for reasons such as Malaysia was once under British rule and influence. It is highly likely that the procurement systems and contract documents used were adopted from the former colonial practice.

However, over the years, various modifications and amendments have been made to the various standard forms of contract in order to accommodate the ever-changing needs of the Malaysian construction industry. For instance, the Form PWD 203 Standard Form of Contract, probably the oldest set of conditions in Malaysia and used predominantly in the public sector, has undergone many revisions, the latest being in 1983. In addition, several addenda and special provisions were added to it to accommodate current needs of the parties to the contract. Special provisions to the Form PWD 203 Standard Form of Contract applicable currently are:

1. Advance Payment: introduced in 1985 to provide advance payment to contractors to help finance the early stages of the construction production processes;

2. Variation of Prices: introduced in 1980 to provide price fluctuation provisions in works contracts; and

3. On-Site Training Programme: introduced in 1982 to provide on-site training programmes for construction workers.

As for the standard forms of contract used in the private sector, the PAM Standard Forms of Contracts for Building Works has been reviewed by a committee comprising representatives from the main professional institutions including the MBA, *Persatuan Kontraktor Melayu Malaysia* or PKMM, IEM, ISM and the PAM. The objectives of the review include to promote fair and equitable contracts to the parties involved, to bring the PAM form in line with the PWD 203 Forms and to keep abreast with the changing circumstances (Master Builders Association, 1989/90, p41; Sharif, 1996, p363).

While it is probably true that the various standard forms of contract currently in use in Malaysia were foreign in origin, the many revisions that they have gone through over the years suggest that they have been 'Malaysianised'. The forms therefore, should be able to meet the conditions and contracting environments specific to the Malaysian construction industry.

In Section 5.5.5, a list of tender documents for a typical public works contract was identified. A full set of these documents obtained from the successful bidder will become the basis of the contract documents.

5.7.6 Summary on risks allocation

1. Risks is a factor of consideration in all construction contracts;
2. The success of a construction project to a large extent depends upon the risks associated with the project being allocated efficiently among the parties involved;
3. The allocation of risks in a construction project is a function of the system of procurement. In Malaysia, the three dominant procurement systems are the traditional lump sum contract, the design and build or turnkey system and construction management; and
4. Although in Malaysia, the standard forms of contract currently in use appears to be foreign in origin, the fact that those forms have been revised over the years suggest that they have been 'Malaysianised' and therefore, should be able to accommodate the specific needs of the Malaysian construction industry.

5.8 Summary

This chapter has attempted to provide a widespread and in-depth knowledge of the processes of construction procurement in Malaysia in the context of the framework that has been established in Chapter Three of this thesis.

Key participants in the processes of construction procurement in Malaysia were identified. They are the initiator/ promoter or clients, architects, engineers, quantity surveyors, and contractors including specialist subcontractors.

In terms of procurement systems used, the dominant procurement systems are the traditional lump sum, design and build or turnkey system and management contracting. However, the traditional procurement system appears to be most dominant, in particular in the public sector.

In conclusion, it could be said that the processes of construction procurement in Malaysia are constrained by a variety of factors. The major factors of constraints include complex and bureaucratic government control, complex processes of obtaining funding for project finance, inadequate expertise and experience among consultants and contractors in the procurement of complex projects that require high level of technology and constraints in resources notably availability of materials and manpower.

Efficient procurement of construction projects is vital for Malaysia in its quest towards meeting the objectives of Vision 2020. However, the study in this chapter suggests that the Malaysian construction procurement processes are facing constraints. Those constraints are likely to affect the effectiveness and efficiency of the procurement process. This chapter illustrates therefore, there is a need to carry out further investigation and to seek current and empirical evidence on the issue concerning constraints within the processes of construction procurement in Malaysia.

The following chapters, Chapter Six and Chapter Seven, respectively, focus on the methodology used and the carrying out of the study to identify any constraints within the processes of construction procurement in Malaysia that may inhibit the level of construction output and report its findings.

CHAPTER 6

RESEARCH METHODOLOGY

6.0 Introduction

This chapter aims to describe the research methodology adopted in carrying out the present research. The main issues to be described include (1) the research problem, (2) the research questions, (3) research aims and scope, (4) the key research concepts, (5) the research methodology, and (6) methodology and research limitations.

6.1 The Research Problem

The construction industry of Malaysia is facing two paradoxes. Firstly, the industry has been enjoying prominent growth as evidenced from the annual rates of growth in construction GDP averaging 12.3 per cent per annum for the period 1988-96. The average annual rate of growth surpasses the average annual rate of growth in the economy as a whole. For the period 1988-96, the economy grew at an impressive rate averaging 8.8 per cent per annum. Secondly, the size of the construction industry (measured in terms of its contribution to GDP) which, at an average of 3.9 per cent of GDP per annum for the period 1988-96, remains relatively small.

According to Wells (1986, p23) and other researchers (see Section 2.7 of Chapter Two of this thesis) for a middle income developing country like Malaysia, the size of the construction industry should not be less than 5.4 per cent of GDP. Researchers including Wells (1986, p23-24) and Ruddock and Lopes (1996, p577) warned that should construction's contribution to GDP falls below the minimum recommended level, inadequate construction output may be acting as a constraint on long term sustainable economic growth and development

In addition to the above paradoxes, construction procurement in Malaysia appears to be plagued with problems particularly shortages of major resources including in manpower and in construction materials, continuous and upward increase in construction prices and bureaucratic inefficiencies. The phenomena of low-level construction output and price increases suggest that demand for construction is exceeding supply or a constraint is developing in the supply side of the construction industry.

It may be argued that additional output in construction, as in any other industries, would normally be realised if there were an increase in demand (normally accompanied by higher price). A question could therefore be asked: is it possible to experience a supply constraint, in terms of a physical limitation on the size of construction output?

It has been established through the literature review (Section 4.3 of Chapter Four of this thesis) that demand for construction has been on the increase, particularly in recent years. This has been a consequence of the prolonged and prominent economic growth and the continuous and upward increase in demand for social and physical infrastructures and facilities. The latter are urgently required to promote and to sustain economic growth and development, in order to meet the objectives of Vision 2020. In addition, factors notably the growing population, rising incomes and rapid urbanisation suggest that demand from all sectors of the Malaysian construction industry: buildings, residential and non-residential and civil engineering is increasing. The prospect for the construction industry to expand is therefore, highly promising.

In spite of the increase in demand for construction and the high rate of construction activities, as evidenced from the high annual rate of growth in construction GDP, the size of construction output continues to remain relatively small. It is therefore, highly likely that there is a supply constraint, either physically in terms of project implementation, or financially, or both, that may inhibit the level of construction output.

Wells (1986, p40) contended that supply constraint in the physical sense may be in the form of (1) an actual failure to implement construction projects, or (2) delays to complete the works thus, inhibiting the level of construction output within a time frame. The former could be due to factors including inability of clients to employ designers or contractors willing to do the work and the latter could be due to factors such as constraints in the availability of vital construction inputs including physical resources of manpower, materials, plant, etc. Constraint in finance makes sense because rising prices, in itself indicating constraints in the availability of vital construction input(s), inhibits the volume of work that can be done if financial resource is fixed.

Many researchers and writers including Turin (1973a, 1973b), Ofori (1980), Edmonds and Miles (1984), World Bank (1984), Wells (1985, 1986), Wang (1987, 1991), Miles and Neale (1991), Sharif and Morledge (1996), Morledge (1996), Sharif (1996) suggest that among the many areas of constraints faced by most construction industries are constraints that exist within the processes of construction procurement. These constraints could be due to either one or a combination of two or more of the following factors: unavailability, insufficiency or inappropriate use of resources, functions or institutions. These aspects have been discussed in the literature review in Chapter Three of this thesis. Constraints in the processes of construction procurement restrict or limit the effectiveness of the procurement process. Ineffective construction procurement would affect output and would subsequently inhibit growth in the construction industries.

Malaysia is firm in her quest towards Vision 2020. Its achievement, in the context of this research the Vision 2020's ninth challenge, hinges upon various factors but it is contended that a competitive, dynamic, robust and resilient construction industry is of paramount importance. Only such a construction industry could deliver the much and urgently needed social and physical infrastructures and facilities critical for Malaysia's Vision 2020. In the context of this research a competitive, dynamic, robust and resilient construction industry includes an industry that (1) grows at a rate higher than the economy, (2) in terms of its size, contributes 5.4 per cent or more to the GDP per annum, and (3) possesses characteristics of an efficient and effective processes of construction procurement. The characteristics, called 'vital ingredients' by Wang (1987, p24 and 1991, p92), are listed in Section 3.1.3 of Chapter Three of this thesis. In addition, Wang (1991), Sharif and Morledge (1996) and Sharif (1996) state that effective and productive construction procurement can only be achieved if the supply chain of key competencies and resources are in place.

A supply constraint if it exists, in the Malaysian construction industry may render fulfilling the imminent and much higher demands of the rapidly growing and more modern and industrialised Malaysian economy unattainable. Consequently, rapid and sustained economic growth may be unachievable, unless radical steps are taken. Given that time is ticking away and the year 2020 (targeted for achieving the objectives of Vision 2020) is getting closer, the issue of a potential supply constraint in the Malaysian construction industry becomes highly critical. Steps to be taken to boost and to sustain growth in the industry therefore must be taken as soon as possible.

6.2 The Research Questions

The issues discussed above therefore, pose several questions. In the context of the present research, the more important questions are thought to include:

1. Are there constraints in the processes of construction procurement that may inhibit the level of construction output?

2. If there are constraints, can the types of constraints be identified and their extent ascertained?

3. If there are constraints and the types and extent of constraints identified, are there appropriate strategies that could be implemented to remove or alleviate the constraints identified?

According to Fellows and Liu (1997, p98-99) "not all research projects will have hypotheses to be tested." They argued that for a research topic that is exploratory in nature, has very limited theory being developed and where empirical research is lacking, one may not be able to develop hypotheses in a meaningful way. In such situation, the appropriate approach is not to impose issues artificially but to carefully observe subjects' behaviour. Fellows and Liu therefore, advised researchers not to feel bound to incorporate a hypothesis or hypotheses.

According to *Institut Tadbiran Awam Negara Malaysia* (National Institute of Public Administration Malaysia) or INTAN (1995, p3-5) there are 6 types of research, i.e., (1) historical research, (2) descriptive research, (3) action research, (4) exploratory research, (5) causal relationships research, and (6) experimental research. INTAN provides definitions and characteristics of each type of research.

In the context of exploratory research, INTAN (1995, p4) defines it as:

> "To study a problem, phenomenon or new area of interests in order to know, analyse or appreciate that problem, phenomenon or the area being studied."

In addition, INTAN (1995) argued that exploratory research attempts to answer questions such as:

1. Whether the problem actually exists;
2. What is the type of the problem; and
3. How serious is the problem.

The present research appears to exhibit characteristics of exploratory research, in particular in two key areas. Firstly, this research seeks to identify whether problems, i.e., constraints, exist in the processes of construction procurement, if they exist, to identify the types and extent of the constraints, from it to develop proposed strategies to remove or to alleviate the constraints identified. Secondly, there is no known empirical research finding specific to the Malaysian procurement processes that could be referred to in generating hypotheses for the present study.

On the apparent lack of empirical research findings specific to the Malaysian procurement processes that could be referred to in generating hypotheses for the present study, it could be asked: why not generate hypotheses on the basis of theories or empirical research findings conducted elsewhere? The approach seems logical given that there is a plethora of empirical findings on constraints facing the construction industries of other countries (for example, Turin, 1973a; Turin, 1973b; Edmonds, 1979; Ofori, 1980; Edmonds and Miles, 1984; World Bank, 1984; Wells, 1986; Miles and Neale, 1991). However, it is contended that in the present research generating hypotheses on the basis of theories or empirical research findings conducted elsewhere is not appropriate due to several factors, in particular differences in political, economical, social and technological environments with Malaysia.

It could also be argued that hypotheses could be generated in other ways such as through commonly held belief and intuition (Sarantakos, 1993, p120). However, it is felt that these approaches may not produce meaningful hypotheses or may produce hypotheses that are relatively impossible to verify empirically.

It is acknowledged that the types of research are not mutually exclusive and that it is possible for a researcher to employ more than one type of research in a project. According to Sarantakos (1993, p8) it is the researcher's prerogative to decide about the types and forms of research that will fulfil the goals of the study.

On the basis of the arguments presented above, the present research therefore, will not attempt to formulate and test hypotheses. In order to fulfil the research aims, efforts will be focused on seeking answers to the three key questions listed above.

6.3 Research Aims and Scope

The present research represents the first major attempt to study empirically the processes of construction procurement in Malaysia. It also represents a modest attempt towards developing the construction industry of Malaysia. However, its scope is limited by constraints in particular in terms of time, human and financial resources and the research methodology.

The position of the researcher as Quantity Surveyor with the *JKR* and CIDB provided an invaluable opportunity to identify and assess the constraints in the processes of construction procurement experienced by the public and private sectors organisations in Malaysia. His twelve years experience in project implementation in Malaysia generated the knowledge and insight of the constraints that exist and the subsequent problems.

As a result of careful and substantial deliberation, two primary, focused and manageable areas of investigation were identified, i.e.,

1. To identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output; and

2. To develop proposed strategies to remove or alleviate the constraints identified.

It has been established through literature review in Chapter Three of this thesis that the framework of construction procurement in Malaysia encompasses the processes of (1) initiation/promotion, (2) funding, (3) design, (4) statutory approval, (5) tendering, (6) construction, and (7) risk allocation among the parties involved. Each of the processes, prevailing in the Malaysian construction industry, has been discussed in some details in Chapter Five of this thesis. The framework acts as a conceptual boundary for this research. Consequently, activities that fall outside the framework are considered not to be within the scope of the present research. Such activities may include sourcing of raw materials for the manufacturing of construction materials, manufacturing of construction materials and components, manufacturing or assembly of construction plant and equipment, etc.

The present research is focused at a construction industry-wide level. It may be asked whether it is realistic to assume the Malaysian construction industry as a single market? The answer to this question is probably not, because given the high degree of fragmentation and segmentation of the Malaysian construction industry and the diversity of its outputs (see Section 4.4 and 4.7 of Chapter Four of this thesis) it is possible that there is not a single market but several. Thus, it is likely that constraints in construction procurement may exist in certain sections of the market but not in others. Nonetheless, the present research focuses on construction industry-wide level due to the constraints mentioned above. To study constraints and the respective strategies in each section of the market would be an enormous task for the researcher and is not within the scope of this study. No attempt therefore, will be made to identify the types and extent of constraints in resources and functions at micro level, such as types of construction projects (for example buildings, civil engineering, specialists or maintenance works), types of organisations that are involved in the procurement processes (for example designers, contractors or clients; public or private), or their size; or geographical locations of organisations or construction projects, etc., which may be particularly affected.

In addition, the present research focuses on the formal sector of the Malaysian construction industry. Construction procurement activities such as self help, individual jobbers, rural construction, etc., which can be described as being in the informal sector of the Malaysian construction industry are excluded from the present research for practical reasons as stated in Section 4.4.2 of Chapter Four of this thesis.

The backdrop to this research is Malaysia's Vision 2020 ninth challenge and the target that its economy will continue to grow by 7 per cent per annum. It is acknowledged that the state of Malaysia's economy is influenced by a multitude of national and international factors and the attainment of Vision 2020 is therefore, dependent upon these factors being conducive to that aim at all times up to 2020 (see Section 4.3.5 of Chapter Four of this thesis). Any factors therefore, that could result in Malaysia's economy being unsupportive to this assumption, which could subsequently affect the construction industry, which occur during the course of the research, are not considered to be within the scope of this research.

The study seeks to identify the types and extent of constraints that exist currently and into the foreseeable future, and to develop proposed strategies to remove or to alleviate the current and future constraints identified. It is acknowledged that long term projection of any economic activity is plagued with various uncertainties. Consequently, this study will focus in the short and medium terms, i.e., up to five years from the time of study (from 1996 to 2001). Through this approach, the researcher hope to be able to concentrate on identifying constraints and developing proposed strategies of greatest priority.

6.4 The Key Research Concepts

Idris (1994, p201) refers to concepts as the building blocks of scientific investigations. They are an abstract idea developed from particular facts. In quantitative research project, in contrast to qualitative one, concepts are firmly defined before research begins (Sarantakos, 1993, p15). According to Idris (1994, p202) it is up to the researcher to define a particular concept. He argued that a definition is "by their very nature, neither true nor false: they are only more useful or less useful."

In research, concepts to be investigated are operationalised by (1) constructing indicators to indicate their presence, and (2) specifying the procedures of measurement. The latter is known as the operational definitions of the concepts. The operational definition assigns empirical meaning to the concept by specifying the means of measuring it in reality (Idris, 1994, p202).

Derived from the research questions outlined in Section 6.1, there are two key concepts to be investigated in this research, i.e., (1) constraints in the processes of construction procurement, and (2) strategies to remove or to alleviate the constraints identified.

For the purpose of this study, the concept of constraints in the processes of construction procurement is defined as limitations or restrictions imposed on the processes of acquiring construction projects. Constraints in the processes of construction procurement are divided into two categories, i.e.,

1. Current constraints: defined as constraints in resources and functions that are currently experienced by the respondent organisations and/or currently exist in on going construction with which the respondent organisations are involved; and
2. Future constraints: are those perceived by the respondent organisations will exist over the next 5 years, i.e., until at least 2001.

For the purpose of this study, the concept strategy is defined as plans or methods to be employed to remove or to alleviate the constraints identified. Strategies to remove or to alleviate the constraints identified are divided into two categories, i.e.,

1. Strategies to remove or to alleviate current constraints identified; and
2. Strategies to remove or to alleviate future constraints identified.

To establish the concepts of resources and functions it is considered to be instructive to critically examine the inputs-conversion-output processes of construction procurement in Malaysia. Inputs, in terms of resources including manpower, materials, plant, financial, etc. are converted during the processes of construction procurement into outputs in the form of completed projects in the category of either buildings, civil engineering or specialist facilities. During the conversion process, key procurement functions of: (1) initiation/promotion, (2) funding, (3) design, (4) statutory approval, (5) tendering, (6) construction, and (7) risks allocation among the parties involved take place. Chart 3.1 of Chapter Three illustrates the input-conversion-output processes and the environments they relate and Chapter Five describe in some details the processes of construction procurement as it is being practised in Malaysia. It is constraints in construction inputs, in terms of the major resources of manpower (management and labours), construction materials, plant and equipment and financial, and in the conversion processes, in terms of the procurement functions performed, that this research is concerned with.

6.5 Research Methodology

Research methods are the means of data collection and analysis. Results, conclusions, values and validity of a research hinge upon a well-designed research methodology. Following an extensive literature review of published and unpublished sources (the latter refers specifically to past doctoral and masters theses) relating to research methodology the presence of a plethora of research methods that could be employed to collect and to analyse data is obvious. The selection of a methodology based upon sound theory able to produce reliable results is considered to be of vital importance.

In general, a research method could either be (1) quantitative, or (2) qualitative. The differences between them are distinct and varied. For instance, Fellows and Liu (1997, p19) suggest that quantitative methods seek to collect factual data and apply scientific techniques to obtain measurements in the form of quantified data while qualitative methods seek to gather insights and to understand 'the world' as perceived by people, either as individuals or groups. Data gathered through the qualitative methods may be unstructured but it tends to be detailed both in its content and scope. Analysis of data gathered through the qualitative research methods therefore, tends to be more difficult and may be highly onerous in contrast to data gathered through the quantitative research methods. Idris (1994, p34-35) suggested that data gathered through quantitative methods is thin, narrow but generalisable and produces findings that are prescriptive in nature while data gathered through qualitative methods is thick, deep and holistic and produces findings that are descriptive in nature.

There has been a conflict and the conflict continues about which research method, quantitative or qualitative, is the best choice for a researcher. The key point of contention seems to be the perceived view on quality. Proponents of quantitative research emphasise the drawbacks of qualitative research and contended that quantitative methods are better than qualitative methods while proponents of qualitative research present their methods as the most appropriate form of research, for similar reasons. Sarantakos (1993, p56) in referring to the conflict suggest that there is no 'right' research methodology. He wrote:

> "Quantitative and qualitative methods are the tools of trade of social scientists, who use them according to circumstances, that is, according to the research question, the available resources, the research conditions and most of all the type of information required. The two methods are different, they serve different research needs and produce equally useful but different forms of data."

Nachmias and Nachmias (1992, p198) pointed out that each research method has particular advantages as well as some inherent limitations. They provided an example to illustrate their point: in the case of a qualitative research employing observation technique to study human behaviour, observing a subject's behaviour as it occurs may lead to the researcher being unable to determine the reason(s) for its occurrence. In contrast, if a qualitative research method is used, the structured questionnaires may be able to seek reason(s) for the subject's behaviour. Likewise, if the researcher, employing a quantitative research method, asked respondents in an interview to report on their behaviour verbally, there is no guarantee that the respondents' actual behaviour is identical to their reported behaviour.

In the context of research in the field of construction, Lenard, Raftery and Mc George (1997, p20-23) examined the quantitative and qualitative research approaches adopted by different researchers. They observed that the conflict between the proponents of quantitative and qualitative research methods has developed since

1996 and contended that it arises partly as a consequent of the researchers' educational and professional background. They state:

> "The first opportunity for misunderstanding is that the engineers, who may be unfamiliar with qualitative research designs, might be tempted to think that these methods are slightly 'unscientific' or lack rigour in some way. The second opportunity for misunderstanding lies in credulous people with an engineering, surveying or technical background taking too seriously, notions which have become distorted during their importation from the social sciences."
>
> Lenard et al. (1997, p20).

Lenard et al. (1997, p20-23) concluded that there are tensions and inadequacies in both the quantitative and the qualitative research approaches and stressed that both approaches are attempting in their own way to uncover knowledge in a rigorous and scientific way. They argued that on the one hand, proponents of quantitative research methods should not have any doubts about the scientific rigour and richness of detail gathered through well designed qualitative research. On the other hand, proponents of qualitative research methods should recognise the value of sceptical, critical experimental and quantitative work in testing, verifying and generalising important observations.

The conflict and subsequent debates over quantitative and qualitative research methods lead to the conclusion that more than one research method may and should probably be employed in order to fulfil the aim(s) of a particular research. Different research methods should not be considered as mutually exclusive but to be considered as complementary. This view concurs with the views of researchers and writers in the field of construction such as Lenard et al. (1997, p22) and Fellows and Liu (1997, p20) and in the field of social sciences such as Nachmias and Nachmias (1992, p199), Sarantakos (1993, p155-156) and Idris (1994, p35-36). Broadly, these researchers and writers argue that employing more than one research method, such as combining quantitative and qualitative approaches, will lessen or eradicate disadvantages of each individual method and will reap the advantages of each.

A combined research approach can be based upon the principle of triangulation. According to Idris (1994, p35) triangulation research uses multiple, but independent measures. Lenard et al. (1997, p22) states that the theory of triangulation is pre-owned by the surveying profession where if there are only two data points the outcome could either be a measure of agreement or disagreement. By employing a third data point, it is possible to confirm the data from the initial two points, or to provide explanation of irrefutable disagreement between the two data points.

On the concept of triangulation, Sarantakos (1993, p155) wrote:

> "Quite often, researchers combine different methods of data collection, for example surveys and experiments, experiments and observation, or observation and documentary methods, when studying the same social issue. Such combinations of methods is called *triangulation*,"

In addition, Sarantakos (1993, p155) pointed out that triangulation method allows researchers to:

1. Obtain a variety of information on the same issue;
2. Use the strength of each method to overcome the deficiencies of the other;
3. Achieve a higher degree of validity and reliability; and
4. Overcome the deficiencies of single-method studies.

In construction research, the term triangulation has been discussed by Fellows and Liu (1997, p9 and 20) and Lenard et al. (1997, p23). For instance, Fellows and Liu suggest that in triangulation research where two or more research methods are combined, quantitative and qualitative approaches, they produce a multi-dimensional view of the subject being studied, gained through synergy. The triangulation "can be very powerful to gain insights and results, to assist in making inferences and in drawing conclusions."

Lenard et al. suggest that triangulation could be done by "data source and by data type (e.g. qualitative semi-structured interviews and quantitative survey data), by method, by researcher and by theory." They contended that:

> "Because triangulation forces the researcher to consider situations from a variety of standpoints it is an excellent medium for stimulating and focusing thought. It also minimises the dangers in post-rationalising findings."

Although there are many researchers who argue that using triangulation may produce more valid and reliable results than using single-research methods, the potential areas of serious research methodological problems must not be overlooked.

For instance, Sarantakos (1993, p156 in citing the works of Lamnek, 1988) identified some of the problems associated with the triangulation research methods as:

1. Similar to single-research methods, triangulation can be equally useless if they are based on wrong conditions and wrong research foundations;
2. Can be used as a way of legitimising personal views and interests; and
3. Is difficult to replicate.

6.6 Methodology Adopted for the Research

On the basis of the views on research methods discussed in Section 6.5, and in the context of fulfilling the present research aims, the researcher strongly believes that the triangulation approach is appropriate and therefore has been adopted.

The triangulation approach in the present research comprises:

1. Multiple data sources of literature, respondent organisations, and professional institutions; and
2. Multiple research methods of quantitative and qualitative approaches.

Primarily, there are three key data points in this research. Firstly, non-empirical theory gathered from extensive literature review forms the first data point. Secondly, quantitative methods of questionnaire surveys to gather primary data to identify type and extent of current and perceived future constraints in major resources and functions in the processes of construction procurement in Malaysia forms the second data point. Also to appraise proposed strategies developed and aimed at removing or alleviating the constraints identified. Thirdly, qualitative method of semi-structured face-to-face or telephone interviews to validate data obtained from the quantitative data point form the third data point. Chart 6.1 shows a conceptual model of the triangulation research approach adopted in the present research.

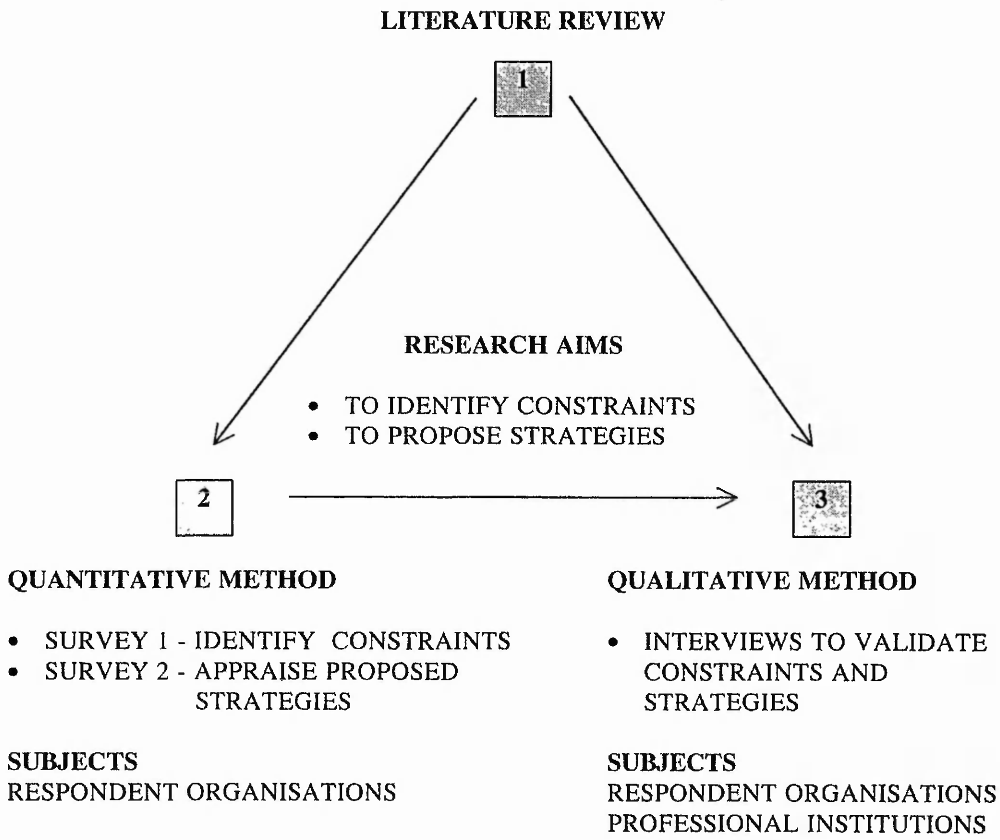
The triangulation research approach provides several opportunities to the researcher; the more important ones are thought to include:

1. The research process is more robust and therefore, enables a much higher quality data to be gathered and results to be achieved. This increase the researcher's confidence in the results;

2. It enables the researcher to integrate the quantitative results with the results from the face-to-face or telephone interviews. Thus, data on constraints and on strategies gathered through the quantitative research methods will be tested against the qualitative data from the interviews; and

3. It enables the researcher to integrate the results from the respondent organisations with the results from the professional institutions.

Chart 6.1 – The triangulation model of data sources and research methods



6.6.1 The literature review

The literature review for this research is extensive. It covers previous study reports, text and journal articles published in Malaysia and elsewhere, previously unpublished doctoral and masters theses, unclassified government memos, reports and official departmental circulars, and news reports, particularly those published by the Malaysian mass media.

A significant proportion of the Malaysian literature was written in *Bahasa Malaysia*. For the purpose of this research they have been translated into the English language by the researcher. Malaysians considered to be experts in both *the Bahasa Malaysia* and English languages were consulted in an attempt to reduce inaccuracies in the translation.

The literature review was to provide the researcher with a background understanding of the concepts including economic growth, development and construction and its economic significance. It also appraised him of the various works on the subjects of construction procurement, constraints the processes suffer and provided an in-depth knowledge of Malaysia's socio-economic past, Vision 2020, and its construction industry. These aspects of the literature have been incorporated and form the first five chapters of this thesis.

In the context of the triangulation research process, the literature review forms the first data point. An extensive search of the literature for all possible items to be included in the questionnaire surveys and in the interviews has been performed. The indicators and variables constructed for the purpose of measuring the key concepts are based on a series of key references.

6.6.2 The questionnaire surveys

Questionnaire survey forms the second data point. There are two questionnaire surveys in this research and both were conducted by post.

The primary objective of the first survey (hereinafter referred to as Survey 1) is to identify the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output.

In addition, Survey 1 provides focus for the development of the proposed strategies for major resources and functions suggested to be of highest constraints.

The primary objective of the second survey (hereinafter referred to as Survey 2) is to appraise proposed strategies developed to remove or to alleviate current and perceived future constraints identified through Survey 1.

On the basis of practicality, time constraint, and cost consideration, the postal questionnaire survey was adopted over other methods of questionnaire survey for this stage of the research. The in-depth reasons for employing the postal questionnaire approach include:

1. Geographical accessibility. Due to: (1) the distance between the UK, from where the survey is administered, and Malaysia, and (2) the geographical distributions of respondent organisations within Malaysia, the use of postal questionnaire could afford a wider geographical coverage of subjects;
2. Relatively inexpensive to administer. Due to: (1) the number and category of respondent organisations under investigation, (2) the distance between the UK, from where the survey is administered, and Malaysia, and (3) the geographical distributions of respondent organisations within Malaysia, the use of postal questionnaire is cheaper than other survey methods such as personal and telephone interviews and therefore, is considered most cost effective;
3. Reducing bias. Respondents have no personal contact with the researcher during data collection;
4. Minimise respondents' inconvenience. Respondents can respond to the survey at their own convenience and therefore, are less disruptive to their daily schedules; and
5. Problem of non-contact is avoided. Often in personal interviews the respondent were not available when the interviewer calls. Since the postal services will deliver questionnaires to any location that has a reachable address, the problem of non-response due to non-contact is avoided and saves the researcher's time and costs in terms of follow up visits.

However, the researcher acknowledges there are many shortcomings of postal questionnaires survey and therefore, took various steps (see Chapter Seven of this thesis) to minimise their influences on the quality of data collected and findings obtained. In the context of the present research, the shortcomings of postal questionnaire survey may include:

1. Problems of getting adequate response rate. This refers to the number of valid responses expressed as a percentage of the number of questionnaires sent out. It is a known fact that postal questionnaire suffers from a low response rate. According to SNAP (Version 3, pS4) a response rate of only 5 per cent for postal survey is quite common. However, there is no uniformity in terms of what may be considered to be an adequate response rate. A review of survey literature uncovers a wide range of response rate that is considered to be adequate, ranging from 15 per cent (Harper, 1988, p26) to 50 per cent (Idris, 1994, p239). A response rate of 60 per cent is considered to be good, and a response rate of 70 per cent is considered to be very good (Idris, 1994, p239). In construction research, Gareis (1979, p317) received a response rate of only 10 per cent and used them in the analysis of results. In order to increase response rate, efforts including follow-ups and reminders were recommended by researchers and writers;

2. There is no opportunity for the researcher to probe beyond the given answer, to clarify ambiguous questions, to overcome unwillingness to answer, or to appraise the validity;

3. The researcher cannot be sure that the targeted person completes the questionnaire; and

4. Takes a relatively longer period for bulk of responses to return.

6.6.3 The interviews

Interviews form the third data point in the triangulation research methods adopted for this research.

The objective of the interviews is primarily to validate the proposed strategies appraised by respondents of Survey 2. In addition, the researcher attempts to solicit additional information including information to validate the constraints identified through Survey 1.

The interviews also serve as the third point in terms of data source. This is achieved through interviewing representatives of professional institutions related to the Malaysian procurement processes. The institutions are not subjects in the questionnaire surveys and in the interviews with respondent organisations. Subsequently, data on constraints and on proposed strategies obtained from the literature, the questionnaire surveys and the interviews with respondents organisations can be integrated with data obtained from the interviews with the professional institutions.

In discussing the different types of interviews Sarantakos (1993, p178-179) suggests that structured interviewing be considered to be a quantitative method while unstructured interviewing is mostly a qualitative method. Somewhere in between structured and unstructured interviewing lies semi-structured interviews. They can be either qualitative or quantitative methods depending on factors such as the research topic and purpose, resources, preferences and the type of information sought.

As stated earlier, there are two issues to be discussed during the interviews. These issues shape the interview techniques to be followed in this research. Firstly and most important, the interview aims to validate data that have been obtained through the questionnaire surveys. The questions to be asked in the interviews therefore are relatively rigid and structured including in their wordings and in the order of the questions. They prompt respondents to the questions being asked and to the answers to be selected. These approach exhibit characteristics of a structured interview closer to the quantitative research method.

And secondly, the interviews also serve to solicit additional information including information to validate the constraints identified through Survey 1. These aspects of the interviews require probing and therefore, seem inappropriate to have strict wording of the questions or the order of the questions. They require some degree of flexibility. These approach exhibit characteristics of unstructured interview closer to the qualitative research method. On balance, it is considered more desirable to conduct semi-structured interviews closer to the qualitative research methods in attempts to afford additional information that would enrich the quantitative data obtained through the questionnaire surveys.

The primary interview method used in this research is personal face-to-face interview. In situations when this is not possible, such as due to geographically dispersed respondents that could lead to much travelling and high travelling costs, or when respondents request to be interviewed by telephone for their own convenience, telephone interviews will be conducted. According to Sarantakos (1993, p196) telephone interviewing exhibits similar characteristics as standard interviewing techniques with the exception that it is conducted by telephone. He suggests that telephone interviewing is suitable in cases such as when quick and inexpensive results are sought or when it is considered not compulsory to meet the respondent face-to-face. Nachmias and Nachmias (1992, 231-232) states that due to the wide availability of respondents with telephones, telephone interviews now no longer suffer from limitation in terms of respondents' inability to access a telephone. In addition, they suggest that telephone interviews should be used in conjunction with personal interviews in specific situations.

However, the researcher is aware of some of the limitations of interviews as a method of data collection and will take various steps to minimise their influence on the quality of data collected and results obtained (will be discussed in Chapter Eight). In the context of the present research, the shortcomings of interviews are thought to include:

1. Interviews are more costly and time-consuming than other survey methods;
2. The presence of the interviewer may introduce personal influence and bias; and
3. It may be less effective than other methods when issues considered sensitive by the respondents are being discussed.

In relations to limitations in the methods of data collection, Sarantakos (1993, p199) wrote:

> "Interviewing is affected by factors common to other techniques of data collection, for example deliberate misrepresentation of facts, genuine mistakes, unwillingness or inability to offer information, and similar problems."

6.6.4 Respondents' database

The present research is designed to elicit information on a construction industry-wide perspective. The questionnaire surveys and the interviews therefore, were conducted on the main Malaysian organisations that are involved in construction procurement in Malaysia during the period of the research; irrespective of types and locations of organisations and projects, size of organisations and projects, life span of organisations and projects, projects' costs and complexities.

Derived from the literature review in Chapter Five of this thesis, the main organisations involved in construction procurement processes in Malaysia may be categorised as (1) clients, (2) designers, and (3) contractors. The organisations were stratified into the these categories, hence:

1. Government departments and private organisations that initiate or promote construction projects were classified as clients;

2. Registered firms of architects, engineers and quantity surveyors and the offices of *JKR* nation-wide were classified as designers; and

3. Registered contracting firms classified as contractors.

The present research emphasises the timing of the presence of constraints, that is, current constraints referring to constraints that exist during the time of survey, and future constraints referring to constraints that are perceived to exist in the future for up to five years, year 2001, and their strategies, respectively. It is strongly believed that only those main organisations that are currently involved in the processes of construction procurement in Malaysia, criterion critical for consideration as subjects to the present research, would possess first hand knowledge, expertise and experience to provide meaningful responses to the research.

There are several ways in which the clients, designers and contractors' organisations currently involved in construction procurement in Malaysia could be identified. For instance, the organisations may be identified through visiting on-going projects, or on-going projects' signboards where normally the main firms involved with those projects are listed. They could also be identified by approaching individual firms and asking whether they are currently involved in construction procurement or not, or looking at records kept by the local authority that issue project approval document. However, there are several inherent problems in these approaches that may affect the quality of the data gathered and results obtained. The problems may include (1) some organisations may not be accredited professionally, (2) some organisations may not possess first hand knowledge or expertise to provide meaningful responses to the research such as a main contractor that sub-let or assigned the on-going project to other contractors, a practice common in Malaysia, (3) the plethora of construction projects and of main organisations involved, geographically dispersed across Malaysia makes identification both tedious and difficult, the latter due to time and resources constraints and logistical problems (the research is administered from the UK). Some organisations may be over-looked, or (4) bureaucratic red tape within the local authorities may constraint speedy retrieval of information, or the local authorities may not possess latest up to date records of all on-going projects or of organisations involved with the projects.

The following sections describe the approach taken in identifying the main organisations to be included as subjects to the present research. The approach is not exhaustive, but it represents a systematic and comprehensive attempt in the context of meeting the aims and scope of the present research and its limitations.

6.6.4.1 Clients' organisations

In the case of public clients, they are those government ministries, departments, and statutory bodies that are currently being served by the *JKR* through out Malaysia in 1996. The *JKR* Headquarters in Kuala Lumpur furnished the names and addresses of 55 public client organisations on 26 September 1996.

In the case of private clients, they are those property development companies currently listed on the KLSE, as of July 1996. The KLSE furnished the names and addresses of 58 listed property development companies on 12 July 1996.

The researcher is critical of the small number of client organisations, in contrast to the numbers of designer and contractor organisations, in the database. Various efforts to obtain names and addresses of other client organisations, in particular those private clients not listed on the KLSE but are thought to be currently active in initiating or promoting construction projects in Malaysia were made but were unsuccessful. Two efforts warrant reporting are when the researcher contacted the Registrar of Companies and the HDAM. In the former, the Registrar of Companies responded to the researcher's letter stating that corporate information they supply is chargeable at RM10.00 per company. The total number of property development companies registered with the Registrar of Companies in 1996 was 26,791. Total fee chargeable at RM267,910.00 is well beyond the researcher's means (letter reference PS/PTN/166/15/25 (Jld.5) dated 24 July 1996). In the case of the HDAM, 4 correspondences to their registered office, including facsimile transmissions between July and September 1996 received no reply.

On the basis of the following factors, the public and private clients identified through the above approach are considered to possess first hand knowledge, expertise and experience to provide meaningful responses to the present research:

1. In the case of the public sector clients, a large proportion are frequent clients i.e., those that initiate/promote projects on a regular basis and most employ in-house professional staff acting as construction procurement advisers. In addition, by virtue of being currently served by the *JKR* confirms that they are currently involved with the processes of construction procurement and therefore, possess first hand knowledge and expertise to provide meaningful responses to the present research; and

2. In the case of private sector clients, by virtue of being currently listed on the KLSE indicates that they are respectable and experienced clients, in particular in terms of size of organisations (such as number of employees, number and value of past and present projects being procured, etc.), of being frequent and active clients, and of possessing the technical expertise and experience in the processes of construction procurement in Malaysia. Almost all-public listed property development companies have their own in-house technical department.

Individual clients and the SOCs (see Section 5.1.1 of Chapter Five of this thesis) are deliberately excluded from the present research. This action is based on the assumptions that (1) being one-off clients or clients that do not initiate/promote projects on a regular basis they may not possess the requisite expertise and experience to respond to the present research, (2) their share, in terms of the volume of construction output, is believed to be much smaller than the public and private sector clients identified for the study, and (3) identification is expected to be tedious and difficult notably due to current and up to date records within the approving authorities are either lacking or complicated by bureaucratic red tape.

6.6.4.2 Designers' organisations

It has been established in Section 5.3.1 of Chapter Five of this thesis that all designers and designers' firms must be registered with their respective Boards. Registration requirement is on an annual basis and individuals and firms cannot practice without current and valid registration document.

The present research is focussed at the organisations; therefore, only designers' firms currently registered with the respective Boards qualify as subjects to this research. By virtue of being a currently registered firm, the firm is accredited professionally and is considered active in construction procurement in Malaysia.

The following designers' firms, considered as main participants in the processes of construction procurement in Malaysia, qualify as subjects to the present research:

1. Firms of architects registered with the Board of Architects Malaysia for 1996. A list comprising names and addresses of all 657 registered architects firms was obtained from the PAM Directory 1995/96;

2. Firms of engineers registered with the Board of Engineers Malaysia for 1996. A list comprising names and addresses of all 250 registered engineering firms was obtained from the Board of Engineers Malaysia; and

3. Firms of quantity surveyors registered with the Board of Quantity Surveyors for 1996. A list comprising names and addresses of all 175 registered quantity surveying firms was obtained from *the Buku Panduan Lembaga Juruukur Bahan Malaysia*, January 1996.

In addition, all *JKR* federal, state, district, regional, and special offices throughout Malaysia are considered as subjects to the present research. *JKR* is the government's key technical department responsible for planning, designing and supervising all public works in Malaysia. Between July and October 1996, the Federal *JKR* Headquarters in Kuala Lumpur furnished addresses of all its offices in Peninsular Malaysia; the *JKR* Headquarters in Sarawak and Sabah furnished the names and addresses of all their offices in Sarawak and Sabah, respectively. In all there are 180 *JKR* offices across Malaysia and they all become subjects to the present study. Each *JKR* office is staffed by highly trained and experienced professionals comprising engineers, architects, quantity surveyors, etc. Almost all are registered with their respective professional institutions and Boards.

The researcher considers the *JKR* as superior than other technical departments in Malaysia in many ways including expertise, experience, size of organisation (number of offices, number of professional staff, number and value of past and current projects, etc.), geographical distributions of offices and of projects, and types of works: buildings, civil engineering, specialist projects, etc. In terms of a construction industry-wide perspective of the issues being investigated, the *JKR* offices would be in a far better position to provide meaningful responses to the present research. It is on this basis that only *JKR* offices were considered as subjects to this research, representing designers' organisations in the public sector. Consequently, other technical departments such as the Drainage and Irrigation Department and the Urban Development Authority have been excluded as subjects.

6.6.4.3 Contracting organisations

It has been established in Section 5.3.3 of Chapter Five of this thesis that it is mandatory for all contractors to be registered with the CIDB before they could participate in tender exercises and execute any construction project in Malaysia. The CIDB registers contractors in grades that reflect the size of the firms, Grades G1 (the lowest) to Grade G7 (the highest) according to project cost limit, technical and financial capabilities and experience.

It was decided that in the present research, subjects representing the contracting organisations are drawn from those CIDB registered Malaysian contractors. *PKK* registered contractors were not considered because registration with the *PKK* is not mandatory and that it registers contractors for public works only.

It is acknowledged that the CIDB list of registered contractors may not be comprehensive because the registration requirement is still at its infancy (it was made mandatory from 22 July 1996). However, given the fact that registration is mandatory, being a registered contractors therefore, suggests that the firm is committed to the business of contracting and is probably having on going projects, the latter is critical in term of providing meaningful responses to the present research.

In compiling the database for the present research, lower grade contractors, i.e., those in Grades G1 and G2 were excluded due to the following assumptions: (1) they normally act as domestic sub-contractors to the higher grade contractors, (2) they may not have professionally qualified staff because they are not required, for the purpose of registration, to employ such staff, and (3) because of the ease of entry, there is a very high rate of turnover of companies in these grades. Consequently, there are doubts over their knowledge and expertise of the processes of construction procurement and may not be able to provide meaning responses to the present research.

In all a total of 477 names and addresses of CIDB registered contractors from Grades G3 to G7 were compiled. The list was abstracted from the CIDB's *Senarai Kontraktor Pembinaan Bangunan (B) dan Kejuruteraan Awam (CE) Yang Berdaftar* dated 21 July 1996 furnished by the CIDB.

6.6.4.4 Institutions' database

The triangulation method adopted in the present research comprises mixing both the quantitative (questionnaire survey) and the qualitative (respondent interviews) methods and three types of data sources of literature, respondent organisations and professional institutions. Data from the professional institutions is gathered through semi-structured face-to-face or telephone interviews.

Sharif (1996, p374) argued that the existence of key competencies required for effective processes of construction procurement depends upon the establishment and maturing of a variety of institutions indigenously. He identified the institutions to include non-construction industry specific institutions concerned with finance, legal systems and client bodies, and also construction industry specific institutions such as education and training, trade associations, professional institutions and research and development institutions. In Malaysia, Sharif (1996, p416) found that in general institutions responsible for promoting competencies associated with the processes of construction procurement are available and supply the competencies that were in demand.

In terms of construction industry specific institutions, in the context of the three categories of main organisations (client, designer, contractor) involved in the processes of construction procurement in Malaysia, the following institutions have been identified:

1. HDAM, Housing Developers Association of Malaysia, representing housing and property developers;
2. PAM, *Pertubuhan Akitek Malaysia*, representing the architectural profession;
3. IEM, Institution of Engineers Malaysia, representing the engineering profession including civil, structural, electrical and mechanical engineering;
4. ISM, Institution of Surveyors Malaysia, representing the surveying profession including quantity surveying;
5. MBA, Master Builders Association of Malaysia, representing the contractors;
6. PKMM, *Persatuan Kontraktor Melayu Malaysia*, representing the Bumiputera contractors; and
7. CIDB.

Broadly, the above institutions (excluding CIDB) serve the functions as a learned society as well as an education or qualifying body. The HDAM, MBA and PKMM also act as trade associations. The government in 1994 established the CIDB. It is considered as an icon for a more established and modern Malaysian construction industry.

In terms of acting as a learned society, an institution provides members with technical advice, access to library facilities, research and publishing technical journals and papers. It also liases with government and other bodies in order to help raise standards of the Malaysian construction industry, in the context of the profession it represents.

In terms of acting as an educational or qualifying body, the institutions set examinations and accredit Malaysian and foreign degree courses that allow exemption for those who graduate from all academic requirements of the institutions' membership. To this end, the PAM, IEM and ISM work jointly with the respective Boards in accrediting individuals and firms and in their registration requirements.

Each institution maintains Rules of Professional Conduct to which its members are expected to adhere, and it endeavours to maintain the professional interests of its members and of its profession whenever this is appropriate.

The following, quoted from the mission statement of the IEM, illustrates the functions played by the institutions and their endeavour towards developing the construction industry and the country:

- IEM shall promote sound professional engineering practice in support of the socio-economic development objectives of the nation;
- IEM shall service the needs and interests of its members and the public and uphold the social standing and image of the engineering profession; and
- IEM shall contribute towards nation building and shall strive to enhance society's consciousness of science and technology.

All the above institutions and the CIDB sit on various government and quasi-government bodies and committees to deliberate matters concerning the Malaysian construction industry. Two annual events, the dialogues between the Minister of Domestic Trade and Consumer Affairs and the construction industry and between the Minister of International Trade and Industry and the construction industry are worthy of mention. In 1995 the researcher was involved in both dialogues as the sole representative of the CIDB. In these dialogues issues relating to the Malaysian construction industry, including those on construction procurement processes, are discussed at the highest level.

It is acknowledged that the institutions and CIDB are not directly involved in the processes of construction procurement in Malaysia, a criterion set in the selection of respondent organisations. In addition, one could argue that being institutions comprising of individuals associated with the organisations considered as subjects to the present research, there could be little or no additional information that could be gained; in fact there is potential for duplication.

The following are the justifications for making the institutions as subjects to the third and vital data point in the triangulation research method:

1. The institutions are organisations that command high level of integrity and reputation, both locally and internationally;

2. The institutions endeavour to raise standards of the Malaysian construction industry; and

3. The institutions possess a helicopter view of the Malaysian construction industry but more importantly, they also possess expert knowledge of the Malaysian procurement processes.

Consequently, the institutions could afford to offer independent, unbiased, meaningful responses to the issues being investigated in the present research. This aspect of the interview is highly critical as the data obtained would be used to either confirm the data from the initial two data sources (literature and respondent organisations), or to provide explanation of irrefutable disagreement between the two data sources.

6.6.4.5 Total organisations in database

In all, a database comprising names and addresses of 1,852 respondent organisations across Malaysia was compiled. This respondents' database is referred to as the main database. It consists of 113 clients, 1,262 designers and 477 contractors (Chart 6.2). Table 6.1 shows the breakdown according to types of organisation: client, designer and contractor. Subjects for questionnaire surveys 1 and 2 and the respondent interviews will be drawn from the main database.

Chart 6.2 - Category of Organisations in Main Database

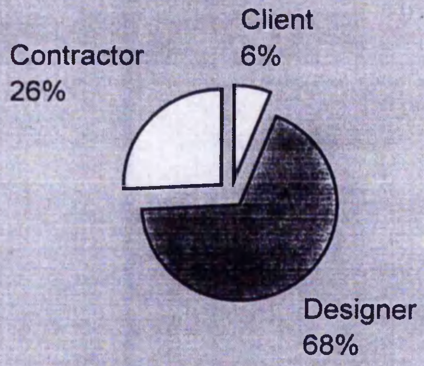


Table 6.1 – Main Database of Organisations (by category and type)

Category and type	No	%
Client		
Government ministry and department	55	2.97
Property developer	58	3.13
Total client	**113**	**6.10**
Designer		
JKR	180	9.72
Architect	657	35.48
Engineer	250	13.50
Quantity surveyor	175	9.45
Total designer	**1262**	**68.15**
Contractor		
CIDB Grade 3	137	7.40
CIDB Grade 4	49	2.64
CIDB Grade 5	90	4.86
CIDB Grade 6	69	3.72
CIDB Grade 7	132	7.13
Total contractor	**477**	**25.75**
Total	**1852**	**100.00**

In addition, the 7 institutions identified in Section 6.6.4.4 will become subjects for the interviews representing the third and final data source.

It is strongly believed that the database covers the majority of main organisations in Malaysia currently involved in construction procurement.

6.6.5 Selection of respondents

The questionnaire surveys and the interviews are directed towards senior management personnel of the respondent organisations. They are the Chief Executives, General Managers, Directors, Principal Partners, Senior Managers or other senior staff of firms and their equivalent in the public sector.

The selection of senior management personnel is based on the assumptions that:

1. They are the controlling officers in their respective organisations. They are entrusted with the responsibility of planning, utilising, and managing resources and functions in pursuance of their organisations objectives and projects' procurement objectives with which their organisations are involved;
2. They normally represent organisations in temporary project matrix set up to execute the processes of construction procurement;
3. Some senior management personnel may have, in their careers, been senior managers or higher of more than one organisation or projects. In any case, their position in the organisation suggests that they have been substantially exposed to the Malaysian procurement processes and the construction industry; and
4. Most top management personnel, certainly those in the public sector, are individuals with both academic and/or professional qualifications.

As senior management personnel they are considered to be most suitable to respond to the questionnaire surveys and to the interviews in terms of the objective of the present research. They possess authority within the organisations and projects with which their organisations are involved. In addition, the senior management personnel have acquired wide and frequently varied nature of experiences. These characteristics afford them with both an intimate first hand knowledge, expertise and experience of the Malaysian procurement processes and a helicopter view of the construction industry as a whole. Consequently, it is strongly believed that the senior management personnel would respond to the questionnaires and interviews in an informed and confident manner.

6.6.6 The primary data collection

The present research requires primary and secondary data. Primary data refers to data collected from original sources specifically for the purpose of the present research and is utilised primarily for answering the research questions, in both a qualitative and quantitative manner. The secondary data is the pre-recorded data, collected by others and could be assessed through literature. The latter are used for problem recognition, problem clarification, developing proposed strategies and the identification of research methods for use in the present research.

As some aspect of the research design including the questionnaire design, questionnaire piloting, development of proposed strategies, their appraisal and validation; and methods of data analysis are discussed in the forthcoming chapters, the following provides an overview of the steps involved in the primary data collection procedures.

The primary data collection is carried out in three stages referred to as Research Stage 1, 2 and 3.

6.6.6.1 Research Stage 1

Stage 1 involves the preparation of questionnaires and the carrying out of Survey 1.

Survey 1 utilises the main database of respondent organisations. In an attempt to achieve a high rate of response it was decided, after careful and substantial deliberation, to include all the 1852 organisations in the main database. Survey 1 was carried out by post, the questionnaires were mailed in early November 1996 and closed at the end of February 1997.

In all 205 organisations responded to the survey. The response rate was 11.24 per cent.

Chapter Seven describes in detail the procedures involved in carrying out Survey 1 and analysis of data and reports the results.

6.6.6.2 Research Stage 2

Stage 2 involves the preparation of questionnaires and the carrying out of Survey 2.

The results in Survey 1 identified the areas of highest constraints thus, provide a focus in the development of proposed strategies. The proposed strategies were developed primarily through literature relating to procurement practices adopted by the construction industries in the UK, Japan and South Korea. Chapter Eight (Part 1) of this thesis offer reasons and justifications for using these countries as model for Malaysia in the present research.

The researcher is aware of the mistakes made by many construction industries in developing countries whereby strategies found to have been successful in the developed countries were imported lock, stock and barrel with little or no regards whatsoever to the specific needs, conditions and environments of the importing countries. Different researchers have examined this issue and there is a plethora of literature relating to it. For example, Edmonds and Miles (1984, pvii) state:

> "Some construction industry problems are the same everywhere, but others are exacerbated by the economic environment. There is no reason to suppose that the construction industry pattern that pertains in most industrialised countries is necessarily that which is also most suited to the developing countries environment. Yet this is the pattern that has been reproduced the world over."

Consequently, researchers such as Miles and Neale (1991, pvii) suggested that:

> "A prerequisite for the effective development of a nation's domestic construction industry is a better understanding of the constraints faced by that industry in its own environment, leading to specific measures to overcome them."

The researcher submits to the above views and the approach taken in this research is consistent with those views in the sense that: firstly, identify the constraints affecting the Malaysian procurement processes and secondly, develop specific strategies to remove or to alleviate the constraints identified. The researcher does not wish to make similar mistake and more importantly, Malaysia could not afford such mistakes given the rigid time frame set to achieve Vision 2020. Hence, the approach taken in the strategies development include modifying the strategies to a level that is considered appropriate to suit Malaysia's needs, conditions and environments but more importantly, to present the developed strategies to the

Malaysian procurement practitioners for their appraisal. Only those strategies that passed these rigorous tests and do so with the highest level of support are worthy of consideration as proposed strategies for Malaysia.

Survey 2 provides an opportunity for the parties that matter most in the Malaysian procurement processes, i.e., those clients, designers and contractors, to appraise the proposed strategies on the basis of viability, feasibility and implementation including the likely need for government intervention where appropriate. The proposed strategies therefore, go through a series of rigorous tests, the result of which are strategies that are considered to be appropriate in meeting the needs, conditions and environments specific to Malaysia.

The database for Survey 2 was compiled from the respondent organisations in Survey 1 that indicated willingness to participate in Survey 2. This approach is taken in order to try to achieve consistency between the constraints identified through Survey 1 and the proposed strategies to be appraised in Survey 2. In all, names and addresses of 186 organisations were compiled. In an effort to achieve a high rate of response it was decided to include all 186 organisations in the survey. Survey 2 was carried out by post, the questionnaires were mailed in April 1997 and closed at the end of July 1997.

In all 54 organisations responded to Survey 2. The response rate was 29.03 per cent.

Chapter Eight (Part 2) describes in detail the procedures involved in carrying out of Survey 2 and analysis of data and reports the results.

6.6.6.3 Research Stage 3

Stage 3 involves reviewing the proposed strategies in the light of the analyses and comments of the respondent organisations in Survey 2 and the carrying out of a series of semi-structured interviews held in Malaysia.

There are two parts in Research Stage 3. Firstly, interviews are performed with senior management personnel of organisations that have provided responses to Surveys 1 and 2. This represents the qualitative element of the triangulation of research methods adopted for this research. And secondly, interviews are performed with representatives of professional institutions and CIDB. These organisations were not respondents to the questionnaire surveys and to the interviews prior to this. The interviews with the professional institutions and the CIDB represent the third and final data sources in the triangulation of research methods.

The respondent organisations interviewed included a combination of those that returned the questionnaire for Survey 2 and indicated willingness to participate in the interview (24 organisations) and also respondents who had not responded to both surveys. The latter were selected through a stratified random sampling from the main database after excluding those organisations that indicated willingness to participate in the interview (40 organisations). The sample was proportionately stratified according to the categories of organisations: clients, designers and contractors. This step was taken in an attempt to offer further but equal opportunities, the latter in terms of the population size of the stratum, to organisations that have not responded to the research thus far (i.e., Surveys 1 and 2) and to try to minimise potential non-response bias. In all, names and address of 64 organisations were compiled.

All 7 organisations, i.e., 6 professional institutions and the CIDB form the database for institutions to be interviewed in the Stage 3 research.

The organisations identified as respondents in the interviews (71 organisations all together) were contacted in July 1997. The interviews were held in Malaysia, mostly face-to-face but some through telephones, between August and September 1997. For consistency in the validation of the strategies, an identical set of semi-structured questions relating to the reviewed and appraised proposed strategies were administered to each of the interviewees. Issues regarding implementation of the proposed strategies were also discussed during the interviews. In addition, the interviews allowed primary data to be collected regarding the verification of constraints identified through Survey 1. Each interviewee was presented with a list of constraints and was asked to verify and discuss the extent of the constraints.

In all, 47 interviews were performed. The interview's response rate was 61 per cent.

Chapter Eight (Part 3) describes in detail the procedures involved in carrying out of the interviews and analysis of data and reports the results.

6.6.7 Sample size

The approach taken in preparing the databases of names and addresses of respondent organisations for Survey 1 and 2 and of respondent organisations and institutions for the interviews have been described in Section 6.6.6.

The present research does not aim to be statistically significant. The key consideration in determining the sample size is the low response rate to postal questionnaire reported in previous studies. In the present research, several efforts have been made to increase the response rate in particular:

1. Utilising all names and addresses of organisations in the main database in carrying out Survey 1, in short the whole population was surveyed;
2. Utilising all names and addresses of organisations indicating willingness to assist in further research in carrying out Survey 2. The names and addresses were compiled from organisations responding to Survey 1;
3. Utilising all names and addresses of organisations indicated willingness to participate in the interview, stratified proportionately and at random from the main database of non-respondent organisations to Surveys 1 and 2 or organisations that failed to indicate willingness to be interviewed and utilising all the 7 institutions identified as respondents in the interviews; and
4. By sending reminders.

Given the physical distance between the UK, where the study is being administered, and Malaysia there are inherent logistical and administrative difficulties in the primary data collection for the research. The research therefore, was largely determined by the good will and willingness of the various respondent organisations and institutions to discuss the issues being investigated.

6.6.8 Analysis of data

The primary data from the questionnaire surveys and from the semi-structured interviews were analysed in two stages. First, the descriptive statistics such as measures of central tendency of mean, median and mode; percentages and measures of dispersion were obtained to describe data. Data on constraint identifications and on the appraisal of proposed strategies were analysed by adopting specific equation and methods, details to be described in Chapters Seven and Eight respectively. All quantitative data analysis was using the SNAP (Version 3) or Microsoft Excel 97 computer software.

In the second stage, the qualitative analysis of the interview data was undertaken. The examination of the interview records (written notes and recorded audio-cassettes) to establish the observations represent the first step of the analysis. The interview data was analysed with particular emphasis on the viability, feasibility and methods of implementation of the appraised strategies, on the presence of current and perceived future constraints and on similarities and differences within and between the different categories of organisations. The discovery of additional factors that are significant in describing the types and extent of constraints and the viability, feasibility and methods of implementation of the appraised strategies are the main contribution of this analysis.

Conclusions about the types and extent of current and perceived future constraints and the proposed strategies to remove or to alleviate the constraints identified are drawn on the basis of the findings from the quantitative and qualitative analyses.

6.6.9 Validity and reliability

A valid measurement is one that does what it is supposed to do and measures what it is supposed to measure. According to Sarantakos (1993, p75) a measure that is valid produces true results that mirrors the true situation and conditions of the environment it is supposed to study. The key issue is the accuracy of the measurement.

There are different kinds of validity (Sarantakos, 1993, p74-80; Idris 1994, p230; Fellows and Liu, 1997, p113-115). For the purpose of the present research the content validity of the data collection instrument is considered to be most relevant. Content validity refers to a measure that covers all possible aspects of the research topic. It is concerned with the degree to which the scale items represent the scope of the concept being studied.

The process of validation in the present research involves two steps:

1. Literature search: An extensive search of the literature for all possible items to be included in the measurement has been performed. The construction of the indicators and variables to measure the relevant concepts is based on a series of key references. These aspects of the validation process will be described in the questionnaire design for Surveys 1 and 2 and the interviews in Chapters Seven and Eight, respectively.

2. Questionnaire piloting: Before the questionnaires for the postal surveys and the interviews were administered, they underwent a series of test to ensure that they were not ambiguous and that the questions were easily understood. The tests involved administration of the draft questionnaires among the research supervisors and a small sample of organisations conveniently drawn from the main database. Details of the tests will be described in the questionnaire designs for Surveys 1 and 2 and the interviews in Chapters Seven and Eight, respectively. Based on the comments and suggestions of the respondents in the pilot test, the contents, wordings and presentation of the questionnaires were modified accordingly prior to producing the final version for administration. Consideration of presenting the questionnaires in *Bahasa Malaysia* was rejected in the light of the comments received suggesting that the questionnaires worded in the English Language were well understood and received by the respondents.

It is acknowledged that the above procedures would not guarantee a perfect content validity. Nonetheless, the procedures taken afford the researcher with a reasonable degree of confidence as to its existence. Other researchers including Abdul Rashid (1991), Idris (1994) and Sharif (1996) had adopted a broadly similar approach.

Reliability refers to the consistency and stability of a measure in achieving repeatability in particular the probability of obtaining the same results if the measure was to be employed several times. Validity and reliability are different but interrelated, the former is concerned with the accuracy issue while the latter is concerned with the consistency issue (for example, Sarantakos, 1993, p80; Idris, 1994, p234).

There are different kinds of reliability. In this present research, the concern is considered to be on the stability reliability. It relates to reliability across time. The issue here is whether the questionnaires produce reliable findings if it is employed several times. Consequently, the test-retest method for testing reliability was employed. According to Sarantakos (1993, p79) the approach involves testing and re-testing subjects with the same questionnaire. If the results arising from both tests are the same, the instrument is considered reliable. In the present research, it is not possible to test and retest subjects due to difficulties in terms of administering the questionnaires and time and costs constraints. Instead, the final draft of each questionnaire was tested and re-tested among the researcher's colleagues. All three sets of questionnaires (Surveys 1 and 2 and the interview questionnaires) produced the same results. However, it is acknowledged that the approach taken in the reliability testing in the present research is extremely basic and perfect stability reliability therefore, could not be achieved.

6.7 Methodology and Research Limitations

Several limitations that may have some impact on the quality of the data gathered and results obtained by the present research were encountered and recognised at each of the three phases of the research.

6.7.1 Limitation of the methodology

The use of the postal questionnaire surveys and the interviews as the main source of obtaining data have several limitations. These issues have been outlined in Section 6.6.2 and 6.6.3, respectively.

A key issue that is considered high on the list of limitations of the methodology is willingness of respondent organisations to assist with the research. Although efforts have been taken to increase response rate of the questionnaire surveys and the interview difficulties were faced. In Survey 1 a response rate of 11.24 per cent was obtained (from 1852 sets of questionnaires send out, 205 sets of questionnaires were returned). In questionnaire Survey 2 a response rate of 29.03 per cent was obtained (from 186 sets of questionnaires send out, 54 sets of questionnaires were returned). In the interviews, a response rate of 66 per cent was achieved (from 71 organisations contacted for the interviews, 47 interviews mostly face-to-face but some through telephones were performed).

The researcher is concerned with the low response rate, particularly of the response rate to Survey 1. However, on the basis that (1) the number of responses received for all surveys and interviews were relatively large, and (2) the degree of consistency of responses which were received back from the wide range of respondent organisations, it is considered that the response rates to the surveys and the interviews were adequate for the purpose of the present research.

The number of officers who were willing to be interviewed restricted the number of interviews performed. Some respondents were not available for interview due to a host of factors such as sickness, urgent duty elsewhere, etc., despite the agreed appointments. In such cases the researcher had to be satisfied with the alternative officers (sometimes of lower position) provided or otherwise the interview may have to be abandoned. In addition, the period of the interview, between August and September 1997, coincided with the worst ever haze conditions in Malaysia. Outdoor activities and air travel was seriously affected and therefore, seriously affecting the researcher's itinerary and that several interviews were cancelled.

The various inherent limitations to the research methodology therefore, could promote some degree of unknown bias and misunderstanding of which the researcher would not have means to minimise.

6.7.2 Resource limitations

Due to constraints in financial, time and human resources only relatively small samples of organisations could be targeted in the investigation. With greater resources available the research could afford to incorporate other categories and types of organisations for all the surveys and the interviews.

Particular attention is drawn to the research scope described in Section 6.3. The present research has no claims for representatives concerning conditions that lie outside the research scope.

6.7.3 Accessibility to published data

During the progress of the present research a major problem has been to obtain published data relating to construction procurement processes in Malaysia, Japan and South Korea. The problems emanate from the fact that (1) in the UK published data on these countries are limited or difficult to access, and (2) a large proportion of the published data is not in English. Attempts were made to reduce this problem by accessing data directly from the countries. In the case of the Malaysian published data, the researcher had an opportunity to gather a substantial proportion of it while carrying out the interviews across Malaysia in August and September 1997.

Data published in *Bahasa Malaysia* was translated into English. To reduce inaccuracies in the translation advice from *Bahasa Malaysia*/English languages experts were sought. In the case of Japan and South Korea certain publish data only available in their national languages and due to time and financial constraints could not be translated into English. Their impact on the present research is not known.

6.8 Summary

The present research aims to seek answers to the following key questions:

1. Are there constraints in the processes of construction procurement that may inhibit the level of construction output?

2. If there are constraints, can the types of constraints be identified and their extent ascertained?

3. If there are constraints and the types and extent of constraints identified, are there appropriate strategies that could be implemented to remove or alleviate the constraints identified?

The research adopts the triangulation research approach. It comprises multiple data sources of literature, respondent organisations, and professional institutions, and mixing the quantitative and qualitative research methods.

The subjects for the research are the main Malaysian organisations that are involved in construction procurement in Malaysia during the period of the research. The respondents' database comprises 1852 organisations. In addition, 6 professional institutions and the CIDB were included as subjects to the interviews. Senior management personnel from the organisations are selected as respondents to the questionnaire surveys and interviews.

There are three stages in the primary data collection. Stage 1 involves the carrying out of postal Survey 1 to identify the types and extent of constraints, current and perceived future constraints, in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output. Stage 2 involves the carrying out of postal Survey 2 to appraise proposed strategies developed to remove or to alleviate the constraints identified through Survey 1. Stage 3 involves reviewing the proposed strategies in the light of the analyses and comments of the respondent organisations in Survey 2 and the carrying out of a series of semi-structured interviews in Malaysia. The interviews also aim to solicit additional information including information to validate the constraints identified through Survey 1.

The present research is limited by constraints in terms of resources: time, financial and human; and in the problems associated with the research methodologies. These would impact the data gathered and results obtained.

The carrying out of Surveys 1 and 2 and the interviews and their results are the focus of the next two chapters.

CHAPTER 7

A SURVEY OF CONSTRAINTS IN THE PROCESSES OF CONSTRUCTION PROCUREMENT IN MALAYSIA

7.0 Introduction

The objectives of both Chapters Seven and Eight are to provide a detailed description of the primary data collection for the present research. They include the design of questionnaires, their construction and piloting, the carrying out of postal questionnaire surveys and interviews, methods of analysis of data and the reporting of results.

Chapter Eight provides in-depth descriptions of the second area of investigation, i.e., development, appraisal and validation of proposed strategies designed to remove or alleviate the constraints identified. The investigation is carried out through questionnaire Survey 2 and a series of semi-structured interviews, respectively.

This chapter will firstly, describe the first area of investigation, i.e., to identify any constraints within the processes of construction procurement in Malaysia that may inhibit the level of construction output. The investigation is carried out through questionnaire Survey 1.

7.1 Objective of Survey 1

The primary objective of Survey 1 is to identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output.

Survey 1 also seeks to gather data about the conditions of the Malaysian construction industry including the extent of use of different types of procurement strategies, the industry's performance, levels of foreign inputs (import) in major resources and the relationship between the construction industry and Vision 2020.

Since empirical data relating to the current conditions of the Malaysian construction industry are lacking, it is felt that those data would provide better understanding of the broader issues relating to any constraints within the processes of construction procurement in Malaysia.

7.2 Questionnaire Design

The concepts to be measured in Survey 1 have been discussed in Chapter Six of this thesis.

The initial questionnaire development process follows an extensive literature search relating to constraints in the processes of construction procurement in Malaysia as well as in other developing and developed countries. The objectives of the search is two-fold:

1. Firstly, to identify suitable questionnaires that may be adopted, perhaps with modifications, to meet the present research aims, or used as a model for designing a questionnaire for the present research. This aspect of the literature search was unsuccessful, questionnaires considered to be suitable were not found. A new questionnaire for Survey 1 therefore, has to be developed; and
2. Secondly, to obtain qualitative data on the types and extent of constraints in the processes of construction procurement in Malaysia. Analysis of the literature reveals the types of resources and functions allegedly to be in constraint. The search uncovered a host of variables that could be included in the questionnaire, mostly from a series of key references. This aspect of the literature search represents the first data source in the triangulation approach adopted by the present research.

Arising from the extensive literature search, an international perspective on constraints in the processes of construction procurement in developing and developed countries has been incorporated as Chapter Three of this thesis.

The present research concerns constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output. Constraints in any of them, possibly due to unavailability, insufficiency, or inappropriate use; are considered restricting or limiting in the processes of construction procurement. Consequently, construction procurement performed in such an environment may be highly inefficient and ineffective and in turn may inhibit the level of construction output.

This research concerns resources that are Malaysian in origin. The reason for considering only Malaysian resources is because the research concerns achieving and sustaining long-term economic growth through Vision 2020. According to Wells (1986, p35) the only option for a vast majority of developing countries, if they wish to achieve and to sustain economic growth in the long-term, is to develop and expand the indigenous resources of materials, manpower and technology. She warned that a failure to do so "in periods of reduced foreign-exchange earnings or international recession" would run the risks of constriction in growth in the economy as a whole. It is considered justifiable therefore, for the present research to focus on indigenous resources only.

Questionnaire for Survey 1 (shown as Appendix A) consists of 6 parts, over 12 pages. The parts are:

1. Part 1: Characteristics of respondent organisations;
2. Part 2: Current and future constraints in resources and functions in construction procurement process in Malaysia;
3. Part 3: Procurement strategies;
4. Part 4: Current performance of the Malaysian construction industry;
5. Part 5: Foreign inputs (import) in the Malaysian construction industry; and
6. Part 6: The Malaysian construction industry and Vision 2020.

All questions are close-ended and almost all require a tick in the appropriate box, or boxes. Where appropriate, respondents were given the option to suggest a non-presented alternative but were informed that written comments could be brief and hand-written. These approaches represent an attempt to seek factual responses and to facilitate respondents in answering the questionnaires.

7.2.1 Questionnaire Part 1: Characteristics of respondent organisations

Part 1 contains questions relating to respondents' organisations. There are 6 questions concerning: (1) type of organisation, (2) size in terms of number of employees, (3) head office location, (4) current projects' locations, (5) types of current projects, and (6) total value of current projects. Respondents were asked to tick a box or boxes representing an answer or answers that reflect their organisations' characteristics. The data serves to provide details of subject's statistics.

7.2.2 Questionnaire Part 2: Current and future constraints in resources and functions in construction procurement process in Malaysia

Part 2 contains questions aimed at identifying the type and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output. In all 84 types of resources and functions were incorporated into the questionnaire. There are 25 questions altogether in Part 2.

A standard list of resources and functions for current constraints and perceived future constraints is used. To each resource or function two rating scales, one each for current constraints and for perceived future constraints are provided. The rating scales are the same, presented side by side, immediately following the resource or function. These approaches were taken in attempts to (1) achieve economy in the size of the questionnaire, in particular the number of pages, and (2) to facilitate respondent organisations in giving their responses. The rating scale and its construction and method of analysis of data will be discussed later.

Question 1. Prior to answering questions on the type and extent of current constraints and perceived future constraints in major resources and functions in the processes of construction procurement in Malaysia respondent organisations were asked whether they or the projects with which their organisations are currently involved experience resources and/or functions constraints. Respondents were asked to provide a simple answer of either Yes or No by ticking the appropriate box.

The approach is taken in an attempt to: (1) obtain an overall expert opinion on the existence or otherwise of current constraints in resources and functions within the processes of construction procurement in Malaysia, and (2) obtain data on the types and extent of current constraints in resources and functions basing on respondents organisations' actual experience. Those that indicate experiencing constraints are asked to answer questions on the type and extent of current and perceived future constraints. The respondent organisations that did not indicate that they were currently experiencing constraints were asked to answer questions on perceived future constraints only.

Question 2. This question was designed to specifically identify the types and extent of constraints during the initial stages of construction procurement. The literature review uncovers various articles and media reports alleging constraints in various resources and functions at project planning stage, in particular:

1. Availability of suitable sites (Monerasinghe, 1985, p50 and 55; Yin, 1993, p13; *Bank Negara Malaysia*, 1992, p72; Awang, 1994, p36-37; The Star, 3 April 1996). The literature suggests constraints in availability of land suitable for development. In urban areas the constraints are exacerbated by high demand for land for housing and high prices of land. In addition, the process of land acquisition and conversion is lengthy, resulting in increased holding cost to clients and restricts the supply of land temporarily.

2. Availability of project finance. No evidence was found in the literature to suggest that availability of project finance to clients is a constraint. The constraint is however, in obtaining the finance, i.e., the process is highly specialised and complex. The complex process may have something to do with availability of funds, i.e., the highly specialised and complex process may well be a manifestation of the existence of a constraint in the availability of funds for project finances. It was decided therefore, that the issue of availability of project finances be investigated.

3. Availability of expert advisers. The literature review suggests that there are constraints in availability of Malaysian professionals with the necessary expertise, skills and experience to advice clients at project planning stage, particularly in the area of feasibility studies.

4. Constraints caused by procedures in obtaining statutory approvals. This is a function constraint related to the authorities that may inhibit progress during the initial stages of the processes of construction procurement. Allegedly constraints occur in obtaining approvals relating to land matters, EIA reports, planning permissions, Development Orders and Building and Services plan approvals

There may be other areas of constraints at project planning stage that could be investigated. However, on the basis of frequency of reporting, i.e., the above four areas were featured more often than other in the literature before the researcher, they are considered to be critical and warrant investigation. It is acknowledged that both the areas of constraints and the approach taken appear to be broad. For instance, there are different aspects of statutory approval, a constraint may occur in some areas but none in others. However, given the fact that this research is exploratory in nature and to attempt to minimise the size of the questionnaire, the approach taken is considered to be adequate.

A space is provided for respondent organisations to specify other areas at project planning stage that constraints are currently experienced and/or constraints that are perceived to exist in the future.

Question 3. This question was designed to specifically identify the types and extent of constraints in availability of key construction materials. The literature search uncovers various articles and media reports alleging constraints in the availability of construction materials, in particular cement and timber (for example, Ministry of Finance, 1994, p73; Ministry of Finance, 1995, p75, 79; Abdullah, 1995, p7-8; Yaacob, 1995, p7-8; Kong, 1996, p10; The Star, 29 March 1996, The Star 3 April 1996; The Star, 6 June 1996, The Star, 16 July 1996, *Berita Harian*, 18 July 1996, The Star, 2 August 1996, The Star, 16 September 1996). The problem appears to be shortages of materials probably due to high demand arising from the current construction boom. There were also allegations of manufacturers' failing to expand their production capacity in tandem with the rapid development of the construction industry. However, no empirical data, apart from cement, was found to support these allegations or identifying the specific type(s) of construction material in constraint and the extent of the constraints.

In considering the types of construction materials to be investigated, use is made of the lists of selected materials contained in the *JKR's* "Special Provision To The Conditions Of Contract For Building Works (Variation of Prices of Materials)" and "Special Provision To The Conditions Of Contract For Civil Engineering Works For Variation Of Prices Of Automotive Gas Oil (Diesoline), Fuel Oil and Bitumen." The lists, (Table 5.7 in Chapter Five) is used in all public work contracts (and in most private contracts). It contains selected materials considered to be significant to all projects. It forms a basis in determining the amount to be added to or deducted from a contract sum relating to variations of prices of materials in a project.

A space is provided for respondent organisations to specify other types of material where constraints are currently experienced and/or constraints that are perceived to exist in the future. If respondent organisations indicate current constraints in the availability of construction materials, they were asked to give two most important reasons for the constraints.

Question 4. This question was designed to specifically identify constraint and its extent in the availability of transportation for distribution of construction materials. There have been allegations that material shortages in some parts of the country may be due to constraints in the availability of efficient transportation to those areas. For instance, the Master Builders (1989/90, p35) claimed that there is a shortage of lorries to transport construction materials, in particular cement, to the east-coast states of Peninsular Malaysia. It is therefore, considered instructive to include a question to identify the availability of efficient transportation for construction materials' distributions in the questionnaires. If respondent organisations indicate current constraints in transportation they were asked to give two most important reasons for the constraints.

Question 5. This question was designed to specifically identify the types and extent of constraints in availability of construction labour. It has become common knowledge that the Malaysian economy is virtually in full employment and that labour shortages in all sectors and upward pressure on wages are major issues. In the context of the construction industry, the key questions are:

1. Are there specific areas of constraints, i.e., in terms of the broad categories of skilled, semi-skilled or unskilled labour and of the different trades? and
2. What is the extent of the constraints?

In the present research, both these questions will be addressed.

In considering the types of constraints in the availability of skilled labour to be investigated, use is made of the list of skilled construction workers available in the CIDB Act 520 of 1994 (Third Schedule, p30). The list (see Table 5.8 in Chapter Five) therefore contains the various trades of skilled labour considered important to the Malaysian construction industry.

A space is provided for respondent organisations to specify other trades that constraints are currently experienced and/or constraints that are perceived to exist in the future. If respondent organisations indicate current constraints in the availability of skilled labour, they were asked to give two most important reasons for the constraints.

Question 6. This question was designed to specifically identify constraints and its extent in availability of facilities for training skilled labour. There have been allegations that formal training facilities are lacking and this has influenced the availability of skilled construction labour (for example, Sharif, 1996, p418). Moggie (1994) Abdullah (1995, p10-11) and Yaacob (1995, p10-11) pointed out that Malaysia does not have a single training centre that specialises in the training of skills for the construction industry. Wang (1991, p104) claimed that Malaysia lacks systematic and orderly education and training of skills for the construction industry.

However, the researchers' own observation reveals that formal skills training centres exist, almost all run by the public sector. These centres claim (based on their prospectuses) to offer courses including those relating to the construction industry. In addition, the are informal on-site apprenticeship schemes (known as *'kepala'*) organised by contractors and subcontractors. The key issue therefore, is the present training facilities insufficient? If so, what extent is the extent of constraints in availability of facilities for training skilled labour?

Question 7. This question was designed to specifically identify the types and extent of constraints in availability of an adequate supply of properly maintained and efficient mechanical plant. Although Malaysia is dependent on the import of new plant and equipment (Anwar Ibrahim, 1996) no published evidence was found to suggest that constraints exist in the availability of mechanical plant for the construction industry. The literature review in Chapter Five established that construction activity in Malaysia is highly labour intensive. Numerous calls have been made by various quarters for contractors to shift to capital and technology intensive operations in order for them to stay competitive, to increase productivity, etc. Contractors may be reluctant to shift toward using capital and technology intensive operations for a number of reasons such as availability of cheaper labour resources (local or imported), lack of funds for capital investments, lack of skills to operate mechanical plant, or probably there are constraints in the availability of mechanical plant in the country. In the light of these issues, particular to the potential constraints in the availability of mechanical plant, therefore, it is considered to be instructive to assess empirically the situation in the availability of mechanical plant both at present and in the future.

In considering the types of mechanical plant to be investigated, use is made of the list of plant available in the "Basic Plant Charges In Connection With Day-works" found in public work contract documents. The list (Table 5.11 in Chapter Five) contains different types of mechanical plant frequently used in all construction projects and is used as basis to determine day-work rates. The list therefore, contains mechanical plant considered to be significant to the Malaysian construction industry.

A space is provided for respondent organisations to specify other types of mechanical plant where constraints are currently experienced and/or perceived to exist in the future. If respondent organisations indicate current constraints in the availability of mechanical plant, they were asked to give two most important reasons for the constraints.

Question 8. This question was designed to specifically identify the types and extent of constraints in availability of key design team members. It has been established through the literature review in Chapter Five that the leading professionals involved in the processes of construction procurement in Malaysia are the architects, engineers and quantity surveyors. They are assisted by the semi-professionals representing architectural, engineering and quantity surveying assistants, respectively.

The literature alleges that Malaysia is facing a shortage in key design team members (for example, Gabor, 1994, p7; The Star, 8 October 1996; The New Straits Times, 18 November, 1996) and that the construction industry depends too much on the services of foreign professionals (Ministry of Finance, 1995, p167; The Star, 23 July 1996). There were claims of competition for professional and semi-professional staff among firms in the private sector (*Berita Harian*, 18 July 1996) and between the public and the private sectors (The Star, 8 October 1996; The Star, 15 September 1996) and of higher salary demands (*Berita Harian*, 18 July 1996; The Star, 8 October 1996). However, the literature does not furnish empirical data and that it is not known as to the specific areas of constraints, in terms of the different types of key professionals or semi-professionals, and the extent of their constraints. It is therefore, considered to be instructive to investigate constraints in the availability of key design team members and of their assistants and to ascertain the extent of the constraints. On the basis of the literature review in Chapter Five the key design team members and their assistants to be investigated are as follows:

1. Professionals (those with degree/professional qualifications): architects, civil and structural engineers, mechanical and electrical engineers and quantity surveyors; and

2. Semi-professionals (technical assistant/technician): architectural, civil and structural engineering, mechanical and electrical engineering and quantity surveying assisting the professionals, respectively.

A space is provided for respondent organisations to specify constraints experienced in the obtaining of other design team members and/or constraints that are perceived to exist in the future. If respondent organisations indicate current constraints in the availability of key design team members, they were asked to give two most important reasons for the constraints.

Question 9. This question was designed to specifically identify the types and extent of constraints in availability of technically competent, experienced and financially capable Malaysian contractors.

The actual number of contractors in Malaysia is difficult to ascertain due to many factors including ease of entry into the business by the smaller sized firms and the presence of the two registration bodies, the *PKK* and the CIDB. In terms of availability of contractors generally, no published evidence was found to suggest that constraints in their availability exist.

However, there have been reports suggesting that Malaysia lacks technically competent, experienced and financially capable contractors, in particular in specialised areas such as in specialised building works, in hydro and in tunnelling projects (Moggie, 1994; Building, 8 July 1994; Building, 12 April 1996). The literature also suggests that foreign specialist contractors undertook most specialist works either singularly or in joint venture with Malaysian contractors. On this basis, it is therefore considered to be instructive to investigate the constraints on the availability of Malaysian contractors in general and of specialist contractors in particular and to ascertain the extent of their constraints. In the questionnaire, questions on the availability of technically competent, experienced and financially capable Malaysian contractors are divided into two:

1. Main contractors referring to building and civil engineering contractors. This group is presented according to the CIDB's grades of registration thus, Grades 6-7 (considered as Large and International firms), Grades 3-5 (Medium firms) and Grades 1-2 (Small firms); and
2. Specialist contractors referring to electrical, mechanical, sanitary and water engineering, telecommunications and other specialist works.

If respondent organisations indicate current constraints in the availability of contractors, they were asked to give two most important reasons for the constraints.

Question 10. This question was designed to specifically identify constraints and their extent in availability of credit facilities or financial backing to contractors. The literature review in Chapter Five established that most contracting firms in Malaysia lack paid-up capital and they rely on other sources to finance their projects. But the process of obtaining funds from financial institutions is tedious, lengthy and complex. This may have something to do with the availability of the credit facilities/financial itself, i.e., the highly specialised and complex process may well be a manifestation of the existence of a constraint in their availability. It was decided therefore, that the issue of availability of project finance be investigated. If respondent organisations indicate current constraints in the availability of credit facilities or financial backing to contractors they were asked to give two most important reasons for the constraints.

Questions 11 and 12. These question were designed to specifically identify constraints and their extent caused by statutory requirements at construction stage and constraints in obtaining Certificate of Fitness for Occupation of the completed facility, respectively.

On statutory requirements at construction stage, the literature review in Chapter Five outlines the requirements to be followed by contractors during construction and the different authorities involved in ensuring those requirements are met. Wang (1987, p90) claimed that there is very little or nominal control by the authorities during construction and that the S.O or the Architect or Engineer are taking control of the construction operations until works are completed. Nonetheless, there have been numerous allegations concerning various problems faced particularly by contractors during the construction stage. The allegations include the authorities' high-handed approach in enforcing statutory regulations, such as safety regulations, dirtying of public roads, noise and other forms of pollution; and failures to take appropriate or immediate actions on non-compliance leading to prolonged work-stop orders and unnecessary delays. Alwi (1995, p51) claimed that the authorities constantly monitor projects so that offences are not committed or if committed, those responsible are disciplined. However, he indicated that availability of staff is a constraint. On the basis of the issues presented, it is considered to be instructive to include a question to identify constraints and the extent of those constraints caused by statutory requirements at construction stage.

On constraints in obtaining CF for occupation of the completed facility, it has been alleged that clients faced various procedural and bureaucratic problems when applying for the certificate (The Star, 2 April 1996; The Star, 13 April 1996; The Star, 20 June 1996; The Star, 19 August 1996; The Star, 2 September 1996). The alleged problems include ambiguous procedures, procedures that are not standardised among the various bodies within a local authority and among the different authorities within Malaysia, staff shortages within the authorities, non-technical considerations and that the process takes a very long time. However, no empirical data was found to support these claims. Therefore, it is considered instructive to identify whether constraints exist in obtaining the Certificate of Fitness and if so, to ascertain its extent.

Questions 13 and 14. These questions were designed to specifically identify constraints and their extent during the processes of tendering for contractors' and consultants' services, respectively. Question 13 seeks to identify constraints in tendering for contractors' services, in terms of fair competition, adequacy of tender documents and tendering period. Question 14 seeks to do the same for consultants' services, in terms of system of selection and appointment. Problems concerning these issues have been discussed in Chapter Five of this thesis.

Questions 15, 16, 17, 18 and 19. These questions were designed to specifically identify constraints and their extent in the administration of a contract. There are various aspects associated with contract administration. In the present research, the aspects to be investigated are: co-ordination of various parties involved (question 15), political and/or bureaucratic interference (question 16), conditions of contract in terms of fair and equitable terms for all parties (question 17), problems in interim payments to contractors, inspections of works; communications between contractor and clients or their representatives (question 18) and constraints caused by design standards/specifications in terms of their appropriateness to local conditions and practice (question 19). Discussions relating to these areas have been presented in Chapter Five of this thesis.

Question 20. This question was designed to specifically identify constraints and their extent in obtaining bonds to meet bond requirements. The 3 types of bonds normally required by clients are:

1. Bid bond: submitted by a tenderer in support of a bona fide tender. The amount is usually 3 per cent of the tendered sum;
2. Performance bond: submitted by a contractor in order to guarantee the performance of a contract. The amount is usually 5 per cent of the contract sum; and
3. Advance payment bond: submitted by a contractor to guarantee the reimbursement of advance payment paid by the client. The amount is equivalent to the amount of advance payment paid.

The bonds may be in the form of cash, bank or insurance guarantees. In the present research the three types of bonds are included in the questionnaire.

There have been allegations that contractors faced problems such as delays or failures to participate in tenders, tenders rejected, delays to commence works, failure to obtain advance payments, etc. for failures to provide the requisite bonds. The problems seem to emanate from contractors' inability to raise the amount of cash required or to provide collateral acceptable by insurance companies or banks in order for them to issue letter of guarantees. There were also allegations of complex and bureaucratic procedures, prolonged delays or inability of local insurance companies and banks to provide the required bonds despite the contractors' ability to provide the necessary collateral. The DTI, UK (1995, p4) indicates that there are weaknesses in these areas of Malaysia's financial sector. However, no empirical data was found to support these allegations. Therefore, it is considered instructive to identify whether there are constraints caused by different types of bond, and if so to ascertain their extent, respectively. If respondent organisations indicate current constraints they were asked to give two most important reasons for the constraints.

Question 21. This question was designed to specifically identify constraints and their extent in availability of adequate insurance facilities to cover risks. The two common types of insurance in the Malaysian construction industry are:

1. Works insurance: this normally takes the form of a Contractor's All Risks Insurance. It covers the works against loss and damage by the various factors of

risks, damages to contractor's property such as plant and equipment, and public liability insurance; and

2. Professional indemnity: It covers the consultant firms against risks of professional negligence.

In the present research both types of insurance are included in the questionnaire.

There have been allegations that contractors and consultants faced problems in obtaining adequate insurance facilities to cover risks. The contractors and consultants claimed that insurance companies charged exorbitant rates so high that they could not afford to pay. They therefore settled for bare minimum cover or even lower cover. There were also allegations of complex and bureaucratic procedures, prolonged delays or inability of local insurance companies to provide the necessary insurance covers despite the contractors' and consultants' ability to pay the full costs of premium charged. The DTI, UK (1995, p4) indicates that there are weaknesses in Malaysia's insurance sector. However, no empirical data was found to support these allegations. Therefore, it is considered instructive to identify whether constraints exist in availability of adequate insurance facilities to cover risks and if so to ascertain its extent. If respondent organisations indicate current constraints they were asked to give the two most important reasons for the constraints.

Question 22. This question was designed to specifically identify constraints and their extent in the availability of reliable sources of published information in terms of statutory requirements, cost data and project opportunities for contractors and consultants.

In carrying out the present research, the researcher found that data relating to statutory requirements on construction, cost data for tendering and estimating purposes, construction orders, construction starts, on-going works and works completed are either non-existence or if they are available, they are not comprehensive and often outdated. Apart from the (1) *JKR*'s biannual tender price index for public works, and (2) the ISM's quartely cost analysis and basic material prices there are no other bodies or institutions which analyse data or forecast predictions for the construction industry on a regular basis. Other researchers including Monerasinghe (1985, p37) and Sharif (1996, p63) have reported problems in gathering secondary data relating to the Malaysian construction industry. Abdullah (1994, p2) claimed that Information Technology in the construction sector is almost non-existence and that vital statistics of the industry have not been compiled, monitored and kept for ease of reference.

This raises a question whether the apparent lack of reliable source of published information affects the processes of construction procurement and if so to what extent? The concern of question 22 is the availability of sources of published information relating to statutory requirements, cost data and project opportunities. It is thought to be instructive that information about availability of these areas of information considered critical to both the participants and the processes of construction procurement was sought.

Question 23. Respondent organisations were given further opportunities to specify other type resources or functions where constraints are currently experienced and/or constraints that are perceived to exist in the future. This approach represents an attempt by the researcher to identify other types of resources and functions not included in the questionnaire but that could be in constraints currently or perceived to be in constraint in the future.

Question 24. This question was designed to specifically identify the location that has the most constraint (overall) when acquiring construction projects. Respondents were asked to give the name of one state in Malaysia that, based on their own organisation' experience, has the most constraints.

Question 25. In contrast to question 24, this question was designed to specifically identify the location that has the least constraint (overall) when acquiring construction projects. Respondents were asked to give the name of one state in Malaysia that, based on their own organisations' experience, has the least constraints.

7.2.2.1 Rating scale for Questionnaire Part 2

In the questionnaire part 2 a subjective assessment approach was used to record the expert opinions of respondent organisations.

Respondent organisations were given opportunity to rate, on a Likert style scale, the extent or otherwise of constraints in each resource or function, either 1, 2, 3, or 4 representing No Constraint, Low Constraint, Medium Constraint or High Constraint, respectively. A rating of 1 indicates no constraint in a resource or function thus implying that the processes of construction procurement could be performed very efficiently. A rating of 4 indicates high constraint in a resource or function thus implying that the processes of construction procurement could be severely restricted or limited. The respondent organisations were asked to tick a box representing a number on the scale that reflected their organisations' assessment of the type and extent of current constraints and/or perceived future constraints in resources and functions in construction procurement processes in Malaysia.

However, consistent with basic economic theory that all resources and functions are scarce (for example in Myers, 1994, p1) it would be highly unlikely that no constraint at all in resources and functions within the processes of construction procurement was experienced. On this basis, it was decided that the scale of 1 would act as a dummy scale. In the analysis of data the scores for 1 would be combined together with the scores for 2 to become 1 representing Low Constraint. Consequently, the scoring system is set as 1, 2 and 3 for Low Constraint, Medium Constraint and High Constraint ratings, respectively.

The above method for recording respondents' expert opinions excludes questions 1, 24 and 25. For these questions, the respective methods have been described together with those questions.

7.2.2.2 Method of analysis of data for Questionnaire Part 2

A literature search was performed to identify methods of analysis of data. The search uncovers various methods of analysis of data such as mean scores, modal scores and relative indices. Researchers and writers including those in the field of construction research such as Shash (1993, p115) and Holt (1997, p88) have discussed the merits and demerits of these methods of analysis of data. For instance, Shash contends that mean and standard deviation may not be suitable statistics for determining the overall ranking of factors being investigated, he prefers the importance index method in displaying the significance of results. Holt claimed that the relative index is used extensively in construction research for analysing structured questionnaire survey response data for measuring attitude. Using hypothetical data, Holt compares the relative index methodology with commensurate observations on mean response and concluded that:

> "… should ordinal sorting of variable (based on sample attitude) be the only research requirement, then the more simple measure of mean response will achieve the same results as relative index."

In one particular study concerning productivity issues in the Indonesian construction industry, Arditi and Mochtar (1996, p14) apply a scoring system that is consistent with the scoring system used in the present research. In the analysis of data, they used weighted mean score, the equation being:

$$S = \frac{3H + 2M + L}{H + M + L}$$

Where S is the weighted mean score, H is the percentage of respondent that gave a High rating, M is the percentage of respondent that gave a Medium rating, and L is the percentage of respondent that gave a Low rating. In addition, they provide interpretation of the weighted mean score hence, scores between 1.00 – 1.66 are classified as Low, 1.67 – 2.33 as Medium and 2.34 – 3.00 as High in relation to the concepts being studied.

In the present research, the weighted mean score, the modal score and the relative index methods of analysis of data were tested on the data received from the pilot studies. The results obtained from each method were analysed. These show that the outputs, in terms of the scores received by each resource and function are consistent, irrespective of the method of analysis of data used.

On the basis of the following factors, the Arditi and Mochtar's (1996, p14) method of analysis of data was adopted for use:

1. The scoring system is consistent with the scoring system used in the present research;
2. The study relates to the Indonesian construction industry, using Indonesians organisations as subjects. The method of analysis of data therefore, has been

tested in the context of a construction industry and culture similar to the one in Malaysia; and

3. The method provides an interpretation of the weighted mean score, in the context of the present research, which facilitates categorisation of the scores for each resource and function into Low, Medium or High constraints respectively

In the present research the resources and functions that received High or Medium scores are considered to be constrained. This approach is taken because:

1. A High rating or a medium rating for a resource or function indicates that the constraint is critical and could severely restrict or limit the processes of construction procurement; and
2. A high rating or a medium rating suggests that there is an urgent need for strategies to remove or to alleviate the constraints in that resource or function in order to boost construction output.

7.2.3 Questionnaire Part 3: Procurement strategies

Part 3 contains questions aimed at establishing the current extent of use of various procurement strategies in Malaysia. There are 6 questions altogether in Part 3.

Question 1. This question was designed to establish the present extent of use of different basis of appointment of consultants. Two approaches: scale of fees and fee competition, were presented. A space is provided for respondent organisations to specify any other basis of appointment of consultants, which they consider to be dominant.

Question 2. This question was designed to establish the present extent of use of different basis of appointment of main contractors for building and civil engineering works. Four approaches: open tendering, selective tendering, negotiation and pre-qualification, were presented. A space is provided for respondent organisations to specify any other basis of appointment of main contractors, which they consider to be dominant.

Question 3. This question was designed to establish the present extent of use of different basis of appointment of specialist contractors (for example for electrical, mechanical, telecommunication, etc.) Three approaches: nominated sub-contractors, domestic sub-contractors and specialist contractors directly employed by the client were presented. A space is provided for respondent organisations to specify any other basis of appointment of specialist contractors, which they consider to be dominant.

Question 4. This question was designed to establish the present extent of use of different forms of joint venture contracting in Malaysia. Two approaches: joint venture between Malaysian and foreign firms and between Malaysian and Malaysian firms were presented. A space is provided for respondent organisations to specify any other forms of joint venture contracting, which they consider to be dominant.

Question 5. This question was designed to establish the present extent of use of different contractual arrangements in Malaysia. Seven types of contractual arrangements: lump sum based on drawings and specifications, lump sum based on firm bills of quantities, approximate bills of quantities, design and build, cost plus, management contracting and construction management, were presented. A space is provided for respondent organisations to specify any other types of contractual arrangement, which they consider to be dominant.

Question 6. This question was designed to establish the present extent of use of different standard forms of contract. Two standard forms: PWD 203 series and PAM Standard Forms of Contract were presented. A space is provided for respondent organisations to specify any other standard forms of contract, which they consider to be dominant.

7.2.3.1 Rating scale for Questionnaire Part 3

In the questionnaire part 2 a subjective assessment approach was used to record the expert opinions of respondent organisations.

Respondent organisations were given opportunity to rate, on a Likert style scale, the extent of use of the different procurement strategies, either 1, 2, or 3 representing Low frequency of use, Medium frequency of use or High frequency of use, respectively. A rating of 1 indicates low frequency of use thus, implying that the particular procurement strategy is not dominant. A rating of 3 indicates high frequency of use thus, implying that the particular procurement strategy is dominant. The respondent organisations were asked to tick a box representing a number on the scale that reflected their organisations' assessment of the present extent of use of different procurement strategies in Malaysia.

7.2.3.2 Method of analysis of data for Questionnaire Part 3

Number of responses to Low frequency of use, Medium frequency of use and High frequency of use for each procurement strategy will be recorded. The predominant response to each procurement strategy indicates the extent of use of that procurement strategy.

7.2.4 Questionnaire Part 4: Current performance of the Malaysian construction industry

Part 4 contains questions aimed at establishing the current performance of the Malaysia construction industry. There are 14 questions altogether in Part 4.

Different indicators are presented to assess the performance of various aspects of the Malaysian construction industry.

Question 1. This question was designed to specifically establish design time performance. Design time refers to the period between briefing to tender invitation.

Question 2. This question was designed to specifically establish construction time performance. Construction time refers to the period from possession of site to practical completion.

Question 3. This question was designed to specifically establish construction cost performance. The measure of construction cost performance here relates to performance in terms of ability to combat cost increase during construction.

Question 4. This question was designed to specifically establish performance in quality. Quality refers to performance in terms of meeting client's needs.

Question 5. This question was designed to specifically establish performance in using modern technology, i.e., (1) in design for example, the use of computers in design, in estimating, in tender and contract documentation, and (2) in construction for example, the use of modern equipment, modern construction techniques, robotics, etc.

Question 6. This question was designed to specifically establish performance in project management in construction. The measure here is the extent of use modern project management tools including the use of computers (i.e., other than simple bar charts and schedules).

Question 7. This question was designed to specifically establish quality of locally produced construction materials.

Question 8. This question was designed to specifically establish standard of workmanship.

Question 9. This question was designed to specifically establish performance in terms of health and safety on construction sites.

Question 10. This question was designed to specifically establish performance in terms of level of investment in assets (fixed and current).

Question 11. This question was designed to specifically establish performance in terms of level of investment in research and development.

Question 12. This question was designed to specifically establish overall performance in terms of design time, construction time, construction cost and quality in the following sectors: (1) housing and residential buildings, (2) commercial and industrial buildings, (3) civil engineering and others, (4) public sector, and (5) private sector. Each sector is represented in the questionnaire.

Question 13. This question was designed to specifically establish performance in export of construction services in the key sectors of (1) consultants, and (2) Contractors. A space is provided for respondent organisations to specify other sectors that they considered to be significant.

Question 14. This question was designed to specifically establish the success of technology transfer in the Malaysian construction industry.

7.2.4.1 Rating scale for Questionnaire Part 4

In the questionnaire part 4 a subjective assessment approach was used to record the expert opinions of respondent organisations.

Respondent organisations were given opportunity to rate, on a Likert style scale, the performance of the Malaysian construction industry, on the basis of the key performance indicators, either 1, 2, 3 or 4 representing Poor performance, Good performance, Very Good performance or Excellent performance, respectively. A rating of 1 indicates poor performance thus, implying that the construction industry's performance is poor in terms of the indicator that scored poor. A rating of 4 indicates excellent performance thus, implying that the construction industry's performance is excellent in terms of the indicator that scored excellent. The respondent organisations were asked to tick a box representing a number on the scale that reflected their organisations' assessment of the current performance of the Malaysian construction industry basing upon the given indicators.

7.2.4.2 Method of analysis of data for Questionnaire Part 4

Number of responses to poor performance, good performance, very good performance and excellent performance for each construction industry performance indicator used will be recorded. The predominant response to each performance indicator indicates the current performance of the Malaysian construction industry in terms of that performance indicator.

7.2.5 Questionnaire Part 5: Foreign inputs (import) in the Malaysian Construction industry

Part 5 contains questions aimed at establishing the current extent of use of foreign inputs (import) in key resources in the processes of construction procurement in Malaysia and the reasons for using imported resources. There are 12 questions altogether in Part 5.

Question 1. This question was designed to specifically establish the extent of use of imported key construction materials. Derived from the literature, the following construction materials were incorporated into the questionnaire to ascertain the level of use of various types of imported construction materials. They are: (1) cement, (2) steel bars and fabric reinforcement (3) steel and metal sections, (4) plumbing materials, and (5) sanitary fittings. A space is provided for respondent organisations to specify any other types of imported construction materials.

Question 2. This question was designed specifically to establish the reason for using imported materials. Respondent were given the choice of: (1) superior in quality, (2) taste and style, (3) inadequate or shortage of locally produced material, and (4) materials not produced locally A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

Question 3. This question was designed specifically to establish the extent of use of imported construction labour belonging to the categories of (1) unskilled, (2) semi-skilled, and (3) skilled labour.

Question 4. This question was designed specifically to establish the reason for using imported construction labour. Respondents were given the choice of (1) superior standard of workmanship, and (2) inadequate or shortage of local labour. A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

Question 5. This question was designed specifically to establish the extent of use of imported mechanical plant and spare parts.

Question 6. This question was designed specifically to establish the reason for using imported mechanical plant and spare parts. Respondents were given the choice of (1) superior quality and reliability, (2) inadequate or shortage of locally manufactured mechanical plant and spare parts, and (2) mechanical plant and spare parts not produced locally. A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

Question 7. This question was designed specifically to establish the extent of use of imported design team members belonging to the categories of (1) professionals, and (2) semi-professionals.

Question 8. This question was designed specifically to establish the reason for using imported design team members. Respondents were given the choice of (1) technical expertise and experience, (2) taste and style, and (3) inadequate or shortage of local consultants. A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

Question 9. This question was designed specifically to establish the extent of use of imported main contractors for building and civil engineering works.

Question 10. This question was designed specifically to establish the reason for using imported main contractors for building and civil engineering works. Respondents were given the choice of (1) technical expertise and experience, (2) financial capability, and (3) inadequate or shortage of local main contractors. A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

Question 11. This question was designed specifically to establish the extent of use of imported specialist contractors for example for electrical, mechanical, telecommunications works, etc.

Question 12. This question was designed specifically to establish the reason for using imported specialist contractors. Respondents were given the choice of (1) technical expertise and experience, (2) financial capability, and (3) inadequate or shortage of local specialist contractors. A space is provided for respondent organisations to specify any other reasons that they considered to be significant.

7.2.5.1 Rating scale for Questionnaire Part 5

In the questionnaire part 5 a subjective assessment approach was used to record the expert opinions of respondent organisations.

For questions on the extent of use of imported resources, respondent organisations were given opportunity to rate, on a Likert style scale, either 1, 2, 3 or 4 representing None, Low import, Medium import or High import, respectively. A rating of 1 indicates none thus, implying that locally produced resource is used in the processes of construction procurement in Malaysia. A rating of 4 indicates high import thus, implying that high level of imported resource is used in the processes of construction procurement in Malaysia. The respondent organisations were asked to tick a box representing a number on the scale that reflected their organisations' assessment of the current extent of use of those foreign inputs (imports).

For questions on the reasons for using imported resources, respondent organisations were given a range of answers. They were asked to tick the appropriate box or boxes that best describe their organisations' opinion. In addition, they may specify other reasons that they considered significant.

7.2.5.2 Method of analysis of data for Questionnaire Part 5

Number of responses to None, Low import, Medium import and High import for each resource will be recorded. The predominant response to each resource indicates the current extent of foreign inputs (import) in the processes of construction procurement in terms of that particular resource.

As to analysis of data for reasons for using imported resources, number of responses to each reason will be recorded. The reasons will be ranked in order of relative importance on the basis of the number of responses each reason scored. The higher the score, the more importance will be the relative ranking.

7.2.6 Questionnaire Part 6: The Malaysian construction industry and Vision 2020

Part 6, the final part of the questionnaire contains questions aimed at identifying (1) the types of projects procured prior to, and since, the introduction of Vision 2020, and (2) the priorities in construction procurement prior to, and since, the introduction of Vision 2020. There are 3 questions altogether in Part 5.

This part of the questionnaire requires the respondents to make personal assessment, on the basis of their own experience, of the issues being presented. A valid response, for the purpose of this part of the questionnaire, refers to a response from a Malaysian person that has the experience working in the Malaysian construction industry prior to, and since, Vision 2020 was introduced in February 1991.

In an attempt to obtain valid responses, the following assumptions were made and actions taken:

1. The fact that a respondent is working with an organisation that is currently involved in the processes of construction procurement in Malaysia implied that

the person has the experience working with the Malaysian construction industry since Vision 2020 was introduced; and

2. Respondents were asked to indicate whether they have already been involved with the Malaysian construction industry prior to February 1991.

Question 1. This question was designed specifically to establish respondents' experience with the Malaysian construction industry prior to the introduction of Vision 2020 in February 1991. Respondents were asked to provide a simple answer of either Yes or No by ticking the appropriate box.

If a respondent indicates involvement with the Malaysian construction industry prior to February 1991, it could be assumed that he/she has the experience working with the Malaysian construction industry prior to the introduction of Vision 2020.

Those respondents having the experience working in the Malaysian construction industry prior to the introduction of Vision 2020 were asked to answer this part of the questionnaire.

Question 2. This question was designed specifically to establish the types of projects procured prior to, and since, Vision 2020 was introduced. The types of projects presented for respondents to make their assessment are (1) low cost houses, (2) medium cost houses, (3) high cost houses, (4) commercial, (5) industrial and (6) civil engineering and other.

Question 3. This question was designed specifically to establish the priorities in construction procurement prior to, and since, Vision 2020 was introduced. The priorities presented for respondents to make their assessment are (1) technical complexity, (2) aesthetic/prestige, (3) value for money, (4) speed to completion, (5) price certainty, and (6) low maintenance cost. A space is provided for respondent organisations to specify other priorities in procurement that they considered to be significant.

7.2.6.1 Rating scale for Questionnaire Part 6

In the questionnaire part 6 a subjective assessment approach was used to record the expert opinions of respondent organisations.

Respondents were asked to rank, in order of importance, the types of projects procured (question 2) and the priorities in construction procurement (question 3) prior to, and since, Vision 2020 was introduced. The ranking system adopted is as follows: 1 as the most important priority, followed by 2, 3, 4, 5, and 6 as the least important priority.

7.2.6.2 Method of analysis of data for Questionnaire Part 6

The mean value for each variable is calculated. The relative ranking for a variable, in relation to other variables, is determined by its mean value. A variable scoring the lowest mean value will receive the highest ranking thus, implying it being the most important variable. A variable scoring the highest mean value will receive the lowest ranking thus, implying it being the least important variable.

7.2.7 Other aspects of the questionnaire

In further attempts to minimise the exclusion of important data relating to constraints in the processes of construction procurement in Malaysia from the present research, a space is provided at the end of Part 6 of the questionnaire for respondents to write their comments.

At the end of the questionnaire, a short note is added to inform respondents of the next stage of the present research concerning development of proposed strategies to remove or to alleviate the constraints identified. In order to achieve consistency, respondents were invited to participate. They were asked to indicate their willingness to co-operate by stating their name and contact numbers (telephone and facsimile) and their organisation's name and address in the space provided.

The researcher's name, full postal and e-mail addresses, and contact numbers (telephone and facsimile) were also provided in order to facilitate respondents contacting the researcher should they wish to do so.

7.3 Questionnaire Piloting

Before the questionnaire was administered, it underwent a series of tests in attempts to minimise shortcomings including in ambiguity, to ensure that the questions were easily understood, to remove obvious problematic aspects of the questionnaire and to validate the form and content of the questionnaire before the main survey.

The initial test involved piloting the questionnaire among the researcher's colleagues, several final year undergraduate Malaysian students pursuing the BSc Honours in Quantity Surveying course and experts from the Nottingham Trent University. The experts were Professor R. Morledge and Dr A. Sharif from the Construction Procurement Research Unit, Professor J.A.J. Moohan from the Department of Surveying and Dr J. Disney from the Department of Mathematics, Statistics and Operational Research. In addition, several communications through emails and telecom, in particular with Malaysians considered to be experts in both the construction industry and research methodologies were performed. Various comments concerning shortcomings and views considered to be useful including variables to be added or omitted, wording, content, layout and in the presentation of the questionnaire, the rating scales and the analysis of data were received, all were addressed.

The outcome of the initial test, the third draft of the questionnaire, was mailed to 20 senior officials of organisations, some known to the researcher and others conveniently selected from the main database of respondent organisations. The postal questionnaire piloting was administered between 16 July 1996 and 18 September 1996. From the 20 organisations, 10 organisations participated in the piloting. The postal piloting represents a dry run of the processes of postal questionnaire survey that the research will employ.

Arising from the piloting with the Malaysian respondents, the whole content was examined and changes made to improve it. On the basis of the comments and suggestions from the pilot tests, the questionnaire was recomposed until a satisfactory format has been achieved. Six drafts of the questionnaire were prepared before finalisation was considered to be possible. The final version was administered. However, it was acknowledged that some problems would not become apparent until the actual survey has been administered.

7.4 Carrying out Survey 1

The whole process of Survey 1, unless otherwise stated, was conducted entirely by the researcher.

The questionnaire, addressed to senior management personnel, was mailed to all 1,852 organisations in the main database (see Chart 6.2 and Table 6.1 of Chapter Six) on 1 November 1996. The reasons for including the entire population as subject for the research have been discussed in Chapter Six of this thesis. Consequently, a conventional random sampling was not done. To each questionnaire two covering letters written on The Nottingham Trent University's letter headed paper, in English and its version in *Bahasa Malaysia* were attached. The covering letter explains the objective of the research and reassurance on confidentiality of data to be gathered.

In order to facilitate questionnaire returns, a self-addressed freepost envelope was attached to each questionnaire. For this purpose, an account known as International Business Reply Service (IBRS) was opened with the Royal Mail through The Nottingham Trent University's postal services. The freepost envelope, carrying the university's address, was designed in accordance with the Royal Mail and The Nottingham Trent University's specifications. The university's Department of Surveying official seal was stamped to each freepost envelope to facilitate sorting and delivering the returns to the researcher by the university's postal services.

In order to achieve economy in postal charges the following actions were taken. A colleague in Malaysia willing to assist in mailing the questionnaire from within Malaysia was identified. All 1,852 sets of questionnaire, each in a sealed envelope, were air mailed in bulk through a courier company to the colleague who subsequently mailed them within Malaysia. To minimise his inconvenience but most importantly to ensure all envelopes were correctly addressed and appropriately stamped, the researcher affixed the address labels and requisite Malaysian stamps on each envelope. The colleague in Malaysia supplied the stamps after an order, specifying the actual weight and size of an envelope containing a full set of questionnaire, the covering letters and the freepost envelope, was made by the researcher. Through this approach, the researcher was able to bring down the cost of postal charges by some 50 per cent. After 2 days of sending the questionnaire to the

Malaysia the Malaysian colleague confirmed via email that he received all the sealed envelopes and has subsequently, posted them all.

Each respondent organisation was kindly requested to respond within 4 weeks from the date the questionnaire was mailed from the UK. This was stated in the covering letters. The researcher took advice from experts on postal questionnaire surveys from The Nottingham Trent University and considered that 4 weeks is sufficient for the questionnaire to reach the organisations and for the respondent organisations to provide their responses. Follow-up actions through letters, emails (where email addresses were available) and facsimile were undertaken. Three weeks into the survey, a standard letter of reminder was sent to all organisations that had not responded and in order to afford them more time, an additional three weeks were given to the organisations to provide responses.

Arising from the reminders, it was discovered that several organisations might not have received the questionnaire. This assumption was made on the basis of 4 organisations that responded to the reminders, each claiming not receiving the questionnaire. Immediately, the researcher took the following steps:

1. The colleague in Malaysia who assisted in mailing the questionnaires in Malaysia was contacted via email and asked to check whether there were envelopes containing the questionnaire left unmailed and to make enquiries whether there were problems encountered by the Malaysian postal services in delivering the envelope containing the questionnaire. The colleague confirmed via email that all envelopes were mailed and that there were no indications to suggest that the Malaysian postal services was unable to deliver the envelopes containing the questionnaire to the addresses; and

2. A set of questionnaire was sent to each of the 4 organisations that claimed not receiving the original questionnaire.

On the basis of the Malaysian colleague's confirmation and the very small numbers of organisations claiming not receiving the questionnaire, it was assumed that the incident is isolated and that it would not affect the number of responses.

All together, 205 valid responses (11.24 per cent) were received. The largest proportion of the valid responses (135 responses) was received within four weeks of starting the survey. By 20 January 1997, all responses were received. Since no further responses were received after this date, the survey was closed on 31 January 1997. As expected no further response was received after the closing date.

The valid response rate was calculated using the following equation:

$$R = \frac{(n - n1) \times 100}{(N - n1)}$$

Where R is the valid response rate, N is the total number of questionnaire send out, n is the total number of responses, and n1 is the number of invalid response.

Twenty-eight questionnaire were returned but were considered to be invalid responses. The invalid responses comprise: (1) 10 envelopes returned unopened due to change in address or organisations were no longer active, (2) 10 questionnaires were returned unanswered, in this case the two most common reasons cited for non-answering were lack of expertise in dealing with the questions and the questions are not relevant to their line of business; and (3) 7 questionnaires were returned with substantial parts left unanswered or answered incorrectly.

The response rate achieved is rather disappointing. However, the Malaysian construction industry was experiencing a boom. It is to be expected that organisations involved in construction procurement were tied up with heavy workloads and this probably influenced the rate of response. In addition, the size of the questionnaire, 12-pages altogether, could also influence the rate of response. In relation to Malaysian contractors, a low response rate could be due to (1) lack of interest to respond to a questionnaire survey, and (2) the difficulty of obtaining information where there is no tangible mutual benefit (Abdul Rahman and Alidrisy, 1994, p415).

All 205 valid responses received were used in the analysis of the research findings. Full details of subject's statistics (Questionnaire Part 1) are given in Tables 1 – 12 of Appendix B. Data on key areas of the subject's statistics indicates that:

1. The majority (68 per cent) of the respondent organisations are designers;

2. The majority (79 per cent) of the respondent organisations are from the private sector;
3. The majority (65 per cent) of the respondent organisations have less than 50 employees;
4. The largest proportion of responding organisations (35 per cent) have their head office in Kuala Lumpur;
5. The largest proportion of responding organisations (44 per cent) have their current projects located in Kuala Lumpur;
6. The types of projects currently undertaken by respondent organisations, in order of importance, based on frequency of responses are: (1) other buildings excluding housing, (2) housing, and (3) civil engineering works; and
7. The majority (57 per cent) of respondent organisations were undertaking projects with the total value in excess of RM 40 millions

On the basis that (1) the entire population was included in the survey, and (2) due to the degree of consistency of responses received from the wide range of respondent organisations used in the investigation, the response in terms of the number of valid responses received, i.e., 205 responses; was considered to be adequate for the intended purposes of this investigation.

In addition, on the basis of the characteristics of respondent organisations and the fact that respondent organisations were stratified, it is believed that the survey represents the opinion of the majority of organisations in Malaysia currently involved in the processes of construction procurement.

7.5 Results

In the analysis of data advice were sought from various experts in particular from The Nottingham Trent University's Professor R. Morledge of the Construction Procurement Research Unit, Professor J.A.J Moohan of the Department of Surveying, Ms Beverly Priest of Trent Surveys and Ms J. Lincoln of the Department of Mathematics, Statistics and Operational Research. However, it is acknowledged that the analysis of data is the responsibility of the researcher and that the advice from these experts does not make them in any way responsible for the results of the survey.

7.5.1 Presence of current constraints

The results suggest that in Malaysia the majority of respondent organisations (83 per cent) currently experience constraints in resources and functions within the processes of construction procurement (Table 7.1).

The results also suggest that current constraints in resources and functions within the processes of construction procurement are experienced by the majority of respondent organisations in the public and private sectors and in the categories of client, designer and contractor categories (Tables 7.2 and 7.3, respectively).

Table7.1 - The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (overall)

Current constraint	No	%
Yes	170	82.90
No	35	17.10
Total	205	100.00

Table 7.2 - The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (by sector)

Current constraint	Public sector		Private sector	
	No	%	No	%
Yes	33	75.00	137	85.09
No	11	25.00	24	14.91
Total	44	100.00	161	100.00

Table 7.3 - The presence of current constraints in resources and/or functions in construction procurement processes in Malaysia as experienced or perceived by respondent organisations (by client, designer, contractor)						
Current constraint	**Client**		**Designer**		**Contractor**	
	No	**%**	**No**	**%**	**No**	**%**
Yes	10	71.40	119	85.00	41	80.40
No	4	28.60	21	15.00	10	19.60
Total	14	100.00	140	100.00	51	100.00

7.5.2 Identification of the types and extent of constraints

The interpretation of the weighted mean score has been set as follows: scores between 1.00 – 1.66 are classified as Low, 1.67 – 2.33 as Medium and 2.34 – 3.00 as High constraints.

Chart 7.1 provides a graphical presentation of the overall results. Full details of the results are given in Tables 13 - 18 of Appendix B. Tables13 and 14 show detailed results for the type and extent of current and perceived future constraints, respectively, as experienced or perceived by all respondent organisations. Tables 15 and 16 show the results for the type and extent of current and perceived future constraints, respectively, as experienced or perceived by client, designer and contractor. Table 17 provides a summary and relative ranking for current and perceived future constrained resources and functions. And Table 18 shows the results of Chi-square Test of Independence between each constrained resource or function and categories of organisation of client, designer and contractor.

The results show that no resource or function scored high for current constraints. The results show that 29 types of resources and functions scored medium for current constraints. The remaining 55 types of resources and functions scored low for current constraints.

The results show that no resource or function scored high for perceived future constraints. The results show that 32 types of resources and functions scored medium for perceived future constraints. The remaining 52 types of resources and functions scored low for perceived future constraints.

In the present research, the constrained resources or functions are those that received high or medium scores. On this basis, the resources and functions in constraints currently and perceived to be in constraints in the future for up to 2001 (ranked in order of relative importance, on the basis of weighted mean scores) are as shown in Tables 7.4 and 7.5 respectively.

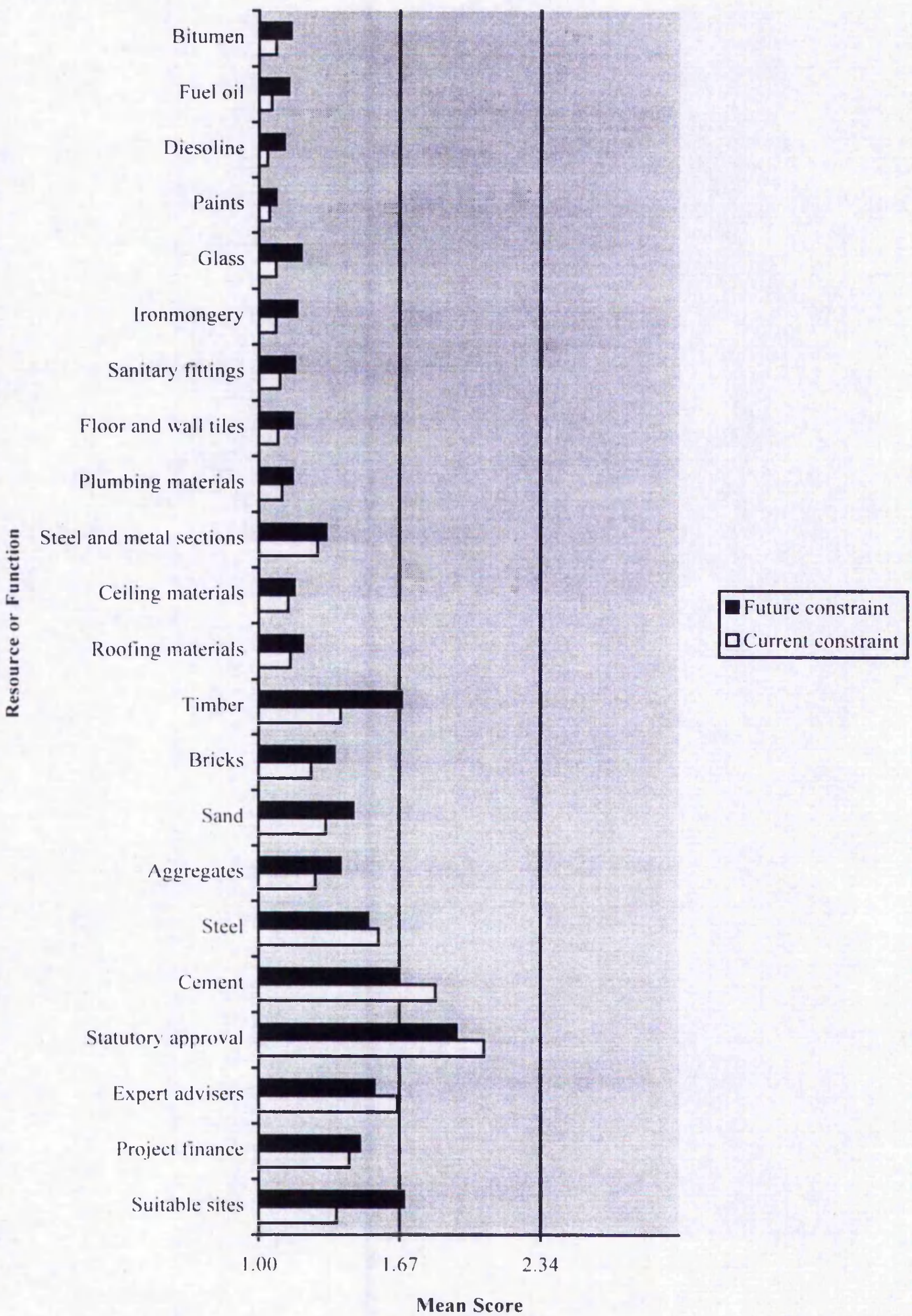
In examining the data from the clients, designers and contractors, respectively; the majority of the constrained resources and functions, both for current constraints and for perceived future constraints, were identified by all three categories of organisations (Tables 15 - 17 of Appendix B). This suggests therefore that the data obtained is highly consistent.

Chi-square Test of Independence was performed on each constrained resource and function in relations to the categories of organisations of clients, designers and contractors. The value of p was set at <0.05. The results show that there were no significant relationships between any of the constrained resources and functions and the categories of organisations (Table 18 of Appendix B).

However, the researcher is cautious in interpreting the results of the Chi-square Test of Independence. This is because the results were for two categories of organisations, i.e., designer and contractor. Data from client organisations were excluded in an attempt to reduce the number of cells with expected frequency of less than 5. Initial tests results indicate that when data from client organisations were included there were more than 20 per cent of cells having an expected frequency of less than 5. According to Bryman and Cramer (1997, p124, 168-172) and other commentators, chi-square can be unreliable if 20 per cent or more of the cells have an expected frequency of less than 5.

Nonetheless, it may be concluded that the results of the Chi-square Test of Independence suggest there is a general consensus amongst the respondent organisations of the type and extent of current and perceived future constraints in resources and functions within the processes of construction procurement in Malaysia. The types and extent of constraints in the resources and functions identified currently, and in the future, therefore, may be considered as a Malaysian construction industry-wide perspective.

Chart 7.1 - Results on Types and Extent of Current and Perceived Future Constraints in Resources and Functions



Low = 1-1.66, Medium = 1.67-2.33, High = 2.34-3.00

Chart 7.1 - Results on Types and Extent of Current and Perceived Future Constraints in Resources and Functions (Cont'd)

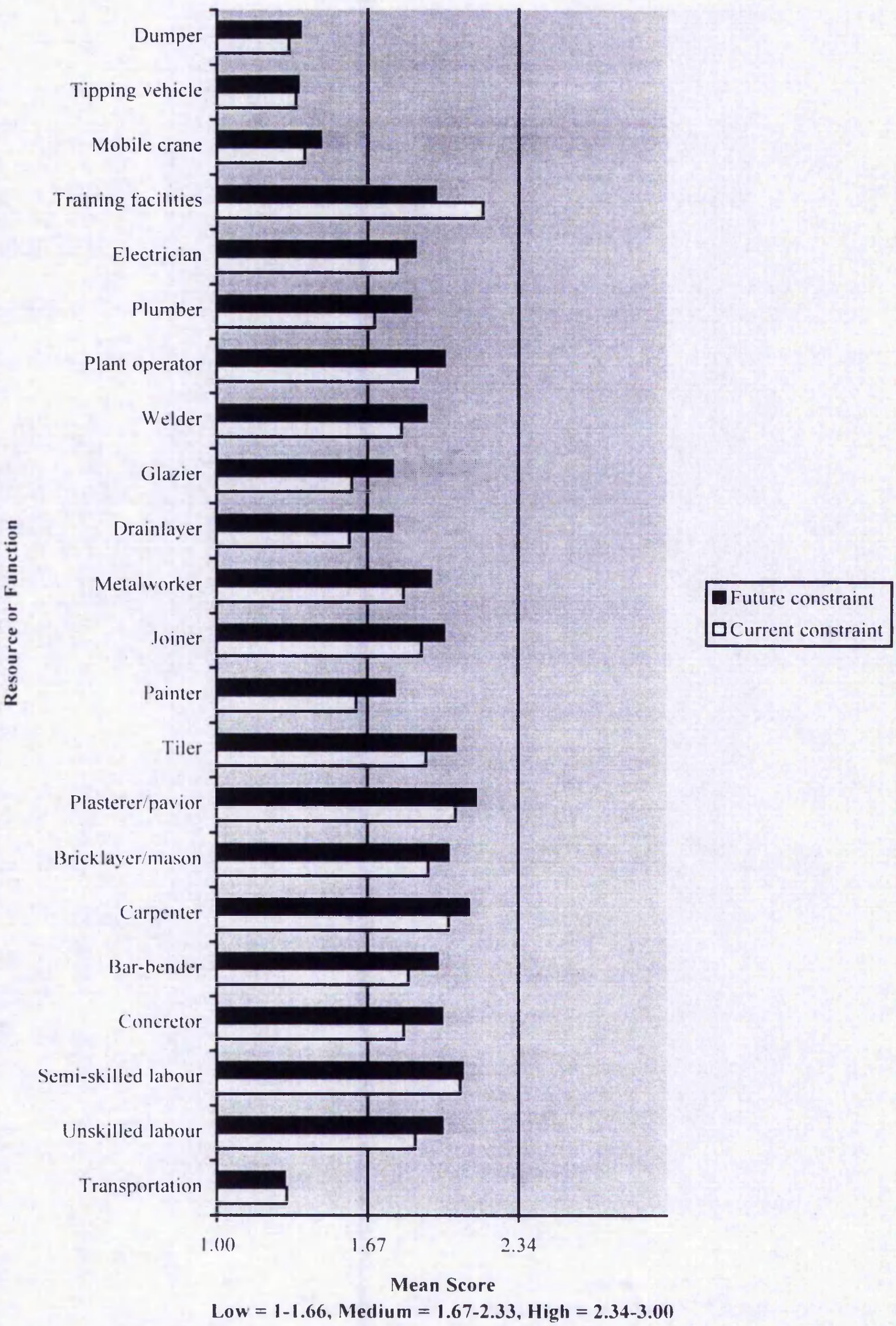


Chart 7.1 - Results on Types and Extent of Current and Perceived Future Constraints in Resources and Functions (Cont'd)

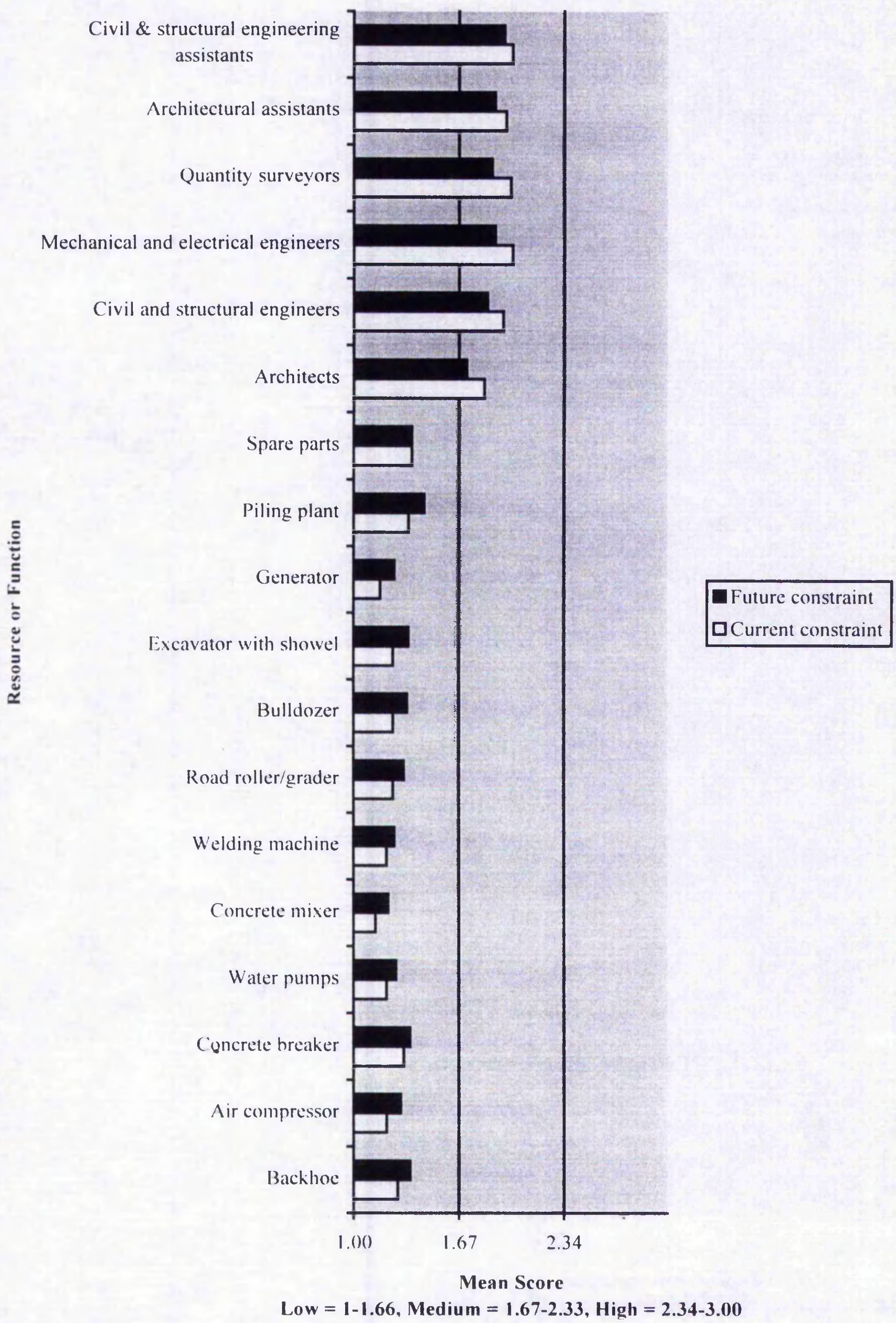


Chart 7.1 - Results on Types and Extent of Current and Perceived Future Constraints in Resources and Functions (Cont'd)

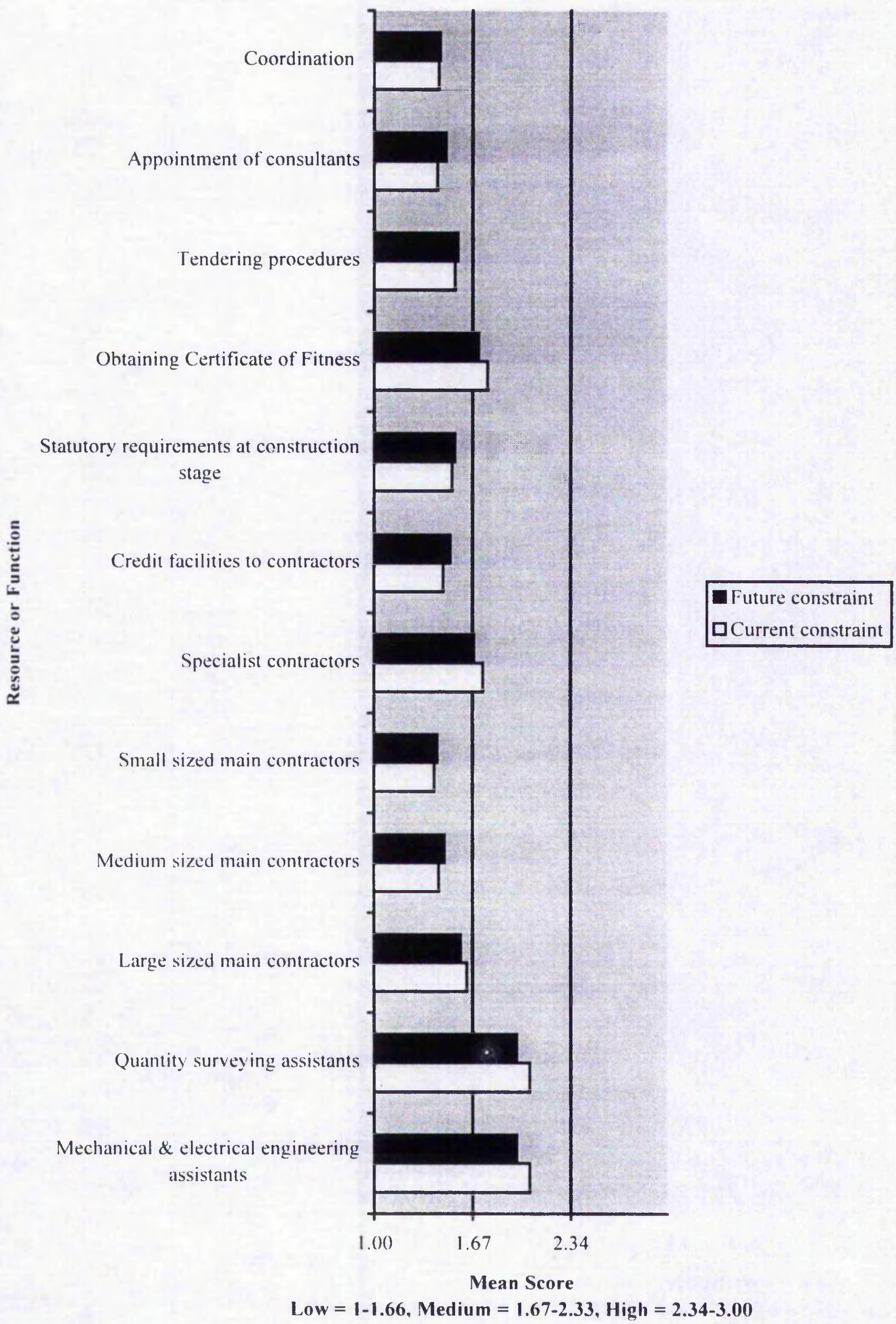


Chart 7.1 - Results on Types and Extent of Current and Perceived Future Constraints in Resources and Functions (Cont'd)

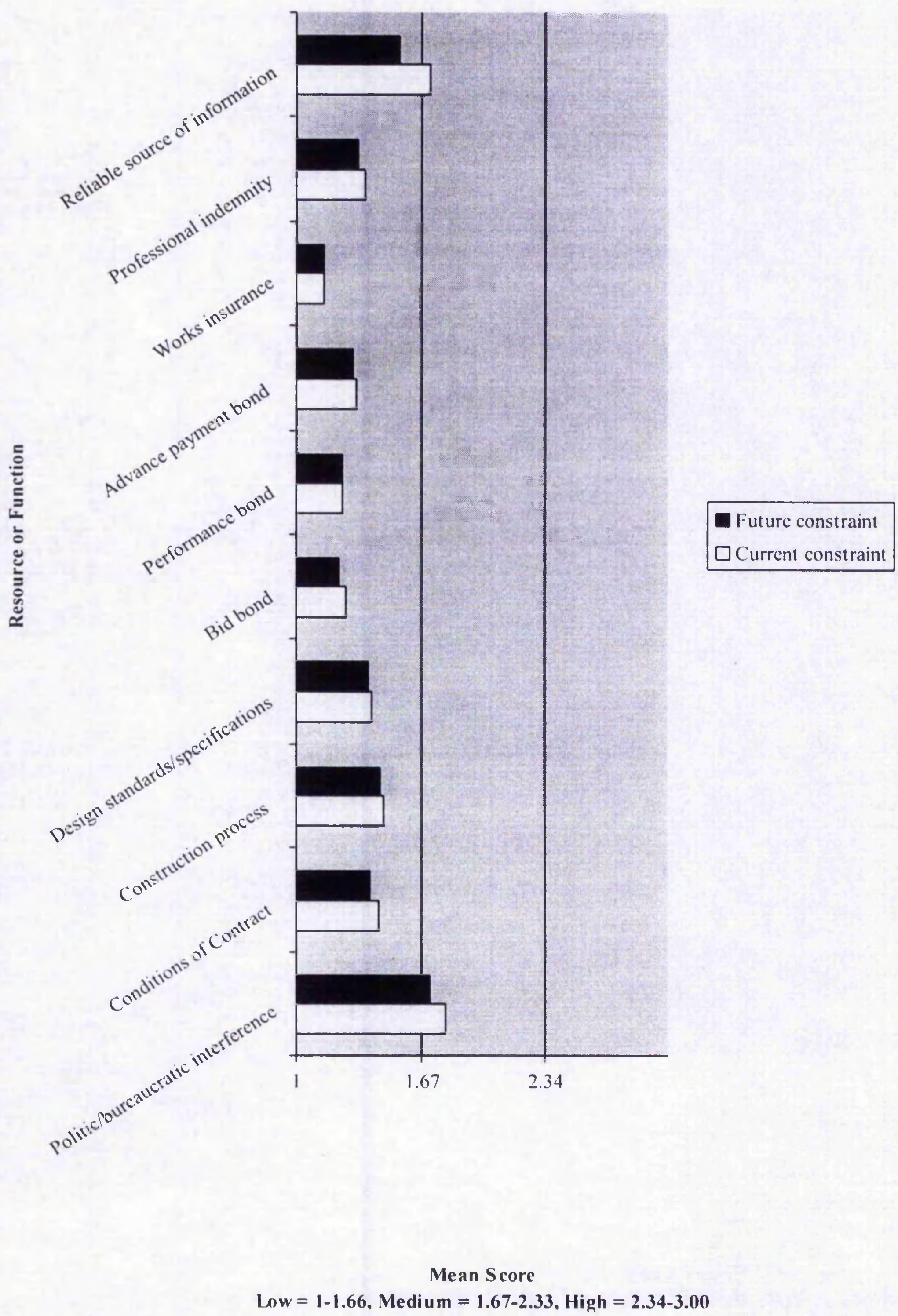


Table 7.4 - Resources and Functions in Currently in Constraints (ranked in order of importance)

1. Availability of facilities for training skilled labourers
2. Availability of semi-skilled labour
3. Constraints at project planning stage caused by procedures in obtaining statutory approval
4. Availability of quantity surveying assistants
5. Availability of plasterer/pavior
6. Availability of mechanical and electrical engineering assistants
7. Availability of carpenter
8. Availability of civil and structural engineering assistants
9. Availability of mechanical and electrical engineers
10. Availability of quantity surveyors
11. Availability of architectural assistants
12. Availability of civil and structural engineers
13. Availability of bricklayer/mason
14. Availability of tiler
15. Availability of joiner
16. Availability of construction plant operator
17. Availability of unskilled labour
18. Availability of bar-bender
19. Availability of cement
20. Availability of architects
21. Availability of concretor
22. Availability of metalworker
23. Availability of welder
24. Availability of licensed electrician
25. Constraints in contract administration due to political and/or bureaucratic interference
26. Constraints caused by procedures in obtaining Certificate of Fitness
27. Availability of technically competent, experienced and financially capable specialist contractors
28. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)
29. Availability of plumber

Table 7.5 - Resources and Functions in Perceived to be in Constraints in the Future for up to 2001 (ranked in order of importance)

1. Availability of plasterer/pavior
2. Availability of carpenter
3. Availability of semi-skilled labour
4. Availability of tiler
5. Availability of bricklayer/mason
6. Availability of joiner
7. Availability of construction plant operator
8. Availability of concretor and Availability of unskilled labour[1]
9. Availability of of bar-bender
10. Availability of facilities for training skilled labourers
11. Availability of quantity surveying assistants
12. Availability of mechanical and electrical engineering assistants
13. Availability of civil and structural engineering assistants
14. Availability of metalworker
15. Constraints at project planning stage caused by procedures in obtaining statutory approval
16. Availability of welder
17. Availability of mechanical and electrical engineers
18. Availability of architectural assistants
19. Availability of licensed electrician
20. Availability of quantity surveyors
21. Availability of plumber
22. Availability of civil and structural engineers
23. Availability of painter
24. Availability of glazier
25. Availability of drain-layer
26. Constraints in contract administration due to political and/or bureaucratic interference
27. Availability of architects
28. Constraints caused by procedures in obtaining Certificate of Fitness
29. Availability of suitable sites
30. Availability of timber
31. Availability of technically competent, experienced and financially capable specialist contractors

[1] Resources received equal ranking

7.5.3 The most and the least constrained locations

Each respondent organisations has indicated the location (in terms of a state in Malaysia) that on the basis of their own experience has (1) the most, and (2) the least constraints, respectively, when acquiring construction projects. Full details of the results are given in Table 19 of Appendix B. On the basis of frequency of responses, the results suggest that when acquiring construction projects locations in Kuala Lumpur, the capital city and a Federal Territory, has the both most and least constraints.

7.5.4 Reasons for current constraints in resources and functions

Respondent organisations provided written answers on the two most important reasons for constraints currently experienced to specific categories of resources and functions. The written answers were coded to facilitate analysis. In the analysis of data, percentages are calculated as a proportion of the number of organisations responding and therefore, add up to more than 100 per cent. Full details of the results are given in Table 20 of Appendix B. Table 7.6 provides a summary of the results indicating the two most important reasons, on the basis of frequency of responses, for current constraints in specific categories of resources as perceived by respondent organisations.

However, the results on current constraints suggest that availability of efficient transportation for distribution of construction materials, availability of credit facilities/financial backing to contractors, bonds' requirements, and availability of adequate insurance facilities to cover risks; are not considered to be constrained.

7.5.5 Present extent of use of procurement strategies

Respondent organisations have provided numerical scoring expressing their opinion on the present extent of use of key procurement strategies. Total numbers of respondent organisations indicating low frequency of use, medium frequency of use, and high frequency of use for each type of procurement strategy were computed, full details of the results are given in Table 21 of Appendix B.

Table 7.7 provides a summary of the results on the present extent of use of key procurement strategies in Malaysia.

7.6 Reasons for Current Constraints in Specific Categories of Resources	
Category of resource	**Two key reasons (in order of importance)**
Constraints in availability of key construction materials (Malaysian origin)	1. High demand 2. Monopoly in supply and distribution
Constraints in availability of efficient transportation for distribution of construction materials	3. Poor infrastructure, in terms of congestion and poor roads and ports 4. High demand
Constraints in availability of skilled labour (Malaysian citizens)	5. High demand 6. Competition with other economic sectors
Constraints in availability of an adequate supply of properly maintained and efficient mechanical plant	7. High demand 8. High capital cost
Constraints in availability of key design team members (Malaysian citizens)	9. High demand 10. Inadequate training facilities
Constraints in availability of technically competent, experienced and financially capable Malaysian contractors	11. High demand 12. Inexperience and or incompetence contractors
Constraints in availability of credit facilities/financial backing to contractors	13. Lending prudence 14. Contractors' inability to provide collateral
Constraints caused by bonds' requirements	15. High costs of securing a bond 16. Contractors' inability to provide collateral
Constraints in availability of adequate insurance facilities to cover risks	17. High cost of premium 18. Inexperience insurers

Table 7.7 – The Present Extent of Use of Key Procurement Strategies

Procurement strategy	Extent of use		
	Low	Medium	High
Basis of appointment of consultants			
Scale of fees	•		
Fee competition			•
Basis of appointment of main contractors (building and civil engineering works)			
Open tendering			•
Selective tendering		•	
Negotiation	•		
Pre-qualification	•		
Basis of appointment of specialist contractors (e.g. electrical, mechanical, telecommunications, etc)			
Nominated sub-contractors			•
Domestic sun-contractors		•	
Directly employed by clients	•		
Joint venture contracting			
Malaysian and foreign firms		•	•
Malaysian and Malaysian companies		•	
Types of contractual arrangements			
Lump sum based on drawings and specifications		•	
Lump sum based on firm bills of quantities			•
Approximate bills of quantities		•	
Design and build	•		
Cost plus	•		
Management contracting	•		
Construction management	•		
Standard forms of contract used			
JKR (PWD) 203 series			•
PAM Forms of contract			•

7.5.6 Current performance of the Malaysian construction industry

Respondent organisations have provided numerical scoring expressing their opinion on current performance of the Malaysian construction industry in terms of the key performance indicators used. Total numbers of respondent organisations indicating poor performance, good, very good and excellent were computed. Full details of the results are given in Table 22 of Appendix B.

Table 7.8 provides a summary of the results on current performance of the Malaysian construction industry, in relation to the performance indicators used.

7.5.7 Present extent of use of foreign inputs (import) in the Malaysian construction industry

Respondent organisations have provided numerical scoring expressing their opinion on present extent of use of foreign inputs (import) in the processes of construction procurement in Malaysia. Total numbers of respondent organisations indicating no foreign inputs, low, medium and high were computed. Full details of the results are given in Table 23 of Appendix B. Table 7.9 provides a summary of the results.

7.5.8 Reasons for using foreign inputs (import) in construction procurement

Respondent organisations have provided two main reasons for using foreign inputs. In the analysis of data, percentages are calculated as a proportion of the number of organisations responding and therefore, add up to more than 100 per cent. Full details of the results are given in Table 24 of Appendix B.

Table 7.10 provides a summary of the results. It indicates the two most important reasons, on the basis of frequency of responses, for using imported resources as perceived by respondent organisations.

Table 7.8 – Current Performance of the Malaysian Construction Industry				
Performance indicator	**Performance**			
	Poor	**Good**	**Very Good**	**Excellent**
Design time (from briefing to tender invitation		•		
Construction time (from site possession to practical completion)		•		
Construction cost (in terms of ability to combat cost increases during construction)		•		
Quality (in meeting client's needs)		•		
Use of modern technology in design		•		
Use of modern technology in construction		•		
Use of modern project management tools and techniques		•		
Quality of locally produced construction materials		•		
Standard of workmanship		•		
Health and safety on construction site	•			
Level of investment in assets		•		
Level of investment in research and development	•			
Sectoral performance (overall, in terms of design time, construction time, construction cost and quality)				
Housing and residential buildings		•		
Commercial and industrial buildings		•		
Civil engineering and others		•		
Public sector		•		
Private sector		•		
Export of consultants' services	•			
Export of contractors' services		•		
The success of technology transfer	•			

Table 7.9 – Present Extent of Use of Foreign Inputs in the Malaysian Construction Industry

Resource	Import			
	None	Low	Medium	High
Cement		•		
Steel		•		
Steel and metal sections		•		
Plumbing materials		•		
Sanitary fittings		•		
Unskilled labour				•
Semi-skilled labour			•	
Skilled labour		•		
Mechanical plant and spare parts			•	
Designers: Professionals		•		
Designers: Semi-professionals		•		
Main contractors		•		
Specialist contractors		•		

Table 7.10 – Reasons for Using Foreign Inputs in Construction Procurement

Resource	Two key reasons (in order of importance)
Key construction materials	1. Inadequate or shortage of locally produced material. 2. Taste and style.
Construction labour	1. Inadequate or shortage of local Labour. 2. Others.
Mechanical plant and spare parts	1. Not produced locally. 2. Inadequate or shortage of locally manufactured mechanical plant and spare parts.
Design team members (consultants)	1. Technical expertise and experience. 2. Inadequate or shortage of local consultants.
Main contractors (building and civil engineering works)	1. Technical expertise and experience. 2. Financial capability.
Specialist contractors (electrical, mechanical, telecommunications, etc)	1. Technical expertise and experience 2. Financial capability.

7.5.9 The Malaysian construction industry and Vision 2020

The results indicate a majority (78 per cent) of the respondents had experience working with the Malaysian construction industry prior to the introduction of Vision 2020 in February 1991. Table 25 of Appendix B provides the full details of the results.

Table 26 of Appendix B provides full details of the results on respondents' perception on the types of projects procured prior to, and since, the introduction of Vision 2020. Table 7.11 provides a summary of the results. The results suggest that since the introduction of Vision 2020, priority in terms of the different types of projects procured have changed.

Table 7.11 – Types of Projects Procured Prior To, and Since, Vision 2020 as perceived by respondents

Type of projects	Priority Prior to Vision 2020	Priority Since Vision 2020
Low cost houses	4	3
Medium cost houses	1	5
High cost houses	6	6
Commercial buildings	2	4
Industrial buildings	3	1
Civil engineering and others	5	2

Table 27 of Appendix B provides full details of the results on respondents' perception on the priorities in construction procurement prior to, and since, the introduction of Vision 2020. Table 7.12 provides a summary of the results. The results suggest that since the introduction of Vision 2020, priority in construction procurement have changed.

Table 7.12 – Priority in Construction Procurement Prior To, and Since, Vision 2020 as perceived by respondents		
Priority in procurement	**Priority Prior to Vision 2020**	**Priority Since Vision 2020**
Technical complexity	6	3
Aesthetic and/or prestige	5	5
Value for money	1	2
Speed to completion	3	1
Price certainty	2	4
Low maintenance cost	4	6

7.5.10 Respondent organisations willing to participate in the second part of the research

Ninety-one per cent (186 respondent organisations) indicate that they are willing to participate in the next stage of the research (Table 7.13).

Full details of the results showing the number of respondent organisations willing to participate in the next stage of the research according to the category and type of organisations are provided in Table 28 of Appendix B.

Table 7.13 – Respondent Organisations Willing To Participate in the Second Stage of the Research		
Would participate in the second stage of the research	**No**	**%**
Yes	186	90.73
No	19	9.27
Total	205	100.00

7.6 A Reflection of the Research Methodology Adopted in Survey 1

The researcher is critical of several issues that may affect the quality of data gathered through the postal questionnaire survey method adopted. The key areas of concerns included limitations of the research methodology and the potentially low response rate. These issues have been pointed out in Chapter Six and actions taken to minimise their impact have been discussed in the appropriate sections of this chapter.

It could be argued that by sending the questionnaire to all organisations in the database, the researcher is not conducting a survey but a census and that a conventional random sampling technique was not used. It is not the aim of the research to conduct a census or to be statistically significant. The reason for including all the organisations in the main database is to attempt to increase response rate and to achieve a representative cross-section of the sample that could provide a construction industry-wide perspective of the issues being investigated.

The researcher is critical of the rating scales used in the present research, in particular the rating scale used for measuring the extent of constraints in resources and functions. The rating scale adopted, i.e., Low, Medium and High seems basic, relative and lacks clarity and could result in inconsistencies in interpretation among respondent organisations. Various alternative approaches were considered and substantial deliberation was made on this issue. One potential solution was to make the rating scale more specific such as by giving a quantitative definition to the scale of Low, Medium and High, respectively perhaps by stating appropriate frequency of occurrence of a constraint in a given time. For instance, high constraint may be defined as those that occur more than 5 times in a week, medium constraint refers to those that occur between 3 to 5 times in a week and low constraints refer to those that occur twice or less in a week. However, the researcher has to make a judgement between two opposing factors in the data collection. On the one hand, quantitative definitions to the scale of Low, Medium and High, respectively may increase the quality and reliability of data. On the other hand, the quantitative definitions may force respondents to examine records to ascertain, in quantitative terms, the extent of constraint to all the resources and functions under investigation. This may include going through projects' or their office's files (assuming such records are readily and easily available) or enlisting staff to provide assistance. Consequently, responding to the survey becomes relatively tedious and time consuming. Given the fact that senior management personnel have other important businesses to attend to they may decide not to respond or to abandon the survey on grounds that it is tedious or too demanding on their time.

The questionnaire had undergone a series of tests but none of the respondents participating in the piloting commented on the concepts Low, Medium and High being ambiguous.

On balance, it was decided that the basic and relative approach adopted in the rating scale should be retained, principally for fear of non-responding or invalid responses (in terms of a major proportion of the questionnaires left unanswered) by the respondent organisations. On the basis that (1) a wide range of respondent organisations was selected to become the research's subject and (2) the research is exploratory in nature, the approach taken is considered to be adequate. It is believed that the potential for ambiguity was minimal and that it would not undermine the results of the survey. The researcher acknowledges that the clarity of the questionnaire is significant, it is his responsibility, and that perhaps should have been addressed more robustly during the questionnaire design.

It is acknowledged that a more robust approach could have been taken in order to increase the response rate. Approaches that could have been taken include sending more reminders including attaching a set of questionnaires either through the post, facsimile or emails or even contacting the organisations through telephones. However, due to limitations in particular in cost and in time, these additional approaches were not taken. Attempts to contact all organisations via emails (a much cheaper and a relatively quicker method) were not possible since the main database does not include email addresses of organisations.

7.7 Summary

Survey 1 sets out to identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output.

In carrying out the survey, the postal questionnaire method was employed. The questionnaire development involved an extensive literature search to identify suitable variables to be included in the investigations and a series of tests to increase the reliability and validity of data to be gathered. The questionnaire was addressed to senior management personnel of 1,852 Malaysian organisations identified to be currently involved with the processes of construction procurement in Malaysia. All together, 205 valid responses (11.24 per cent) were received. All were used in the analysis of the research findings. The survey was administered between 1 November 1996 and 31 January 1997.

The findings indicate that within the processes of construction procurement in Malaysia constraints in some resources and functions are currently experienced and that constraints in some resources and functions are perceived to exist in the future for up to 2001. The areas where these constraints exist now and are perceived to exist in the future have been identified by this survey.

The findings confirm allegations, opinions and speculation raised by different commentators and media reports that the Malaysian construction industry suffers from constraints in resources and functions. But more importantly, the findings provide empirical evidence of the types and extent of those constraints, both currently and in the future for up to 2001.

Consequently, strategies to remove or to alleviate the constraints identified are needed to achieve effective construction procurement in order to boost and to sustain growth in construction output of the Malaysian construction industry. The findings, in terms of areas of constraints identified, will be the focus of the development of proposed strategies. This aspect of the research represents the second area of investigation and is the focus the following chapter, Chapter Eight.

CHAPTER 8

PROPOSED STRATEGIES TO REMOVE OR TO ALLEVIATE CONSTRAINTS IN THE PROCESSES OF CONSTRUCTION PROCUREMENT IN MALAYSIA

8.0 Introduction

The objective of this chapter is to provide a description of the second area of the present research. It concerns the development, appraisal and validation of proposed strategies designed to remove or to alleviate current and perceived future constraints in the processes of construction procurement in Malaysia.

The current constraints and perceived future constraints for up to 2001 in some resources and functions in the processes of construction procurement in Malaysia have been identified through Survey 1 (see Chapter Seven of this thesis). The development of proposed strategies focuses on the areas of greatest constraint. The appraisal of the proposed strategies is carried out through a questionnaire survey (otherwise referred to as Survey 2) and validation is carried out through a series of semi-structured interviews. Survey 2 and the semi-structured interviews represent the second and third stages of the collection of primary data (see Chapter Six of this thesis).

This chapter is presented in three parts:

1. Part 1 examines the literature relating to construction procurement practices of construction industries of the UK, Japan and South Korea. The examination aims to identify the practices considered suitable for adoption as possible strategies to remove or alleviate the constraints identified in Survey 1. Views and comments published in Malaysia in relation to the constraints identified will also be examined;

2. Part 2 describes the methodology and the processes involved in developing and appraising the strategies; and

3. Part 3 describes the processes involved in validating the strategies.

Part 1

8.1 Constraints Identified in the Processes of Construction Procurement in Malaysia

The results of Survey 1 suggest that in the processes of construction procurement in Malaysia 29 types of resources and functions are suffering constraint currently and 32 types of resources and functions are likely to suffer constraint in the future for up to 2001. These are listed in Tables 7.4 and 7.5 of Chapter Seven of this thesis, respectively.

8.2 The Needs for Strategies

It is contended that the constraints identified in the processes of construction procurement could jeopardise Malaysia's pursuit of securing an economy that is fully competitive, dynamic, robust and resilient – the ninth challenge of Vision 2020 – unless radical changes are introduced.

There is therefore, an urgent need for strategies to remove or to alleviate the constraints identified in order to promote efficient and effective processes of construction procurement that help boost construction output. Subsequently, appropriate increases in construction output should facilitate appropriate and sustainable pace in the growth of the economy.

8.3 Synthesis of the Constraints Identified

In examining the results on the types of resources and functions that are suffering constraints currently and on the types of resources and functions that are perceived to suffer constraints in the future for up to 2001, it is thought to be appropriate for the constraints to be synthesised.

The synthesis aims to produce a list of constraints that is considered to be more manageable, in terms of the overall number of constraints identified. This in turn could afford more focussed and meaningful effort in the development of strategies.

The synthesis focuses on (1) resources and functions that may be considered ubiquitous, and (2) constraints that are simultaneous, that is those that suffer constraints currently and in the future for up to 2001.

In the synthesis of the constraints identified, the current and perceived future constraints in the availability of indigenous labour and the current and perceived future constraints in the availability of indigenous key design team members may be considered ubiquitous. This is because the constraints in the availability of labour encompass the unskilled, semi-skilled and skilled labour, the latter included 12 of the 15 main construction trades for current constraints and all 15 main construction trades for future constraints. Similarly, the constraints in the availability of indigenous key design team members encompass the professionals: architects, engineers and quantity surveyors, and the semi-professionals: architectural, engineering and quantity surveying assistants and technicians.

The result of the synthesis is as shown in Table 8.1. In all there are 11 main types of constraints. It encompasses 9 types of current constraints and 9 types of perceived future constraints. There are 7 types of constraints that are simultaneous; that is, they suffer constraints currently and in the future for up to 2001.

In the present research, the development, appraisal and validation of proposed strategies focuses on the 11 main types of constraints shown in Table 8.1.

8.4 A Comparative Study of the UK, Japan and South Korea in Relation to Malaysia

The proposed strategies were developed from procurement practices of construction industries of the UK, Japan and South Korea where sustained growth in construction output has been achieved. Thus it is considered to be instructive to examine these countries in relation to Malaysia. The objective of this examination is to establish the link and to explain further why were these three countries been chosen as models.

The examination focuses on (1) the economies, (2) the construction industries, and (3) bilateral relationship between the UK, Japan and South Korea on the one hand, and Malaysia on the other hand.

Table 8.1 – Main Areas of Current and Perceived Future Constraints in Resources and Functions in the Processes of Construction Procurement in Malaysia		
Area of Constraints (not in order of importance)	**Current constraint**	**Future constraint**
Constraint 1. Constraints at project planning stage caused by procedures in obtaining statutory approvals.	•	•
Constraint 2. Constraints in availability of Malaysian produced cement.	•	
Constraint 3. Constraints in availability of unskilled, semi-skilled and skilled Malaysian labour.	•	•
Constraint 4. Constraints in availability of facilities for training skilled labour.	•	•
Constraint 5. Constraints in the availability of key design team members (professionals – architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals – technical assistants and technicians – in architectural, engineering and quantity surveying).	•	•
Constraint 6. Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors.	•	•
Constraint 7. Constraints caused by procedures in obtaining Certificate of Fitness for Occupation (CF).	•	•
Constraint 8. Constraints in contract administration due to political and/or bureaucratic interference.	•	•
Constraint 9. Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities.	•	
Constraint 10. Constraints in availability of suitable sites.		•
Constraint 11. Constraints in availability of timber.		•

8.4.1 The economy of Malaysia in relation to the economies of the UK, Japan and South Korea

Malaysia is a middle income developing country.

The UK, Japan and South Korea are considered to be developed and/or industrialised countries. For instance, the UK and Japan are members of different key economic groupings including the Group of Seven or G7, the Economist 13, the Industrial Countries, and the OECD (Organisation for Economic Co-operation and Development). South Korea joined the OECD in 1997 (Lieu, 1997, p3; DTI, UK, 1997, p16). According to The Economist (1992, p4) the G7 is recognised as a grouping of countries with developed economies and the OECD member countries are considered as industrialised countries.

Table 8.2 provides a snapshot of the economy of Malaysia in relation to the economies of the UK, Japan and South Korea. In making international comparison of GDP and the likes on the basis of secondary data, the researcher treats them with some level of caution. This is because factors such as variability in the rate of exchange may have particular effect on its interpretation and therefore, may be inconsistent with current and specific needs. Nonetheless, Table 8.2 provides a broad overview of the economies of the UK, Japan, South Korea and Malaysia that for the purpose of the present research is considered to be adequate.

Table 8.2 – The Economies of Malaysia, UK, Japan and South Korea

Country	Population (millions)	GDP (US $ billions)	Real GDP Growth (1980 – 1990) % / year	Per Capita Income (US$)
UK	57.4	741.8	3.1	12,923.88
Japan	123.5	3,680.5 (1991)	4.1	29,801.52
South Korea	42.8	261.3 (1991)	9.7	6,104.49
Malaysia	21.2 (1996)	49.8 (1996)	6.1	4,442.00 (1996)

All data relate to 1990 unless otherwise stated.
Sources: Davis et al. (1994). Malaysian data obtained from Chapter One of this thesis. Rate of exchange used, US$1 = RM2.62.

Table 8.2 suggests that in terms of value of GDP, the economies of the UK, Japan and South Korea are significantly bigger than the economy of Malaysia, i.e., by some 15 times, 74 times and 5.2 times, respectively. In terms of the rate of growth in GDP between 1980-90, Malaysia's economic performance, registering growth at 6.1 per cent per annum, appears to rally closely behind South Korea but performed relatively better than the economies of the UK and Japan.

Table 8.2 suggests that the income per capita of the UK, Japan and South Korea is significantly higher than the income per capita of Malaysia, i.e., by some 2.9 times, 6.7 times and 0.7 times, respectively. Consequently, it could be assumed that broadly the British, the Japanese and the South Koreans enjoy a relatively higher standard of living than the Malaysians.

Under Vision 2020 Malaysia wishes to become a fully developed and industrialised country by 2020. It is hoped that by 2020 Malaysia is able to reduce the social and economic development gaps that exist between itself on the one hand, and the UK, Japan and South Korea on the one hand.

8.4.2 The construction industry of Malaysia in relation to the construction industries of the UK, Japan and South Korea

The construction industries of the UK Japan and South Korea have experienced a period of sustained growth. For instance, Hillebrandt (1988, p69-70) examined the value of construction output in the UK between 1955-73 and commented that "... although there were falls in output for particular quarters, there was no calendar year in which output was lower than the previous year until 1969." She concluded that the period 1955-73 "... was in fact a period of growth and reasonable stability."

Park (1993, p187) pointed out that growth in the construction industry of Japan was experienced in the 1960s, generated notably by the Tokyo Olympics of 1964. Levy (1990, p38) argued that in the 1960s and 1970s Japan experienced extremely high levels of construction activity amounting to 15 per cent of GNP in 1960 and 20 per cent of GNP in 1970.

Park (1993, p23-24) indicates that the South Korean construction industry enjoyed a steady rate of growth averaging 13.7 per cent per annum between 1962-86. He commented that:

> "A big growth rate in construction was an obvious consequence. In order to achieve high economic and social growth, Korea needed heavy investment in industrial and housing estate, roads, highways, harbours, airports, and other civil works and this demonstrates the vital role that construction plays in the process of economic and social development."

Table 8.3 provides data of the construction industry of Malaysia in relation to the construction industries of the UK, Japan and South Korea. As pointed out in Section 8.4.1, in making international comparison of GDP and the likes on the basis of secondary data, this data has been treated with caution. Table 8.3 suggests that in terms of value of construction output, the size of the construction industries of the UK, Japan and South Korea are about 35 times, 413 times, 35 times bigger than the size of the construction industry of Malaysia, respectively. In the case of Japan its total construction output is the highest in the world (DTI, UK, 1995, p8).

Table 8.3 – The Construction Industries of Malaysia, UK, Japan and South Korea, 1993

	UK	Japan	South Korea	Malaysia[1]
GDP (US$ billions)	1,050	4,690	340	49.8
Construction Volume (US$ billions)	80	950	80	2.3
% of GDP	7.6	20.3	23.5	4.6
Total labour (millions)	26.88	64.50	18.25	8.18
Construction labour (millions)	1.81	6.40	1.69	0.70
% of Total labour	6.7	9.9	9.3	8.6
Productivity (Construction Volume/number of workers)	441.99	1,484.37	473.37	32.86
Number of construction firms	210,000	530,000	10,000	40,607

[1] Malaysian data is for 1996, obtained from Chapter Four of this thesis, except for the number of construction firms, which is for 1997 and obtained from Chapter Five.

Sources: Lieu (1996).
Rate of exchange used, US$1 = RM2.62.

In terms of construction's contribution to the GDP, Table 8.3 suggest that size of the construction industries of the UK, Japan and South Korea, respectively are significantly bigger than the size of the construction industry of Malaysia. In the case of Japan and South Korea, the significantly bigger share of construction in the GDP respectively indicates the dynamic growth of the economies and the relatively short period of industrialisation that has allowed little time for the steady accumulation of infrastructure stock.

In terms of construction employment, Malaysia appears to have a construction industry that is comparable with the construction industries of the UK, Japan and South Korea. This statement is made on the basis that some 8.6 per cent of Malaysia's total workforce were employed by the construction industry. The construction industries of the UK, Japan and South Korea employed some 6.7 per cent, 9.9 per cent and 9.3 per cent of the total workforce, respectively (Table 8.3).

However, in terms of construction labour productivity there appears to be a wide-gap between Malaysia on the one hand, and the UK, Japan, and South Korea on the other hand (as well as between Japan and the UK and South Korea). Although the basis of measurement for labour productivity used in Table 8.3 may be considered to be crude, nonetheless it suggests that labour productivity in the construction industry of Malaysia is very low in relation to that of the UK, Japan and South Korea. Perhaps, the higher level of technology used in the UK, Japan and South Korea enables higher labour productivity to be achieved by their construction industries, respectively.

In terms of the structure of the market, the construction industries of Malaysia, the UK, Japan and South Korea appears to be similar. That is each country's construction industry has a small number of large firms and a very large number of small ones, notwithstanding whether size is expressed by number of employees or by value of capital investment. However, it is the bigger firms, although small in numbers that produce the majority of construction output in each country (Hasegawa, 1988, p3; Parsa, 1989, p291; Davis et al., 1994, p129, 147, 211, 240; Morton and Jaggar, 1995, p134-135; DTI, UK, 1995, p11; Jeong-Ho, 1996, p199).

In terms of construction industries' maturity, Kobayashi (1996, p14, 20) considers the UK construction industry to be matured. His comment was made on the basis that there is a high proportion of repair and maintenance (some 42 per cent of the UK construction market in 1994). The proportion of repair and maintenance in Japan, South Korea and Malaysia, respectively are significantly lower, notably because they lagged behind the UK in the provisions of social and economic infrastructures. In Japan, the proportion of repair and maintenance in 1993 was 11 per cent.

8.4.3 The relationship between Malaysia and the UK, Japan and South Korea

Malaysia enjoys strong links with the UK, Japan and South Korea in many ways.

Malaysia was once under British rule and continues to remain a member of the British Commonwealth. Malaysia has a close link with the UK notably in economy, defence (the Five Power Defence Agreement, the other 3 countries are Australia, New Zealand and Singapore), education and through the construction industry.

As discussed in Section 5.7.5 of Chapter Five of this thesis some of the practices of the Malaysian construction industry are broadly similar to those of the UK. A significant number of Malaysian professionals related to construction received training in the UK or were trained by UK institutions operating in Malaysia and these arrangements continue. Some professional institutions relating to construction notably the PAM, IEM, ISM and the Chartered Institute of Building (Malaysia) branched out of their sister institutions in the UK and the close link continues.

The involvement of the Japanese and South Koreans in the Malaysian economy including in construction became more prominent since Malaysia introduced the Look East Policy in 1981.

Malaysia has signed the Investment Guarantee Agreement (IGAs) with the UK, Japan and South Korea. The IGAs serve to ensure against non-commercial risks in terms of expropriation, nationalisation and to allow for remittances of capital and repatriation of capital. The IGAs therefore, encourage the inflows and outflows of capital between member countries (Ministry of Finance, 1994, p254).

The UK, Japanese and South Korean public and private sectors are actively involved in Malaysia. In terms of assistance to Malaysia the UK, Japan and South Korea, through various agencies, provides bilateral grants that include technical co-operation and procurement of services and goods. One such agency is the Japan International Co-operation Agency (JICA). It manages technical co-operation that includes acceptance of trainees, dispatch of experts, grants of equipment, project type technical co-operation, development studies, etc. (Hamamori, 1997, p23).

In the context of the construction industry, Table 8.4 may be used to illustrate the relatively strong links that exist between Malaysia on the one hand and the UK, Japan and South Korea on the other hand. In this instance, Malaysia procured contract and professional services in substantial proportion from abroad, in particular from the UK, Japan and South Korea. Japan emerges as the single largest exporter, accounting for some 48 per cent of the total foreign contract and professional services imported by the Malaysian public sector agencies in 1994. The imported services include procurement of materials, construction and commissioning of projects. This suggests that the construction industry of Malaysia is relatively exposed to the procurement practices and strategies of the UK, Japan and South Korea by virtue of the involvement of these countries in Malaysia.

Table 8.4 – Imports of Contract and Professional Services by Malaysia from the UK, Japan and South Korea (1990 – 1994, RM millions)[1]

Country	1990	%	1994	%
UK	0.9	0.60	87.7	8.76
Japan	30.8	20.59	478.0	47.76
South Korea	0.9	0.60	45.3	4.53
Others (including the US and France)	117.0	78.21	389.8	38.95
Total	149.60	100.00	1,008.00	100.00

[1] The value represents the value of imports by the NFPE's, i.e., public sector agencies that include statutory bodies and government owned or government's controlled companies.

Source: Ministry of Finance (1995, p168).

8.4.4 International benchmarking

In discussing management strategies for Malaysia's Vision 2020, Yeoh (1993, p47-51) introduced the concept of "international benchmarking." He argues that benchmarking is an essential strategy that could facilitate Malaysian organisations and managers to become the best in the world.

From the works of Yeoh (1993, p48-49) and Johnson and Scholes (1993, p140-141) it is proposed that for the purpose of the present research the concept of benchmarking is defined as the process of making comparative analysis between one organisation and another with the objective of establishing characteristics of best practice.

Benchmarking may be intra or inter organisational, it could also be national or international. In essence, Vision 2020 provides a benchmark for Malaysia against the countries that are considered to be developed countries. According to Yeoh (1993, p49):

> "The most worthwhile aspect of the benchmarking process could be the opportunity for people in an organisation to observe first-hand how other organisations go about their businesses."

According to Yeoh (1993) Malaysian organisations and managers need to have a world-class orientation. They need to develop outward looking competitive strategies in order to achieve competitive advantage that could be sustained in the longer term. To do so requires Malaysian organisations and managers to set themselves the goal of surpassing the benchmarks set by the world's best performing countries.

In the present research, reference to construction procurement practices of the UK, Japan and South Korea is considered to be a process of international benchmarking. In the context of the constraints identified, the objective of the benchmarking is to identify best practices in construction procurement for consideration in the development of strategies for Malaysia.

8.4.5 Are the UK, Japan and South Korea the only models suitable for Malaysia?

It is contended that the factors discussed thus far in this section justify the consideration~~s~~ of construction procurement practices in the UK, Japan and South Korea as the basis for the development of proposed strategies to remove or alleviate the constraints identified for Malaysia.

However, to assert that Malaysia can learn construction procurement practices from the UK, Japan and South Korea does not necessarily mean that these three countries are the only models for Malaysia to emulate. It is contended that it is very difficult, if not impossible, to find a 'perfect' model for Malaysia to copy. This is not, of course, the objective of the present study. The main purpose of the present study is to make a comparison between Malaysia and these three countries in the area of construction procurement practices related to the constraints identified. Wherever possible and appropriate, useful practices adopted by the UK, Japan and South Korea will be drawn as basis for the development of proposed strategies for Malaysia.

8.5 Construction Procurement Practices in the UK, Japan and South Korea in relation to those types of Constraints Identified in Malaysia

In this section, preceding each discussion of procurement practices of construction industries of the UK, Japan and South Korea in relation to the constraints identified in Malaysia; attempt will be made to analyse the constraint identified.

Also included in the analysis are procurement practices, which currently exist in the construction industry of Malaysia, or practices of other industries. This aspect of the analysis serves to provide background information in the development of proposed strategies.

Resource limitations mean that the researcher has to be selective of the issues being analysed but would remain highly critical.

8.5.1 Procurement Practices in relation to Constraint 1 and Constraint 7

Constraint 1 refers to constraints at project planning stage caused by procedures in obtaining statutory approvals. Constraint 7 refers to constraints caused by procedures in obtaining CF. Both constraints relate to procedures in obtaining statutory approvals. Thus, they are related and may be discussed together. The key difference between them is that Constraint 1 occurs at project planning stage, Constraint 7 occurs at the end of a construction project, i.e., once the project is completed but prior to occupation.

The processes of obtaining statutory approvals at project planning stage and obtaining CF have been established in Chapter Five of this thesis. In relation to the constraints at project planning stage caused by procedures in obtaining statutory approvals the present research focuses on (1) land acquisition, (2) planning permission, and (3) building regulations. The literature suggests that these aspects of the procedures in obtaining statutory approvals at project planning stage appear to suffer the greatest constraints.

The literature in Section 5.4.2 of Chapter Five suggests the main causes of constraints, both for Constraints 1 and 7. They include: (1) procedures that are complex and bureaucratic, (2) absent of clear and standardised legislation, systems and procedures across the country, and (3) inadequate number of professional and technical staff in local authorities. As a consequence, obtaining statutory approvals at project planning stage and of CF for completed facilities become complex, is expensive and time consuming and continues to create artificial scarcities.

A 'client' once commented (The Star, 2 April 1996):

> "Why the authorities take so much time and so long to process and approve plans is a mystery."

In the following discussions, it is hoped that it is possible to demystify some of the issues relating to the questions raised by the 'client'. However, it is felt that only the local authorities themselves may provide a more specific and detailed explanation.

In connection with the delay and the complex processes of obtaining statutory approvals both at project planning stage and for CF, there have been calls from various quarters in Malaysia to standardise, simplify and to expedite these processes. Others argued that some of the present legislation and regulations and the present systems of the authorities are obsolete and need changing (The Star 2 April 1996; The Star, 20 June, 1996; The Star, 29 August 1996; The Star, 4 October 1996). The legislation and regulations represent a legacy of the British colonial rule (Arbi, 1985, p91; Ibrahim, 1995, p39). In this instance, Wells (1986, p75) and Hillebrandt (1988, p51) pointed out that there have been many changes occurring in the UK that contribute towards making the process of obtaining statutory approvals for construction more efficient and effective.

In addition, different commentators have criticised the local authorities for not having adequate number of professional and technical staff. They claim that the number of technical staff in local authorities does not equate with workload in terms of the number of applications for statutory approvals received (Agus, 1989, p111; Alwi, 1995, p50; The Star, 13 April 1996; The Star, 8 October 1996).

Baron (1983), Hillebrandt (1988), Cooling, Shacklock and Scarrett (1993), Harvey and Ashworth (1993), Davis et al. (1994) and Seeley (1996) have carried out studies relating to the process of obtaining statutory approvals in the UK. Walker and Flanagan (1991), Matsushita (1994), Davis et al. (1994), Research Institute of Construction and Economy (1995) and Kim (1995) carried out similar studies concerning Japan and South Korea. From the above studies, it is possible to identify broadly the characteristics and the practices of obtaining statutory approvals in the UK, Japan and South Korea.

The UK, Japan, South Korea and Malaysia have comprehensive legislation, regulations and procedures concerning land use planning and building controls concerning building construction. In each country, there is some form of centralised structure but regional and district authorities deal with detailed issues. For example, in the UK overall system of land use involved a centralised structure under the Secretary of State for the Environment. The main responsibility for planning lies with the local authorities: the county councils for strategic planning, and the district councils for local plans and development controls (Harvey and Ashworth, 1993, p36).

In Japan the Building Standard Act (provides the minimum standards for building construction) is a national act but the local governments (referred to as prefectural governments and municipalities) have certain delegated powers in its enforcement. Although there are several tiers of administration, the roles and responsibilities of each administration are clear. For example, in the context of building controls in Japan, Matsushita (1994, p214) wrote:

> "No local government can enact any ordinance for the same subject matter as regulated by a national act, except for the scope delegated by the act."

In the context of housing industry in South Korea, Kim (1995, p37) indicated that there is a clear distinction between the roles and responsibilities of the central government and that of the local governments. He wrote that:

> "While the planning of tasks takes place primarily at the central level, local authorities are the principal institutions for implementing policies."

In Malaysia, there are three different levels of administration: local, state and federal; the roles and responsibilities of each administration are not always clear. Matters pertaining to land and the implementation of the Uniform Building by-laws 1984 may illustrate the lack of clarity between the different levels of administration. In the former, there is a national legislation in the form of the National Land Code 1965, but the rights and powers over land matters remains under different state governments. In the latter, there is the Uniform Building by-laws 1984 for Malaysia as a whole, but its implementation is neither uniform in the sense that certain procedures are not specified and therefore subject to individual authority's discretion, nor accepted by all local authorities (Alwi, 1995, p49; The Star, 15 October 1996). In the context of approvals for construction activities, Anwar Ibrahim (The Star, 10 April 1996) has called for greater transparency in the dealings of local authorities.

With regards to CF there have been criticisms that procedures for its application are ambiguous (The Star, 2 April 1996) and delays often occurs in obtaining CF (The Star, 13 April 1996). The government had directed that CF's for buildings declared or certified safe for occupation and met all legal requirements be issued within 6 months upon application (The Star, 13 April, 1996).

There is a marked contrast in terms of time taken in processing applications for statutory approvals. For example, in the UK 75 per cent of application for planning permissions is dealt with within the statutory 8 weeks duration. And the authority must decide on an application for approval of building plans within 5 weeks or a maximum of 2 months if the applicant agrees to this extension (Cooling et al., 1993, p32 and 180). In Japan, the authority must issue building permit allowing for construction work to commence between 7 to 21 days of the client's making an application and must inspect the completed facility within seven days of the client's notice of construction completion and issue an inspection certificate (Matsushita, 1994, p71). In South Korea, the whole approval process normally takes between 6 to 8 months, depending on the region (Davis et al., 1994, p212).

However, in Malaysia there is no provision binding local authorities to make decision on an application for statutory approvals on construction within a certain time frame. But some local authorities may indicate a minimum period in the form of a Clients' Charter. For instance, the Kuala Lumpur City Hall's Clients' Charter provides that the process of approving building and services plan will take 3 months. However, in reality some 30 to 40 per cent of applications cannot be approved within a year. Reasons given for the delays include inadequate number of professional and technical staff and large numbers of applications received (Alwi, 1995, p50).

In the UK the traditional mechanism for building control has been the deposit of full plans with the local authorities in accordance with the Building Act 1984 in advance of work commencing. The authority could also pass the plans in stages and imposing conditions on the deposit of further plans as necessary. An alternative to the traditional mechanism is where a client may give a notice to the local authority indicating his intention to undertake construction works or make a material change in use. The alternative arrangement saves a considerable amount of local authorities time and resources in terms of processing applications. Malaysia does not have similar alternative system.

In the UK Part II of the Building Act 1984 provides for a private system of building control as an alternative to that offered by the local authority. The system, relying on 'approved inspectors' operating under The Building Regulations 1985, enables corporate bodies and individuals such as architects and chartered surveyors to become approved inspectors. The government has designated professional bodies including the RIBA, RICS and CIOB to approve persons to certify plans and has designated certain public and privatised bodies to do likewise in respect of their own development only. The alternative arrangement may relieve some of the workloads of the local authorities. Malaysia does not have similar alternative system.

Although the procedures in obtaining statutory approvals in the UK appear more efficient than in Malaysia, they have not been free from constraints. For example, Baron (1983, p26-27) examined the UK housing industry in the 1980s and the planning system. He claimed that the Government at the time perceived the planning system as a constraint on economic activity in terms of both delays and costs. He observed that planning authorities work in relative isolation with little regard for the national or regional needs. The different tiers of administration: central government, county councils and district councils promote bureaucracies and inefficiencies. Hillebrandt (1988, p51-52) claimed that in spite of many changes introduced into the process of obtaining statutory approvals for construction the procedures remain complex and time consuming. She calls for shorter and more logical regulations that help facilitate their administration. According to Cooling et al. (1993, p179) the private system of building control is not fully practised due to problem of liability insurance. To date only one company, the NHBC Building Control Services Ltd. have been approved for house-building works only.

There are also problems in obtaining statutory approvals in Japan and South Korea. For instance, in Japan in the early to mid 1980s there has been a steady rise in the numbers of complaints and consultation cases lodged with the administrative authorities on matters pertaining to the implementation of the Building Standard Act up to 1987 (Matsushita, 1994, p195). And in South Korea, the procedures appear to be highly inflexible. For instance, it is practically impossible to alter town planning area zoning unless the land use policy is up for review. The Ministry of Construction reviews the land use policy every ten years. In addition, it takes much longer period to obtain statutory approvals for sophisticated buildings such as hotels, condominiums, sports centres, etc. and there is no provision for appeal (Davis et al., 1994, p212).

8.5.2 Procurement Practices in relation to Constraint 2

Constraint 2 refers to constraints in availability of Malaysian produced cement. Availability of cement has been identified to be in constraint currently but is unlikely to continue as constraints in the future.

Many commentators claimed that constraint in the availability of cement is due to high demand arising from the boom in construction (for example Ministry of Finance, 1995, p79; Abdullah, 1995, p7; Yaacob, 1995, p7; MBA, 1996, p10).

The government appears to regulate heavily the cement industry in Malaysia. For instance, under the Control of Supplies Act 1961, to set up and/or to operate cement plant and to become wholesaler of cement requires government's permit, respectively. Under the same Act cement is a price-controlled item, the government fixes its retail price. In addition, the government adopts a policy of protecting local manufacturing industries, cement included. Prior to 1992 there was a ban in the import of cement (Okuda, 1996, p32). Even at times when the ban was lifted imported cement can be subjected to high import duties. For example in 1984 imported cement was subjected to 50 per cent duties as well as sales tax of up to 10 per cent (Master Builders 1989/90, p35). On top of the government's fixed retail price, contractors and traders have to bear extra costs for transportation (The Star, 16 September 1996). As a consequence of these policies, the price of imported cement is much higher than locally produced cement.

Other government policies affecting the cement industry include: (1) ruling that requires all government projects to use locally produced materials (The Star, 2 August 1996), and (2) ruling that requires the use of up to 60 per cent of locally produced materials in all construction works (Lim, 1996).

In any case, contractors are reluctant to use imported cement. Not only because the price of imported cement is much higher than locally produced cement (as a result of the government's policies) but also contractors claimed that due to climatic reason, cement imported from certain countries is not suitable for use in Malaysia (Chik, in The Star, 19 May 1997).

As a consequence of the government policies, the reluctance of contractors to use imported cement and a boom in construction, there is heavy demand for locally produced cement leading to supply shortages. It is believed that the presence of building materials cartels to "*pakat harga*" (rig the market or fix prices) and restrict trade for business gains (MBA, 1995) exacerbates the problem. As a consequence, the price of cement in the market is much higher than the government's controlled price.

According to Okuda (1996, p32 and 35) between 1992-94 cement consumption grew at an annual average rate of 10 per cent. However, the rate of cement consumption increased significantly in recent years, i.e., it grew by 16.6 per cent in 1995 and by 15 per cent in 1996. Presently, there are 6 integrated and 4 grinding plants producing cement in Malaysia, with all plants producing at almost maximum capacity (Ministry of Finance, 1996, p81). The capacity to produce cement is further limited by shortage of locally produced clinker (Okuda, 1996, p35). Table 5.6 of Chapter Five suggests that shortfall in local cement production has been on the rise since 1995. Inadequacy in the capacity of local cement manufactures to meet local demands also appears to have exacerbated the shortages of cement.

In efforts to alleviate the shortage of cement the government has introduced several measures. For instance, the ban on importing cement was lifted and the government waived the import duty on cement from 22 October 1992. In addition, the government revised the control price of locally produced cement upward by 10 per cent from 14 August 1995 to promote local manufacturers to increase production (the last price adjustment was in 1981). Further, the government offers various tax incentives to promote existing plants to increase production and to promote the setting up of new cement plants. There have been reports of 3 new plants being set up and should commence production in 1998 (Berita Harian, 18 July 1996).

Other initiatives of the government to alleviate the shortage of cement included lifting the ruling that requires locally produced cement only to be used in government projects from July 1996 (The Star, 2 August 1996). To facilitate importing cement the government appoints the CIDB and the Standard and Industrial Research Institute of Malaysia (SIRIM) to test and certify quality of imported cement. In order to minimise hoarding and black marketing of cement and to discourage the formation of cement cartels, the government monitors the supply and delivery of cement (The Star, 16 July 1996). However, housing developers, contractors and cement producers called for the government to further liberalise and deregulate the cement industry, to increase enforcement to prevent black marketing and the practice of "*pakat harga*". They also called for improvement to infrastructure facilities and increase the number of permits for lorries allowed to transport cement to facilitate handling large quantities of cement at affordable prices (MBA, 1995; HDAM, 1995; Cement and Concrete Association of Malaysia, 1995).

There were also efforts to seek alternative materials to cement or to minimise its use in construction such as using load-bearing masonry instead of reinforced concrete framed structures (Lim 1994, p4-5; Tapsir, et al., 1996). Lim (1994, p4-5) argued that "reinforced concrete with brick-fill buildings is preferable is a misguided notion." He calls for more timber to be used in the construction of buildings in Malaysia because among others timber is readily available, indigenous and contextual to the Malaysian environment, it grows naturally in the Malaysian tropical rain forests and "are in many ways self generating and is therefore self sustaining. Abdul-Rahman and Alidrisyi (1994, p421) suggested the practice of material management needs improvement in order to reap its benefits which include minimising wastage of materials on site. Although the efforts to seek alternative materials to cement in construction are not primarily aimed at addressing the issue of shortage of cement, these efforts would contribute towards relieving the constraint, albeit in the medium to long term.

In examining the locations of cement plants in Malaysia, it shows that most plants are located on the western regions of Peninsular Malaysia. This may cause additional constraints in terms of high costs of transportation and delays to those in other parts of Malaysia. From the 10 cement plants in Malaysia, 8 plants are in the Peninsular: 5 plants in the west, 2 plants in the north-west and one plant in the south. Sarawak and Sabah each have one cement plant. It is believed that more developed infrastructure in the western areas of Peninsular Malaysia had attracted manufacturers to set up cement plants in those areas.

In the UK, Japan and South Korea, the construction material and components industries including cement appears to be more liberal and may be considered to be matured. This study has not found published data suggesting constraints in availability of cement or in other basic construction materials occurred in recent years either in the UK, Japan or South Korea. The presence of more developed infrastructure including better roads, ports and freight facilities means that storage and distribution of construction materials and components is relatively economical and efficient, thus supporting the view that constraints in the availability of cement or other construction materials do not exist in these countries. For instance, in a study relating to materials management system in the UK, Meraghni et al. (1995, p155) found out the causes of construction materials not being available when needed on site. From the 15 reasons that were provided by the respondent contractors none indicates constraint exists in availability of construction materials. Nonetheless, there might be instances where due to an unexpected rise in demand, certain materials may be temporarily in short supply, thus requiring importation or contractors may have to allow for increased in lead times. According to Harvey and Ashworth (1993, p74) that the maximum difference between the peak and the trough of most materials stock in the UK is a half to two months production.

There is currently very little barrier towards importation of construction materials including cement into the UK, Japan and South Korea. For instance, Harvey and Ashworth (1993, p75) wrote that the UK imports cement and other building materials in order to meet the demands of the construction industry. According to the British Cement Association (1992, p2) cement is 'fiercely price competitive' and the UK producers are in direct competition with importers from countries with surplus production such as Lithuania and Russia, that are prepared to sell on a marginal cost basis, in order to raise hard currency.

In Japan, the government through the Ministry of Construction (MOC) promotes import of construction materials to complement local production. Several measures including import promotion fairs, quality evaluation and verification services, etc. are taken by the MOC to facilitate imports of construction materials (MOC, 1995, p18-19). The DTI, UK (1995, p38-39 and 48) confirmed that in the 1980s the Japanese government has introduced various 'market opening measures' to remove trade barriers and promote imports. South Korea, although used to practice policies that protected her domestic market against foreign competition by measures such as the application of tariff barriers (Kim, 1995, p39) began liberalising its economy including reduction of tariff on import in 1996 (DTI, UK, 1997, p16).

The possession of current and appropriate technology means that the UK, Japan and South Korea are able to continue to innovate. Continuous innovation both in production and material characteristics produce effects including better quality and price (Morton and Jaggar, 1995, p56). In the UK the use of some form of materials management system and in Japan the use of Just In Time production philosophies has been said to offer various benefits including minimising materials waste on site (Bennett, 1991, p82; Meraghni, et al., 1995, p151).

8.5.3 Procurement Practices in relation to Constraint 3 and Constraint 4.

Constraint 3 refers to constraints in availability of unskilled, semi-skilled and skilled Malaysian labour, and Constraint 4 refers to constraint in availability of facilities for training skilled labour, respectively. The constraints in the availability of labour (in terms of semi-skilled and skilled) and training facilities may be considered to be closely related and therefore, are discussed together.

The Malaysian economy is virtually in full employment and the trend is expected to continue into the year 2000. Shortage of labour is widespread and is felt in all parts of the country and in all industries in particular those that are labour intensive such as in agriculture and construction. According to a report in The Star (2 September 1996) the pool of labour in Malaysia is small due to the relatively small size of Malaysia's population.

It has been estimated that for the period 1996-2000 construction employment would grow at 5.1 per cent per annum and would account for 9.3 per cent of the 9.07 millions total employment in the year 2000 (Tan, 1996, p5-6).

In Malaysia construction workers are predominantly self-employed people. The practice of most contractors or labour only subcontractors has been to employ construction workers casually, some even on a daily basis.

The tight labour market has led to upward pressure on wages (MBA, 1996, p10; Ministry of Finance, 1996, p24 and 179) and increased practices of job-hopping and as a consequence, technical skills and the overall skills of workers suffer (Ministry of Finance, 1996, p177; The Star, 25 February 1997). Industries are competing with each other for workers, irrespective of whether they are trained or untrained.

The boom in the economies of most far-eastern countries has led to outflow of Malaysian skilled workers notably to Singapore, Japan and Taiwan where wages for construction workers are much higher (The Star, 15 December 1996). Chin (The Star, 8 October 1996) blamed employers for being unwilling to pay reasonable wages to local skilled workers and this encourages the emigration of Malaysian workers abroad where they could receive higher wages.

There is also the problem of the quality of skilled labour in terms of productivity, workmanship, discipline, awareness of safety standards and compliance with safety procedures (Master Builders, 1989/90, p38; Abdullah, 1995, p7: Yaacob, 1995, p7). The Star (3 July 1996) reported that the construction industry recorded the highest number of occupational deaths with a yearly average of 194 deaths per one million workers. In contrast, other industries registered a yearly average of 157 deaths per one million workers.

The shortage of Malaysian construction workers has led to a massive influx of foreign workers into Malaysia (see Table 5.10 of Chapter Five). The immigrant workers, predominantly unskilled and without valid entry and work permits, are prepared to accept much lower wages and longer working hours. They possess very little or no education, come from mostly rural areas and do not mind spending years living in dilapidated conditions (Fernandez in The Star, 7 November 1996). It has been reported that there are more than one million foreign workers currently working illegally in Malaysia, a large proportion are employed in the construction industry (The Star, 8 October 1996; The Star, 19 February, 1997).

Different commentators have expressed concerns over the presence of large numbers of unskilled foreign workers in Malaysia. The workers brought with them a variety of social and health problems but little in the form of skills that could improve productivity or could be transferred to local workers. Their presence in large numbers would not help Malaysia move out of her low-level technology status (Fernandez, in The Star, 7 November 1996).

Faced with mounting shortage of labour, the government has in 1995 shifted its employment generation policies to one of promoting higher technology industries (Fernandez in The Star, 7 November 1996; Tan, 1996, p5). In order to supply workers with the required skills, facilities for training workers were increased (The Star, 2 September 1996; Fernandez, in The Star, 7 November 1996). However, there has been little success in the government's efforts to train workers required to meet the demands of higher technology because many firms prefer to ignore the government's call for firms to shift to automation (Fernandez, in The Star, 3 April 1996; Fernandez, in The Star, 7 November 1996). There has been a suggestion that the government instead should set a deadline for employers to shift to automation (Fernandez, in The Star, 7 November 1996).

It has been argued that Malaysia does not have a systematic and orderly education and training of skills for the construction industry (Wang, 1991, p104; Sharif, 1996, p418). At present there is no single training centre that specialises in the training of skills for the construction industry (Abdullah, 1995, p11; Yaacob, 1995, p11). And it is observed that out of the seven main government agencies conducting training, only two agencies - MARA and the *Institut Latihan Perindustrian* - conduct training related to skills required by the construction industry. It has also been argued that the current syllabus for training skilled workers failed to respond to the demand of a more modern construction industry (Berita Harian, 7 March 1997) and that many training centres are experiencing shortages of trainers (Ministry of Finance, 1995, p183 and 1996, p178; Government of Malaysia, Sixth Malaysia Plan Mid Term Review, 1993, p213).

The task of training skilled workers for the construction industry and for other industries is left mostly in the hands of the government (Tan, 1996, p9). For instance, during 1991-95 149,580 skilled and semi-skilled workers were trained, almost all (97.4 per cent) were trained by the public sector training institutions. From the total, only 12.2 per cent were skills related to the building and civil engineering trades (Government of Malaysia, Seventh Malaysia Plan, 1996, p117 and 316).

Faced with skill shortages and lack of funds to train workers for the manufacturing industry, the government in 1992 introduced the Human Resources Development Fund (HRDF) Act. Under the Act private sector employers have to make contribution to the fund. The fund is spent on training, re-training and upgrading of skills. The government sees the approach as a starting point in stimulating private sector involvement in training skilled workers. However, the HRDF scheme does not include the construction industry.

In construction, the government through the Ministry of Human Resources operates the On-Site Training Programme. The purpose of the programme is to provide facilities for training new construction workers. Under the programme, a contractor employed to work on a government project must employ a minimum of 5 trainees at the site of the works for a period of 3 months. The contractor must also employ a skilled foreman to guide and train the trainees in basic construction trades. The scheme however, does not cover construction projects in the private sector.

There were contractors that conduct informal and sometimes ad-hoc on site training under the "*kepala*" or foreman apprenticeship. Under this approach, new entrees are assigned a *kepala* who provides general supervision. The approach has drawn criticisms in particular workers tend to pick up many bad habits resulting in lack of discipline, poor workmanship, lack of pride in their work and low productivity (Master Builders 1989/90, p38).

There have been calls from various quarters for the government to tap the relatively large but unused human resources in the form of women, relatively uneducated and unemployed youths and senior citizen (Master Builders, 1989/90, p37, The Star, 7 May 1997). At present women account for only one-third of Malaysia's labour force, most are employed in the agriculture, manufacturing and services sectors (The Star, 7 May 1997). The participation of more women in the economy will mean additional resources for industries, less dependency on foreign labour and less outflow of currency (The Star, 9 March 1997). To facilitate employing more women and senior citizens the government proposes to amend the Employment Act to allow housewives and senior citizens to work on a part-time basis (The Star, 15 May 1996).

In 1996 the CIDB embarked on a programme to register and accredit skilled construction workers and construction site supervisors. The programme is not mandatory for workers. The impact of the programme is still too early to assess and little progress has been achieved (The Star, 29 October 1996). The CIDB believes the programme is able to (1) produce more reliable and up to date data on the supply of skilled labour, (2) offer clients with more competent skilled labour with credentials, and eventually (3) upgrade the status and career prospects of construction workers in Malaysia. The CIDB also plan to set up training centres for training skills required by the construction industry (Abdullah, 1995, p11; Yaacob, 1995, p11).

According to Harvey and Ashworth (1993, p217) the UK construction industry is labour intensive and heavily craft based. Construction employment fluctuates with the workload. For instance, during the construction industry's downturn in the early 1980s, some 250,000 workers lost their jobs and skilled labour left the industry. In addition, the total number of trainees and apprentices fell significantly. Consequently, when the industry recovers, a serious shortage of skill workers takes place (Building, 31 October 1997, p14). According to Briscoe (1989, p2) and Building (31 October 1997, p14) the shortages of skilled workers varied in significance between regions and trades.

Harvey and Ashworth (1993, p217) claimed that there has been a shift in the structure of construction employment in the UK during the 1980s, i.e., from direct employees to labour only subcontracting and self-employment practices. The latter represents over 40 per cent of construction employees in 1990. The shift was brought about by changes in the legislation governing self-employment in 1978 that facilitated labour only subcontracting and self-employment practices.

According to Briscoe (1989, p3) since the rise of self employment and labour only subcontracting in the 1980s there has been a decline in formal training. Very few of these firms engage in any training, they prefer the short-term approach of poaching skilled workers from other firms. Factors such as uncertainty of future works and trained workers cost more than untrained or semi-trained workers have been cited as reasons for their reluctance to invest in training.

The institutional framework for training in the UK is set by government policy. At the head of the system are the Department of Employment and their Training Agency, with overall responsibility for training. The Construction Industry Training Board (CITB), established in 1964, is the statutory authority for much construction sector training. The CITB is part funded by the government and through levy drawn from every construction firm. The roles of the CITB include to improve the quality of training, improve the facilities available for training, forecasting the number of trainees the construction industry requires and organising their introduction to colleges and employers (Briscoe, 1989, p4; Harvey and Ashworth, 1993, p243; Building, 26 April 1996, p41). The CITB runs some of the training courses itself but training is largely provided by Further Education Colleges (FECs) and in some cases by private sector training companies including employers' federations, trade union and various joint industry bodies. The Training and Enterprise Councils (TECs) manages the funds provided for training by the UK government. The TECs comprises local businessmen, they decide on the type of training they believe will give the greatest benefit to local industry (Building, 26 April 1996, p41).

The aim of the training schemes is to produce workers with National Vocational Qualifications (NVQs). The National Council for Vocational Qualifications was established in 1986 and it operates a system of accreditation for qualifications awarded for the various levels of occupational competence through approved bodies. Construction related NVQs are generally divided into three levels, a worker must have attained at level two before being considered competent to work unsupervised.

Most recent development is the construction skills arena is the introduction of the Construction Skills Certification Scheme (CSCS, 1995) in 1996. The scheme administered by the CITB gives skilled workers with photo identity cards displaying their level of competence. It enables clients to verify the credentials of workers. However, the CSCS scheme is voluntary but it paves the way towards allowing only skilled workers to be employed on construction sites.

There have been various strategies to arrest the problems of skill shortages in the UK construction industry. They included training workers with a broader base of skills or multi-skills, alternative sources of supply such as unemployed adults, women and importing immigrant workers from EC countries (Briscoe, 1989, p3; Hillebrandt, 1989, p21-21). Other strategies included increasing labour productivity through increased use of prefabricated parts and components, effective planning and supervision, incentive schemes, effective materials management, and through improved technical innovations (Morton and Jaggar, 1995, p101; Meraghni et al., 1995, p153; Seeley, 1996, p94-99).

Finnimore (1986, p12-13, 26), Hillebrandt (1988, p85, 87) and Seeley (1996, p97-99) pointed out that prefabrication (the terms prefabrication is used in the broadest sense, it includes prefabrication, standardisation and rationalisation of component production) were present in the UK building industry well before the 20th century. Its adoption however, became intense during the first decade after the second-world war. Among the reason for the extensive use of prefabrication and industrialised building then was shortage of skilled labour. On the technique, Hillebrandt (1988, p87) commented: "... industrialised building saved site labour which was to some extent offset by an increase of factory labour but leaving a net saving of labour overall." Finnimore and Seeley argued that prefabrication and industrialised building in the UK were given a major boost in the 1950s and 1960s by large-scale demand for dwellings (that were relatively standard) brought by the UK government of the time when it became the major supplier of housing. With a decline in large scale demand for public housing and major drawbacks notably the extensive major defects and the general lack of popularity with occupants, the future of industrialised building in the UK is very bleak (Harvey and Ashworth, 1993, p92; Seeley, 1996, p108).

According to Gann (1996, p443) the Japanese construction industry has a long tradition of craft productions, based upon carpentry and joinery skills. The shift towards industrialisation of production began in the late 1950s arising from factors including high demand for construction output and shortage of labour including skilled workers. In the early 1990s the shortage of labour worsen largely due to high demand, the reluctance of young people to enter the construction industry and ageing workforce (Bennett, 1993, p10-11; Kamimori, 1995, p18). To address the problems, two key approaches were adopted: (1) attraction of human resources into the industry, and (2) technological development and technological improvement.

In attracting human resources into the Japanese construction industry, efforts in improving employment and working conditions were intensified, taking into account the characteristics of the construction industry. The efforts include raising the standards of employment comparable with other industries, stabilising employment by making employers hire workers on a regular and direct basis, stabilising incomes, training and retraining, etc in order to attract new workers and to increase rate of retention of existing workers. However, attempt to increase construction wages was thought to have made the problem worse. According to Bennett (1993, p11) higher wages led to existing construction workers refraining from working overtime, they could achieve acceptable level of income without having to do so. As a consequence, daily productivity was reduced. Bennett pointed out that there is a strong political objection towards employment of foreign workers in Japan. Import of foreign worker therefore, is not a viable alternative to reduce the problem of shortage of labour in Japan.

In technological development and technological improvement efforts were intensified to develop and to disseminate new construction equipment, robots and methods geared towards labour savings. Contractors including small and medium-sized firms are encouraged to move over to mechanised construction including employing robots. In addition, prefabrication and the use of packaged materials in order to enhance efficiency of work by standardising specifications and less on-site activities were promoted and continue to be promoted (Kamimori, 1995, p19). Bennett (1993, p12) observed that through design innovations, factory based operations have increased and demand for site labour have decreased. Indeed the use of latest technology in construction as a strategy to solve the shortage of labour is widespread in Japan (Engineering News Record, 1983, p43). The high and relatively stable level of demand, excellent manufacturing ability and unrivalled knowledge of the use of robots make Japan a front runner in employing high level technology in construction (Bennett, 1993, p11).

The Japanese and South Korean labour force are highly disciplined and well trained (Huang, 1993, piv, 109; Park, 1993, p61-62; Kim, 1995, p34). The respective governments paid great attention to technical education and in training. For instance, in South Korea, the government rapidly expands education and training since the Korean War (1950-53) ended and used a large part of overseas aid for this purpose (Kim, 1995, p34). There are vocational training centres and technical vocational schools, the former to train craftsman and the latter to train technicians (Kim, 1995, p91). As a consequence, South Korea has an well-organised education system that includes facilitating women to participate in the labour force. The implementation of the minimum wage in 1988 further safeguards the rights and interests of women in the South Korean labour force (Jeong-Ho, 1996, p18).

Park (1993, p61-62) and Kim (1995, p126) claimed that it was a combination of factors including availability of highly skilled, educated, disciplined, high productivity, low wages construction workers and various government policies and assistance that facilitates South Korea into becoming the second largest contractor in the world's construction field.

According to Kim (1995, p33) the construction boom in the Middle East drew about 25 per cent of South Korean workers and this caused rapid rise in wages at home. Industries responded to the rapid rise in wages of workers by investing in greater technological capability for the future. Kim argued that it was the wage increases of the 1970s that promote industries to shift toward higher technology capability that contributed to sustaining the economic development of South Korea.

8.5.4 Procurement Practices in relation to Constraint 5

Constraint 5 refers to constraints in the availability of Malaysians as key design team members. The constraint is ubiquitous, in the sense that it encompasses (1) all key professionals: architects, engineers and quantity surveyors with degree and or professional qualifications, and (2) the semi-professionals: architectural, engineering and quantity surveying assistants and technicians with diploma or certificate qualifications.

Different commentators claimed that the shortage of Malaysians as key design team members has led to wage increase and high voluntary turnover or job-hopping among this category of workforce. Firms of consultants and contractors compete for architects, engineers and quantity surveyors and their respective assistants (for example, Ministry of Finance, 1995, p182; Berita Harian, 18 July 1996). In addition, government designers resigning and taking up offers in the more lucrative private sector is on the rise and this could lead to serious brain drain in the public sector (The Star, 15 September 1996; The Star, 8 October 1996).

To alleviate the constraints in the availability of Malaysians as key design team members, some firms employ foreign professionals and semi-professionals (Berita Harian, 18 July 1996). In terms of engineers, as of February 1996 there were 633 foreign engineers registered on a temporary basis with the Board of Engineers Malaysia, thus enabling them to obtain work permit and employed as engineers in Malaysia (ACEM, 1996, p6). Most of the foreign professionals were hired from the UK, the US and France (The Minister of Works, in The Star, 3 June 1997); others that attract lower wages were hired from India, The Philippines, Bangladesh and the former Soviet republics (Berita Harian, 18 July 1996).

According to The Star (11 March 1997 and 22 April 1997) some foreign professionals work illegally in Malaysia because the process of applying work permit is complex and time consuming. It may take up to 3 months before result of an application for a work permit is known. However, the Department of Immigration claimed that the procedure to get a work permit is simple and approval would be given in two weeks (The Star, 5 February 1997).

Some firms form alliances, either among the same profession or with firms from other professions, to achieve synergy in their efforts and resources including in professional and semi-professional workforce in order to be competitive. Others form similar alliances with firms from overseas. The alliances may be ad hoc, i.e., for a specific project, or a long-term arrangement of co-operation between the firms. The current laws prohibit firms of different professions to form a consortium, many see this as a hindrance towards a more competitive consultancy services. But the government in 1996 has proposed to amend the laws allowing engineers, architects and quantity surveyors to operate as a consortium (The Star, 25 June 1996).

In Malaysia, government public institutions of higher learning are the main provider of tertiary education. Currently, there are 9 universities, 6 polytechnics and 2 government-aided colleges offering courses at post-graduate, degree, diploma and certificate levels. It has been reported that only about 50 per cent of applicants could be admitted into first degree courses annually (Government of Malaysia, Seventh Malaysia Plan, 1996, p315). For instance, in 1995, there were 27,118 applicants for the 15,964 place available for first-degree courses (NAPIEI, 1996, p26).

Consequently, some 70,000 Malaysians seek their tertiary education abroad annually and spend more than RM1.4 billions (Berita Harian, 28 December 1996).

In addition to the general inadequacy of the public institutions of higher learning to offer tertiary education, there is also the problem of inadequacy of these institutions to produce sufficient graduates in technical courses. For instance, the IEM (1996, p11) pointed out that on average the public institutions of higher learning could produce some 2000 engineers annually, but this figure is far below the number of engineers required for the year 2000 and beyond (see Table 8.5).

Table 8.5 – Projected Demand and Supply of Engineers, 1990 –2000

Stock	Demand	Supply	Shortage
1990	1991-2000	1991-2000	
26,500	36,100	18,900	17,200

Source: IEM (1996, p12).

Table 8.6 shows the enrolment and output for First Degree, Diploma and Certificate Course from local public institutions of higher learning for 1990-2000. It suggests that between 1990-95 the output of first degree and diploma courses are predominantly in the arts stream, while at certificate level the output is predominantly in the technical stream. The trend is expected to continue for the period 1996-2000.

The IEM (1996, p13-14) claims that prospective university students are more attracted to courses in the arts stream such as humanities and business studies. It suggests that undergraduate students view career in engineering as less satisfactory in terms of working conditions, nature of job and its challenges and they perceived subjects in engineering courses as difficult. Rocky (1991, p7) observed that graduates prefer careers in computers and information technology.

Table 8.6 – Enrolment and Output For First Degree, Diploma and Certificate Course From Local Institutions of Higher Learning, 1990 – 2000

Course	Total number of students				Output			
	1995	%	2000	%	1990-95	%	1996-2000	%
First Degree								
Science	22,290	28	42,280	29	17,370	27	33,980	31
Technical	13,430	17	31,450	22	9,830	15	20,010	19
Arts	43,610	55	70,970	49	38,270	58	54,090	50
Total	**79,330**	**100**	**144,700**	**100**	**65,470**	**100**	**108,080**	**100**
Diploma								
Science	8,860	19	8,320	13	7,060	18	7,040	11
Technical	14,740	31	23,340	38	14,120	35	25,000	39
Arts	23,330	50	30,240	49	18,690	47	31,590	50
Total	**46,930**	**100**	**61,900**	**100**	**39,870**	**100**	**63,630**	**100**
Certificate								
Science	1,170	7	2,500	12	4,500	15	8,480	20
Technical	12,550	73	13,700	64	17,520	59	23,990	59
Arts	3,360	20	5,080	24	7,760	26	8,470	21
Total	**17,080**	**100**	**21,280**	**100**	**29,780**	**100**	**40,920**	**100**

Source: Government of Malaysia, Seventh Malaysia Plan (1996, p313-314).

In order to provide more facilities for higher education in Malaysia, in particular to generate a larger pool of professional and semi-professional labour force with degree and diploma qualifications, the government encouraged the setting up of private educational institutions. Under the Private Higher Educational Institution Act, 1996 the private sector is allowed to establish degree granting institutions and foreign universities may set up branch campuses in Malaysia. A National Accreditation Board was set up in 1996. Its functions include providing guidelines, monitoring standards and quality control of private educational institutions.

According to the Association of Consulting Engineers Malaysia or ACEM (1994, p17-18) demand for engineers will continue to grow as the country marches towards achieving the objectives of Vision 2020. They suggested that the supply of trained personnel might be achieved through (1) formal education at institution of higher learning, (2) continuing education and training while in employment, and (3) on the job training. In connection with the shortage of professional and semi-professionals faced by the construction industry of Malaysia, the ACEM proposed that:

1. The government should increase the size of student intake in technical subjects at institutions of higher learning;

2. Extensive career guidance should be carried out in schools to promote engineering and other technical courses to students and to attract the better students to enrol in these courses;

3. The government should address the shortage of teachers and lecturers; and

4. The government should provide incentives for firms to provide facilities for on the job training and continuing education while in employment.

It has been suggested that training syllabuses of technical courses in the institutions of higher learning needs reviewing. For instance, Abang Ali (1996, p50-51) examined Malaysian engineering degree courses in relation to engineering degree courses in the UK, US, South Korea, Japan, Australia and New Zealand. His findings suggested that engineering degree courses in Malaysia take 4 years to complete and are more specialised both in terms of depth and breadth. In contrast, the emphasis of engineering degree courses in the UK is on depth and in the US, Korea and Japan, the emphasis is on breadth. Abang Ali claimed that as a consequence of the highly specialised course, many students failed to reach the final year of the course. He calls for a broad-based training for engineers and a reduction in the duration of the course.

Rocky (1991, p8) argues the need for the construction industry to attract and retain technical graduates and to facilitate them into becoming specialists but with adaptable skills. Rocky (1991, p8) and the IEM (in The Star, 6 May 1997) pointed out that the construction industry is finding it increasingly difficulty to attract and retain high quality graduates due to competition from other industries and from other countries. Rocky calls for a review in the training syllabus of courses, and for more incentives to be given in order to address the problems. The IEM suggested efforts including distributing information on the benefits of working at home to those currently working overseas to persuade them to work in Malaysia.

There are unused human resources in the form of women and senior citizens with professional or semi-professional qualifications. No published data was found on their numbers but the impression is that they are sufficiently significant to warrant the government to consider amending the Employment Act to allow housewives and senior citizens to work on a part-time basis (The Star, 15 May 1996). In Malaysia, there is a general tendency for most women to leave their job while in their mid-thirties as soon as they start a family citing reason that they need more time to bring up children. And in the case of senior citizens, the mandatory retirement age in Malaysia is 50 and 55 for women and men, respectively. Due to the significantly improved health services and better standard of living in the past decades, most Malaysians that have reached compulsory retirement age remain relatively fit and healthy. Housewives might be employed on the basis of working from home so that they can remain with their families. Application of information technology including computer networking between homes and offices could facilitate this form of employment. Those retirees that possess qualifications and experience in high demand might be re-employed perhaps on a short-term basis, depending on their level of fitness and health and other considerations.

Table 8.7 provides a broad comparison between the construction industry professionals in Malaysia with those in the UK, Japan and South Korea. It suggests that Malaysia fares badly in terms of availability of construction industry professionals to provide services to society.

However, in making the above comparison there are factors that need to be taken into account. They include (1) history and culture, where different things have developed differently in different parts of the world, (2) the professional disciplines in the UK are generally common to countries that were once under her rule or influence, but not to others, and (3) roles played by professional bodies differ between one country to another (Harvey and Ashworth, 1993, p186). Nonetheless, the data is considered to be adequate in terms of illustrating the condition in the supply of construction industry professionals in the countries being studied.

Table 8.7 – Architects, Engineers and Quantity Surveyors Employed in the Construction Industry

	Per 1 million population			
	Architect	**Engineers**	**Quantity Surveyors**	**Total**
Malaysia	93	578	60	731
UK	563	903	421	1,887
Japan	6,116	67	-	6,183
South Korea	165	4,914	-	5,079

Sources:
Data for Malaysia: constructed from Table 5.1 of Chapter Five, population for Malaysia in 1996 – 21.2 millions.
Data for the UK: architects from RIBA (1991), engineers from ICE (1991), and quantity surveyors from RICS QS division (1991), population for the UK in 1989 – 55 millions (in Harvey and Ashworth, 1993, pix; 176, 177, 180).
Data for Japan: architects from total of 1st Class, 2nd Class and Wood Construction Licensed Architect (1990) and engineers from Registered Consulting (Construction) Engineers (1988) (in Matsushita, 1994, p17, 21), population for Japan in 1990 – 123.5 millions. Quantity Surveying is not widely practised in Japan.
Data for South Korea: architects from total of licensed architect (1994), engineers from total of master, class 1 and class 2 engineers (1995), (in Jeong-Ho, 1996, p201-202), population for South Korea in 1990 – 42.8 millions. Quantity Surveying is not widely practised in South Korea.

In the UK it is believed that there is little institutional constraint in the provision of tertiary education for construction. This factor is probably the most critical factor in making the UK relatively free from constraint in the availability of professional and semi-professionals for its construction industry. The statement is made on the basis that: (1) there exist a variety of routes for studying construction courses, and (2) the availability of facilities in terms of a large number of educational and professional institutions to cater for the needs of both for home and foreign students. The various routes available for studying construction include formal courses either on a full-time and part-time basis and courses through distance learning. Harvey and Ashworth (1993, p222) commented that:

> "The total number of potential recruits to the industry, based on the number of students undertaking construction education and training, tends to correspond fairly closely to the number of recruits required."

Seeley (1996, p480-481) observed that in 1992 there were 70 universities in the UK offering undergraduate courses for at least one of the construction professions, and there were over 200 full-time or sandwich degree courses related to construction (Harvey and Ashworth, 1993, p239).

Technicians are recruited largely from diploma or higher diploma construction courses either through full-time or on a part-time basis. Many students undertaking higher certificate or higher diploma courses may progress on to degree courses and eventually to professional recognition. The recruitment of professional construction staff are mostly from degree and postgraduate courses carried out by universities as well as from courses leading to examination set by the professional institutions. Graduates of non-construction courses could take special conversion courses such as the one offered by The Nottingham Trent University to graduates of other disciplines to become quantity surveyors.

Professional institutions in the UK play an active role in recruitment of professionals and semi-professionals for the construction industry. For instance, Seeley (1997, p479) pointed out that the RICS promotes the surveying professions through various initiatives such as producing a teacher's resource pack relating to the construction industry and producing and distributing a series of careers pamphlets. These initiatives aimed at informing and hopefully encourage school leavers to choose surveying as a career. In addition to the professional institutions, Harvey and Ashworth (1993, p221) pointed out that careers advice in schools were undertaken by lead bodies and employers in the construction industry.

It is also believed that there is no institutional constraint in the provision of tertiary education including in technical courses in Japan and South Korea. For instance, in 1992 Japan has 139 institutions of higher learning offering engineering courses at degree level and 104 institutions offering engineering courses at technician level (Bowen, 1995, p4). Additionally, large Japanese firms invest in well designed, on the job training for their staff (Bennett, 1993, p3). Very few Malaysian firms invest in staff training.

In South Korea, in addition to expanding its institutions of higher learning immediately after the Korean War (Kim, 1995, p34), the government utilised foreign aid to send thousands of South Korean students abroad to be trained as scientists and engineers (Kim, 1995, p34; Asian Wall Street Journal, 9 October 1995). In addition, technical colleges that used to produce technician were upgraded to university status (Kim, 1995, p91).

To retain and to sustain productivity of the workforce including professional staff, Japanese and South Korea firms invest in a variety of incentives for their staff. The incentives include improved employment and workplace conditions, on-the-job training, seniority wage system, and some form of employment security (Walker and Flanagan, 1991, p146; Bennett, 1993, p3; Park, 1993, p123; Huang, 1993, p12; Kamimori, 1995, p18-19; DTI, UK, 1995, p89; Economic Planning Agency, The Government of Japan, 1996, p49-51).

According to Jeong-Ho (1996, p229-230) an approach that is gaining popularity among South Korean firms in recent years is 'strategic collaboration'. Under the approach firms strategically collaborate with other firms, either domestic firms or foreign firms depending upon the kind of needs that can be fulfilled by participating firms, as a way to overcome weakness or drawback. He identified the areas in which strategic collaboration works effectively, that is, technology, financing, professional manpower and licensing; and the forms of collaboration include partnership, joint venture and consortium. Jeong-Ho commented that:

> "...strategic collaboration, whatever form it may take, is not only helpful to the participating firms, but it serves the construction industry as a whole as an effective way to bring about intra-industrial synergy effects."

One particular area that has seen significant impacts in terms of professional and semi-professional manpower in the construction industries of the UK, Japan and South Korea is the application of information technology. For instance, through the application of information technology, the UK consultancy services have been able to reduce the labour intensity of many tasks performed by the professionals and the semi-professionals in the design and other documentation processes. In areas of architecture and engineering through the application of Computer Aided Design or CAD, speed and efficiency has been achieved and it has revolutionised the nature of the design process. In quantity surveying, the application of computers has seen improved services in terms of speed and efficiency by automating manual tasks in tender and other documentation (RICS, 1991, p31). The application of information technology is seen as a powerful tool that has a major role to play in the processes of construction procurement in the future (Seeley, 1997, p549 citing the Department of Environment's Construct IT Report, 1995; Research Institute of Construction and Economy, 1996, p164-166; Jeong-Ho, 1996, p226).

Wells (1986, p66-67) argued that if there are difficulties in setting up training programmes, alternative approaches should be considered. She suggests one alternative might be that construction design and technology should be tailored towards the levels of skills that actually exists. Thus,

> "Plans might instead be based to a large extent upon a limited number of simple, standard building types, requiring only the repetition of a few simple operations on site. Not only would such a move greatly facilitate the training problem, it would also simplify the problem of supervision, lead to a rapid improvement in the productivity of labour, as well as drastically reduce the requirements for scarce and expensive design skills."

8.5.5 Procurement Practices in relation to Constraint 6

Constraint 6 refers to constraints in the availability of technically competent, experienced and financially capable Malaysian specialist contractors.

In the present research, a specialist contractor refers to contractors that perform works considered to be specialised in nature such as electrical, mechanical, sanitary and water engineering and telecommunications.

Data obtained from the *PKK* or CIDB only shows the numbers of registered contractors according to their Class or Grade of registrations, respectively (Tables 5.3 and 5.5 of Chapter Five of this thesis). According to statistics furnished by the *PKK* as of July 1996 there were 899 registered electrical contractors. There is no published data on the number of other specialist contractors in Malaysia.

According to Wang (1991, p104) and Sharif (1996, p361, 416-419) contractors in Malaysia, unlike consultants, lack formal education and training. Sharif (1996) pointed out that the lack of formal training is because facilities for training contractors are very limited and have traditionally been neglected. Wang (1991) argues that the phenomenon creates an imbalance between professionals and contractors in terms of technical skills and expertise.

The construction industry of Malaysia up to the 1970s is characterised by demand that was predominantly rudimentary in nature. Sharif (1996, p255 in citing the works of Peng, 1994) pointed out that the construction industry of Malaysia was traditionally a small neglected sector regarded as a by-product of other areas of activity in the economy. It was only from the mid 1980s, and in particular since Vision 2020 was introduced in 1991 that pressure for speed to completion and demand for more specialised and complex construction begins to flourish. This aspect of the construction industry of Malaysia has been established in Chapter Four of this thesis. Skills in construction of specialist in nature therefore, are only just beginning to develop.

The government acknowledges the lack of training facilities for contractors in general. In order to address the problem, it introduces various initiatives including:

1. Encouraging the transfer of technology from foreign contractors to Malaysian contractors. In this instance, foreign firms are required to form joint ventures with Malaysian firms in bidding and in undertaking public works funded by the government after it has established that Malaysian contractors are not capable of undertaking the works (see Section 5.5.4 of Chapter Five of this thesis). Under the Guidelines on Transfer of Technology (Ministry of Finance, 1995, p260-261) the foreign firms are required (among others) to (1) supply the latest technology available, (2) to allow access to innovations or breakthrough in technology, and (3) to provide adequate training facilities for the Malaysian personnel involved with the project;

2. Provides general guidance and training for contractors through government's agencies, notably the Ministry of Works, the *PKK* and CIDB; *and*

3. The formation of the '*Konsep Payung dan Program Pembangunan Kontraktor Binaan Bumiputera Berwibawa*' (the Umbrella Concept and the Dedicated *Bumiputera* Contractors Development Programme).

The government identified that the *Bumiputera* lags behind in various economic activities including in construction. As a consequence, it initiated the *Konsep Payung dan Program Pembangunan Kontraktor Binaan Bumiputera Berwibawa* in 1993. The key objective of the programme is to establish a pool of technically competent, experienced and financially capable *Bumiputera* contractors. Broadly, the programme operates as follows (*Pekeliling Perbendaharaan Bil 11* of 1993):

1. The *PKK* selects *Bumiputera* contracting companies which meet the minimum requirements in terms of financial and technical capabilities, satisfactory track record and commitment to the contracting industry and designates them as *Kontraktor Berwibawa* or Dedicated Contractors;

2. The *Kontraktor Berwibawa* receive guidance and assistance in order to increase their technical and management competencies and experience. The assistance includes limited preferential treatment in tenders for public work projects, the argument being that a contracting firm must have on going projects for a certain duration (to be decided by the *PKK*) before it could develop sufficient technical and managerial competencies and experience; and

3. The *Kontraktor Berwibawa* must act as umbrella in the sense that it must appoint other *Bumiputera* contractors as sub contractors and provide them with guidance and training. These other *Bumiputera* contractors are identified by the *PKK*.

According to Anwar Ibrahim (1996) as of September 1996, a total of 297 *Bumiputera* contractors have been selected to participate in the programme with some RM 3.0 billions worth of public work projects distributed amongst them. No published data could be found to ascertain how successful the programme has been in terms of meeting its objective. However, the President of the PKKM speaking in a seminar in 1996 claimed that the initiative has been successful in terms of establishing several technically competent, experienced and financially capable *Bumiputera* contracting firms, some have gained listing on the KLSE. These various government initiatives may be extended to include training for specialist contractors.

In the UK, Harvey and Ashworth (1993, p106) estimated that in 1990 there were over 68,000 specialist firms (i.e., other than general builders, building and civil contractors) of various types and sizes. They account for some 33 per cent of total number of contracting firms. There is no government enforced regulation of contractors in terms of licences, thus any firm could, theoretically, offer construction production services.

The construction industry of the UK has evolved gradually over a long period and in the course has developed skills, materials, technologies and procedures that meet her requirements. Other factors that are believed to have helped sustain the supply of contractors of all types in the UK includes: (1) the availability of extensive facilities for formal education and training in construction, and (2) the presence of institutions related to contractors such as the Chartered Institute of Building or CIOB which promotes technical competence among its members. In addition, Hillebrandt (1988, p124) argues that the increase in use of management contracting system of procurement in the UK has contributed towards growth in the practice of subcontracting to specialist firms. This is also believed to be among the factors that help sustain the supply of technically competent, experienced and financially capable specialist contractors in the UK.

In Japan, the Construction Business Act of 1949 requires all contractors to obtain construction licences. The objective of licensing contractors is to ensure proper execution of construction work while protecting the client and to promote quality in the construction industry (Kamimori, 1995, p5). There are all together 28 classifications of works for licensing purposes, a contractor can obtain a license in more than one classification at one time and may add others if it qualifies. In addition to work classification licenses, there are two types of construction business licences: (1) ordinary contractors' licences, and (2) special contractors' licences. The former allows contractors to execute subcontract works up to Yen 30 millions (exchange rate in 1995, Yen 1.00 = US$ 0.01064 or GBP£0.00674). The special contractors' licenses are confined to 7 types of specific contractor: civil, building, electrical, structural steel, paving, painting and landscaping. These works are considered to be of exceptional technology and business operations, the requirements for obtaining the license is more stringent. A company with a special contractor's license is allowed to execute subcontract works worth Yen 30 millions or more. As of March 1995, there were a total of 1,174,891 registered contractors of all classifications in Japan. There were 531,005 contractors with ordinary contractors' license, and 42,860 with special contractors' license (Research Institute of Construction and Economy of Japan, 1996, p152).

In Japan, four main factors are seen as significant in producing and in sustaining the supply of contractors including specialist contractors: (1) the availability of adequate facilities for formal education and training, (2) historical factors, (3) construction practice, and (4) government policies. The availability of adequate facilities for formal education and training has been discussed in Section 8.5.4.

Secondly, historical factors. Immediately after the Second World War, Japan came under the supervision of the US. According to Park (1993, p185-186) Japanese contractors gained valuable on the job training from works commissioned by the US Army.

Thirdly, construction practices. According to Hasegawa (1988, p4) and Kamimori (1995, p6) the Japanese construction industry relies greatly on specialised contractors and equipment installers, commonly referred to as subcontractors. According to Kamimori (1995, p6):

> "Upon receiving an order for construction work, a contractor classifies the project by the type of services required and sublets these services to subcontractors."

Walker and Flanagan (1991, p154) liken the close relationship between main contractors and subcontractors in Japan as 'paternalistic' and commented that the subcontractors:

> "... depend on their 'father' contractors for future work. Many of the specialists will have worked for particular major contractors for some years and in many cases they will work for only one contractor."

The close relationship between main contractors and subcontractors benefited the subcontractors in many ways including in future job stability and in training facilities. According to Bennett (1993, p3) subcontractors benefit from well 'designed, on the job training' that the main contractors provided for their staff and the staff of their subcontractors. As a consequence of advances in construction technology, new construction methods and mechanisation, more subcontractors are becoming specialists and professional subcontractors, notably electrical, air conditioning and plumbing subcontractors (Kamimori (1995, p6).

And finally, government policies related to construction. Among the policies, the importation of foreign technology and the roles of the MOC in assisting Japanese firms are seen as significant factor in bringing up more technically competent, experienced and financially capable contractors of all types in Japan. According to Huang (1993, p110) the Japanese government have demonstrated firm commitment to the technology transfer. During the initial stage of technological development foreign construction technologies were acquired through a variety of ways notably through learning on the job basis from US contractors and engineers on projects commissioned by the US Army in Japan immediately after the Second World War. In addition to using the newly acquired technology, the Japanese did the so called 'reverse engineering' whereby the imported technology are taken apart and through innovation, rebuild them into new and sophisticated technology (Asian Wall Street Journal, 9 October 1995). In this process, the main contractors and the universities work as partners and invest heavily into research and development (see Table 8.8).

In South Korea, all contractors - general (building or civil or both), special (iron and steel installation, dredging, pavement and landscaping) or specialist (21 types of trades such as decoration, steel works, etc.) - are required to obtain construction licenses from the Minister of Construction and Transport. In 1994, there were altogether 2,949 licensees, 218 licensees or 7.4 per cent are special contractors (Jeong-Ho, 1996, p199). According to Jeong-Ho (1996, p200, 204) the construction industry of South Korea "depends on subcontractors who are specialising in different types of building trades."

In South Korea, three main factors are seen as significant in producing and in sustaining the supply of contractors including specialist contractors: (1) the availability of adequate facilities for formal education and training, (2) historical factors, and (3) government policies related to construction. Firstly, availability of adequate facilities for formal education and training; this has been discussed in Section 8.5.4.

Secondly, historical factors. South Korean contractors gained valuable on the job training from works commissioned by the US Army stationed in South Korea following the Korean War reconstructing and building new civil and specialised military projects (Park, 1993, p51). In the 1960s when South Korea embarks upon its industrialisation programmes the construction industry received massive orders for more specialised and complex construction of industrial and infrastructure facilities. In the 1970s as South Korean firms enter the world construction market on a bigger scale, notably in the Middle-East, the skills and expertise in general contracting and in specialist works acquired at home enabled them to make rapid advances.

And thirdly, government policies related to construction. The South Korean government initiates various policies in order to expand its construction industry both at home and abroad. Among the policies, the *Cheabols* approach, importation of foreign technology and the roles of the Ministry of Construction in assisting South Korean firms are seen as significant factor in bringing up more specialist contractors in South Korea.

Kim (1995, p69-70) provides an account of the *Chaebols* approach. Under the *Chaebols* approach, the government encourages the formation of large conglomerates. These *Chaebols* receive preferential treatment from the government in placing bids and in securing construction projects. The construction of the projects are distributed among a chain of subcontractors engaged by the *Chaebols*, each subcontractor performs highly specialised function production under the so-called 'Just in Time' process. The subcontractors received training by the *Chaebols* who also supply the raw materials, equipment and even assist in management and in technology development. In due course the subcontractors become highly specialised in their areas of production.

The South Koreans, like the Japanese, acknowledge that they are indebted to foreign technologies. Importation of technology through a variety of ways will continue because the South Koreans feel that they are still lagging in many areas notably in science and technology (Asian Wall Street Journal, 9 October 1995; Lieu, 1996). Like the Japanese, the South Koreans also did 'reverse engineering' and invest heavily in research and development (see Table 8.8).

In addition, South Korean contracting firms adopt 'strategic collaboration', either with domestic firms or foreign firms depending upon the kind of needs that can be fulfilled by participating firms, as a way to overcome weakness or drawback (Jeong-Ho, 1996, p229-230). Aspects on strategic collaboration in South Korea have been discussed under Section 8.5.4.

As an alternative to training programmes, that is should there be difficulties in setting up training programmes, other strategies such as adapting construction design and technology to suit the level of competency and experience of indigenous specialist contractors that actually exists should be considered. This issue however requires consideration at earlier stages of a project particularly during the planning and design stages. This aspect has been discussed in Section 8.5.4.

8.5.6 Procurement Practices in relation to Constraint 7

Examination of literature relating to Constraint 7 has been dealt with Constraint 1 in Section 8.5.1.

8.5.7 Procurement Practices in relation to Constraint 8

Constraint 8 refers to constraints in contract administration due to political and/or bureaucratic interference. The process of contract administration in Malaysia and its prevailing problems have been established in Section 5.6.1 of Chapter Five of this thesis.

There are two issues in Constraint 8 namely (1) political interference, and (2) bureaucratic interference. Firstly on political interference. The concern of the present research is not on issues relating to politics per se but on the involvement of individual(s), who are not a party to a contract, in the running of a construction project that the contract relates. The issue may be illustrated by a comment made by Abdullah (1989, p16) in the context of contract administration in the *JKR* (the following quote is a translation of Abdullah's paper, which is in Bahasa Malaysia):

> "One problem often faced by S.O.s or their representatives in the administration of a contract is the intervention by certain quarters who are not part of the contract in decisions made by the S.O.s or their representatives. Among the areas where intervention often occur are variation of works, extension of time, damages for non-completion and determination of contractor's employment."

Abdullah claimed that interference by influential individuals or parties with the administration of a contract undermines the S.O.s' or their representatives' position vis-à-vis the contract, and often cause various complications including delays in the progress of a project. Abdullah suggested that S.O.s or their representatives should have a free hand, albeit within the provisions stipulated in the contract, in the running of a project. He commented that:

> "In the administration of construction works, the S.O.s or their representatives have absolute power to make decision on matters that they are empowered to do so by the contract. Top management official and other quarters should not interfere in the decisions made by the S.O.s or their representatives..."

Agus (1989, p105) reported that several studies on public housing development in Malaysia showed that the key weaknesses in its implementation included "administrative incapacity and inefficiency" and "constant intervention of a political party at the local level." In addition, Quek (1989, p50) and Adnan (The Star, 11 June 1997) pointed out that developers and consultants face official red tape that caused delays in project implementation.

It is argued that there are two aspects concerning political interference. Firstly, that it has something to do with the way society in Malaysia behaves including the way they view legal matters such as a contract. Broadly, Malaysians are conservative in their values, that they would prefer solving whatever problems (contractual or others) they may have behind closed doors (so to speak) in order to 'save face'. Bringing a problem out in the open such as through legal means that might ends up in court is seen by many as a last resort. The following two cases (narrated in the course of the investigation on the issue on political interference) may illustrate the point under discussion.

Firstly, a construction project was going on in an area but local residents were not happy with the contractor for employing labour predominantly imported from outside the area. The local residents approached their political representative or their local headman to voice their dissatisfaction. The politician or local headman, in turn would approach the S.O. and asked the latter to consider accommodating the local residents' request for employing locals as labour for the project. It was indeed the rights of the local residents to approach their political representative or local headman to voice their problems. But what happened after that could cause problems to the S.O. in the sense that employment of workmen is the prerogative of the contractor; as long as it is being carried out within the requirements of the law and as stipulated in the conditions of contract. The problem could be worse if skills required by the project are not available locally. If the S.O. complies with the request and instructs the contractor to employ local labour only, it would mean that the S.O. is acting beyond his authority under the contract. But to ignore their request would cause the politician or local headman to suffer *'jatuh air muka'* or loss of respect in the eyes of the local residents. Normally, such a problem is solved between the S.O., the contractor and the politician or local headman amicably.

Secondly, a contractor was disputing a decision made by the S.O. on a contractual matter in a project. Instead of approaching the S.O. or bringing the matter to arbitration or to court (the procedure stipulated under the contract), the contractor would try to solve the so-called problem by seeking help from higher authorities or through political channels. The person contacted by the contractor would feel obliged to help and thus, would approach the S.O. and offer his advice. Because the person contacting the S.O. is of higher authority than the S.O. the latter would be in a difficult position, and may be compelled to review his decision, although in most cases the decision stays.

The problems (as illustrated by these two cases) constrained the actions of an S.O. in discharging his/her roles and responsibilities under a contract. They illustrate that the S.O. has to consider a variety of non-contractual matters when making contractual decisions. People who do not understand the way in which society in Malaysia behave in terms of their conservative value notably towards legal matters may view such cases as political patronage.

The second issue on political interference is that there may be some elements of patronising involved in the administration of construction contracts, such as certain people may exploit society's conservative values for personal gains. For instance, allegation of graft in the construction industry has been cited as the main reason for the escalation in cost of houses (The Star, 11 June 1997), construction accidents and shoddy workmanship (The Star, 10 April 1996). However, it is not the intention to speculate on this second issue of political interference, and that it is considered to be not within the scope of the present research.

The second issue on the constraints in political and/or bureaucratic interference is bureaucratic interference. Abdul Rashid (1992, p7) examined the organisation structure of projects in the *JKR* when implementing public work contracts. He argued that the organisation structure is bureaucratic. The characteristics include that the relationships among the various parties is formal, the structure is hierarchical and there is unity of command, a clear delegation of authority and responsibility and a clear span of control. In other words, the structure is as close as it can be towards the model of bureaucracy proposed by Max Weber (1947 in Abdul Rashid, 1991, p14-19). It is believed that similar project organisation structure prevails in other government departments and in the private sector.

According to Abdul Rashid (1992, p11) there is nothing wrong with bureaucracy and that Max Weber believed bureaucracy is the most efficient way for structuring organisations (Abdul Rashid, 1991, p14-19). However, when issues such as the ones listed below occur in contract administration, strict adherence to bureaucracy could jeopardise efficiency.

1. People use the bureaucratic channels as a means of protecting themselves and their groups by dealing at arm's length;
2. Bureaucracy blocks free discussions and exchanges of ideas; and
3. Decisions and instructions involve the entire chain of command and need efforts that take time and can lead to delays in progress, and delays in making decision.

In fact, it is problems such as the above which gave bureaucracy a bad name in the first place, to the extent that bureaucracy is synonymous with inefficiency.

According to Turin (1973, pE36-37) strict adherence to formal aspects of administration is common to most developing countries. He claimed that in the context of the building process, such practice could ends up by imposing unnecessary constraints. He identified the factors that could cause bureaucratic attitudes among construction professionals to include:

1. Over centralised organisation structure, with limited delegation of powers to regional or local offices, as a consequence of shortages of professional staff; or

2. Persons with authority are relatively conservative in their approach to the design, administration and supervision of construction projects.

The bureaucratic nature of contract administration in Malaysia may be illustrated by examining procedures adopted by the *JKR*. Two aspects of contract administration in the JKR were chosen as examples: (1) appointment of a S.O., and (2) approving variation works. In the former, the system of appointing S.O. is based on public post; expertise, experience or current workloads of the officer concerned are not factors of primary consideration. This issue has been discussed in Section 5.6.1 of Chapter Five of this thesis.

In the second example, the procedure for approving variation works is outlined in *Ketua Pengarah Kerja Raya* (1992, Chapter 16). Under the PWD 203 conditions of contract the S.O. is expressly empowered to make contractual decisions including ordering work to be varied. However, *Arahan Perbendaharaan* No 202 (in *Ketua Pengarah Kerja Raya*, 1992) and *Pekeliling Ketua Pengarah Kerja Raya Bil* 12 of 1987 identify the public officers, in higher position than the S.O. that must give prior approval to the S.O. before the latter could issue a written instruction for variation to the contractor. The officer (hereinafter referred to as authorising officer) that could grant the approval depends on value of a contract and value of variation works to be executed. It ranges from the State Head of *JKR*, to Deputy Director General of the *JKR*, to the Director General of *JKR*, and eventually to the Secretary General of the Ministry of Works (in ascending order of contract sum/value of proposed variation). The S.O. must prepare and submit a detailed application including justifications of the need for the works to be varied to a secretariat. The application would be decided by a special committee presided by the authorising officer.

It is acknowledged that strict procedures are essential to ensure accountability in the procurement of public works. However, the procedures that have been described show that the S.O. does not have complete power to preside on all contractual matters and that the presence of different levels of authorities makes administering contract more bureaucratic. In addition, the procedures often cause delays in making decision, critical when there are matters that requires urgent attention but actions could not be taken for fear of violating the stipulated procedures. These examples illustrate the nature constraints on the S.O. when administering public work contracts.

Abdul Rashid (1992, p22) suggested that *JKR* should consider reforming the way in which contract administration is performed including employing a project manager with " overall control of design, procurement and construction operations."

The researcher found no published data indicating that constraints in contract administration due to political or bureaucratic interference, in the nature as discussed in Malaysia, prevail in the construction industry of the UK, Japan and South Korea.

According to Matsushita (1994, p56-57) and Sharif (1996, p126-127) Japanese society retains a deep Confucian sense of moral values and a spiritual habit to keep harmony in society. Many tend to avoid any legal righteousness and would only consider taking legal actions as a last resort to settle disputes. The Japanese attitude to a signed contract is no more than a platform for establishing more cordial contractual relationship in the future. Based on an account provided by the DTI, UK (1997, p24), the South Koreans attitude towards contract is similar to the Japanese.

In the UK, the architect is often regarded as the leader of the building team (although project managers and other professionals are making some progress in changing this traditional approach). In the context of administration of a contract, the architect retains overall control of a building project, reporting only to the client that employs him. He is responsible for the preparation of the contract, the designs, tendering, and ensuring the contractor carries out the work as required under the contract. In the GC/Works/1 form of contract, the architect is termed as the S.O. Seeley (1997, p39) commented that the architect is,

> "... involved in the production of a building from inception to completion - from pure design, through production drawings and details, to supervising the contractor. He also has the important task of co-ordinating the activities of everyone else involved in the project."

In addition, Seeley (1997, p38) claimed that in the UK:

> "Much of the success or otherwise of a project depends on the way in which the architect performs his functions."

In other words, the architect (or the engineer in the case of civil engineering projects) is given a free hand, albeit within the provisions of the contract, to run the project with minimum interference from any one else, let alone individuals or parties outside the contract. This statement is reinforced by Harvey and Ashworth's (1993, p144) comments in relation to the issuance of interim, practical completion and final certificates in a contract;

> "Any interference on the part of the employer with certificates is a serious offence giving the contractor grounds for termination of the contract and damages."

A similar situation to the one prevailing in the UK, in the context of a person in charge of administering a project retains overall control of the project, also prevail in Japan. For instance, Bennett (1993, p4-5) observed that for each project undertaken by Japan's big five contractors (Kajima, Obayashi, Taisei, Takenaka and Shimizu) the project manager is responsible for the whole process of construction. He/she is involved in the preliminary stages although specialists performed the detailed design and construction planning and is responsible for putting the detailed plan into action. Short day-to-day co-ordination and control meetings (about 20 minutes each day) are normally held to identify problems. Although decision making is through consensus, the project manager retains full control. For instance, Bennett (1993, p4-5) commented that:

> "When a consensus has been reached, the project manager announces the decision, which is then accepted by all."

8.5.8 Procurement Practices in relation to Constraint 9

Constraint 9 refers to constraints in availability of reliable sources of (published) information on statutory requirements, cost data and project opportunities.

It has been argued by Agus (1989, p110-111) that some initiators/promoters of public low cost housing in Malaysia do not understand the procedure for sending in their applications for statutory approvals. Although no published data was found offering reason(s) as to why initiators/promoters of construction projects do not understand the procedures for making applications for statutory approvals, it is believed that constraint in the availability of published information on the procedures might be among the causes. Perhaps, ignorance of the procedure lead to plans often submitted not in order, therefore, requiring amendments in order to comply with the minimum requirement of the by-laws. As a consequence, delays occur in obtaining statutory approvals (discussed in Section 5.4.2.2 of Chapter Five of this thesis).

It is observed that information relating to building plan submission procedures and building requirements of local authorities is not readily available to the public. On this issue, The Star (1 June 1997) reported that one local authority is making efforts to compile an information booklet for distribution to the public is commendable.

Abdullah (1994, p6) indicated that vital statistics of the construction industry have not been compiled, monitored and kept for ease of reference. Such statistics may include costs of materials, plant and labour and indices and forecasts for the construction industry on a regular basis. It is contended that realistic up-to-date information on these areas and others will be valuable to participants of the processes of construction procurement. The information could be applied to understand better the construction industry such as its investment climate and market conditions and would greatly assist participants of the processes of estimating and tendering for projects.

The experience of the researcher working in the construction industry of Malaysia was that published information on the construction industry is limited. For instance, bodies such as the UK's NEDO and the DoE, or Japan's MOC and the Research Institute of Construction and Economy; or South Korea's Ministry of Construction and Korea Research Institute of Housing Studies are not presence in Malaysia. These organisations regularly collate and analyse data and forecast predictions for the construction industry as well as technical appraisals of new technologies and products, compilation of standard specifications and building legislation.

In addition, published data on costs is lacking. Malaysia does not have the equivalent of publications on construction costs such as Spon's Architects' and Builders' Price Book (Publisher: London: E & FN Spon), or the Griffiths Building Price Book (Publisher: Brighton: Barton Publishers), or Laxton's Building Price Book (Publisher: East Grinstead: Reed Information Services Ltd). In Japan, the Construction Research Institute publishes the annual "Construction and Material Costs in Japan." Limited information on costs however, is available such as in the:

1. ISM's Building Cost Information Centre (BCIC) in the form of its quarterly elemental cost analysis and survey on material and labour costs;

2. *JKR*'s biannual tender price index for public works; and

3. *JKR*'s Schedule of Rates for Minor Works (updating depends on need).

The ISM indicated that there is a need for increasing reliability of its data on construction costs published in its BCIC. This is because the data, which is collected through a standard questionnaire on materials, labour and plant hire costs for building works, is based on a small sample (sample size is not disclosed) and that response to the survey has been dismal (The Surveyor, 1st Quarter, 1997, p38). The range of building cost information supplied by the BCIC could not match the extensiveness of the Building Cost Information Service (BCIS) of the UK. The BCIS is a collaborative effort under the control of the RICS. It provides extensive data on building economy that includes quarterly review of building prices, indices; labour, hours and wages; materials and equipment; techniques, systems and operations; legislation; statistics and economic indicators; regional trends; cost guidelines; detailed cost analysis; etc. The *JKR*'s tender price index and Schedule of Rate for Minor Works are strictly for its own use.

Macro economic data offering limited information on the construction industry is available in the annual Economic Report published by the Ministry of Finance and the Annual Report published by the Bank Negara Malaysia. Data on construction such as gross value of output, number and size of construction firms, employment, costs of materials used, capital expenditure and value of fixed assets are available in the Annual Survey of Construction Industries published by the Statistics Department.

However, data published by the Statistics Department is not regular, currently available data is for up to 1992. In addition, it only features data obtained from construction firms that reported a value of work done of RM100, 000 or above through a mailed questionnaire survey (Department of Statistics, 1994, p20).

In terms of project opportunities, tenders for public works are normally advertised in two national newspapers, namely the *Utusan Malaysia* and *Berita Harian*. This is because the government in general adopts an open tender policy (Section 5.5.4 of Chapter Five of this thesis). However, information on project opportunities for consultants for public works and for consultants and contractors for private projects are often left to contacts. The practice of advertising tenders in journals, for example in the Building magazine as practised in the UK, is not practised in Malaysia.

The lack of information relating to the construction industry of Malaysia appears not to be a new phenomenon. Different researchers and writers such as Monerasinghe (1985), Wang (1987), Agus (1989), Abdullah (1994) and Sharif (1996) have claimed that published information relating to the construction industry of Malaysia is lacking. For instance, Monerasinghe (1985, p37) in the mid 1980s faced difficulties in studying the demand and supply of raw materials, labour and capacity of the construction industry because of constraints in the availability of published data. A decade later Sharif (1996, p63, 254) indicated that the problem of lack of published information still persists. He claimed to have faced difficulties in accessing secondary data while studying dominant procurement systems in Malaysia.

Monerasinghe (1985, p55-56) indicated that constraints in the availability of published data relating to the construction industry of Malaysia emanates from the lack of research works. He claimed that the construction industry shuns research works because it feels that there is no direct financial benefit from research. In addition, it claimed that research and development is the responsibility of the government because the community benefits. As such the construction industry does not sets aside money for research and leave it to the government to do whatever research it deems necessary.

Wang (1987, pxi) argued that the dearth of publications relating to construction is largely due to the lack of incentives including financial remuneration for writing and publishing technical books in Malaysia. Rocky (1991, p9) claimed that too little local publication of research output has been done. He calls for greater collaboration between the universities and the construction industry in order to disseminate research outputs. Observations by the researcher reveals that there are publications relating to the construction industry of Malaysia by different professional institutions including ISM, IEM, ACEM, PAM and MBA. However, the contents of these publications seem rhetorical and lacking in empirical data. In addition, they often address issues concerning the interest of the respective profession.

In contrast, in the UK, Japan and South Korea, the private sectors are actively involved alongside the public sector in conducting research and development relating to the construction industry and in publishing their research findings (Harvey and Ashworth, 1993, p253-258; Bennett, 1993, p68; Asian Wall Street Journal, 9 October 1995). As a consequence, the construction industries have reaped and will continue to reap significant benefits from the research and development work.

Table 8.8 shows overall expenditure on all research and development in Malaysia, the UK, Japan and South Korea. It suggests that in respect of expenditure on research and development effort, as measured by research and development expenditure as a proportion to GNP, Malaysia lags far behind the UK and Japan. In addition, Table 8.8 suggests that the government predominantly fund research and development activities, whereas in the UK, Japan and South Korea, the situation is the reverse.

In addition to the relatively low effort on research and development in Malaysia, the bulk of the research focused on agriculture and pure research works (Sulaiman, 1993, p192; IEM, 1996, p22-23). The IEM views the lack of research and development, in the context of the engineering profession in Malaysia as critical. It perceives that "Malaysia will have to continue to depend on imported technology and foreign engineers" and that "research and development deficiency would certainly result in other unfavourable implications on the competency and image of local engineers."

Table 8.8 - Research and Development Expenditure by Country

Country	Unit (Million)	Research Expenditure				Total as % of GNP
		Total	Govt.	University	Private	
Malaysia 1989	RM	765 (100%)	77.6%	16.4%	6.0%	0.8
South Korea 1982	Won	457,689 (100%)	40.7%	14.6%	44.7%	0.95
Japan 1982	Yen	5,881,539 (100%)	15.2%	16.1%	68.7%	2.78
The UK 1975	GBP£	3,622 (100%)	24.4%	11.4%	64.2%	2.47[1]

[1] Figure for 1978.
Source: Sulaiman (1993, p195).

The functions of the CIDB have been outlined in Section 4.7.3 of Chapter Four of this thesis. Among its functions that are related to construction information are (1) to promote, stimulate and undertake research into any matter relating to the construction industry, and (2) to initiate and to maintain a construction industry information system. To deal with these tasks, the CIDB has, under its organisation structure, three separate divisions: (1) Information Technology: to develop and maintain construction industry information system, (2) Technology Development: tasks include promoting new technology and to undertake research and development, and (3) Business Development: tasks include research on construction economic. In the context of construction information, Abdullah (1994, p6) outlines the CIDB plans in the coming years. They include setting up a Construction Resource Centre and a Construction Exhibition Centre. In the former, activities to be performed include to collate and analyse data on the construction industry such as the costs of materials, plant and labour, indices and forecasts. It will also provide information on investment climate and market potentials in other countries to facilitate Malaysian firms of consultants and contractors to venture abroad. The activities of the Construction Exhibition Centre include displaying local and foreign construction services and products. However, these initiatives are still at its infancy and little progress has been achieved. But in the longer term, it is believed that the CIDB, through the above initiatives as well as other initiatives that are still on the drawing board, would become the main producer of reliable construction information for Malaysia.

8.5.9 Procurement Practices in relation to Constraint 10

Constraint 10 refers to constraints in availability of suitable sites. The concern of the present study is on the availability of land suitable for development.

Different researchers and writers have pointed out that land considered suitable for development at reasonable prices is becoming increasingly difficult to find. The problem is more critical in urban areas such as in Kuala Lumpur and Penang (Monerasinghe, 1985, p55; Bank Negara Malaysia, 1992, p72; Lee, 1993, p57; Ahmad, 1993, p64; Teng, 1993, p5; Mohd Zain, 1993, p96; The Star, 3 April 1996).

In an attempt to simplify the discussion of shortage of land suitable for development in urban areas, the scenario in Kuala Lumpur has been selected for discussion and illustration. In any case the situation of availability of land suitable for development is quite representative of those existing in other urban areas. This is because most Malaysian towns and cities have recorded a high population growth, although the bigger ones have been growing faster than the smaller town and cities (Salleh and Lee, 1997, p9).

From the works of commentators including Lee (1993, p59), Abdul Razak (1993, p60-61) and Ahmad (1993, p65), it is possible to suggest factors that contribute toward the shortage of land suitable for development in Kuala Lumpur. The factors include (1) rapid growth in population, (2) scarcity of land and (3) absence or out of date Structure Plan.

Firstly, rapid growth in population. Kuala Lumpur experienced an exceptionally high growth rate of about 6 per cent per annum in the 1970s but has gradually declined to about 4 per cent by 1993. The single largest factor behind the rapid population increase is high rate of migration of rural population, most rapid in the 1970s. The high rate of migration arises as the result of New Economic Policy introduced in 1970 to restructure society and the steady decline in rural and subsistence employment and rapid transformation of development of Kuala Lumpur into centre of administration, commerce and industry. Due to inadequate provision of housing, there has been a steady increase in squatter settlements. Despite various efforts to control and to reduce the problem of squatters, as of early 1993, there was an estimated 138,000 people still living in various squatter settlements in Kuala Lumpur. In the 1990s, the population of Kuala Lumpur increased by some 50,000 people annually and is targeted to reach 2.2 millions by the year 2000. In terms of housing alone, Kuala Lumpur would need some 10,000 units of housing annually, this does not include re-housing of squatters, slum clearance and upgrading of substandard accommodation often found in the older parts of Kuala Lumpur. As a consequence of high demand for land for housing, development of high-density residential areas emerged as alternative (Sulaiman and Yahaya, 1987, p27; Talib, 1993, p54; Lee, 1993, p59). Such development includes high rise, low cost flats for the lower income households and luxurious apartments and condominiums for the middle to higher income households. Long Idris (1993, p29) argued that in view of limited supply of land, a high-density residential development is the only logical solution. He pointed out that during the 1990 planning approval given by the Kuala Lumpur City Hall, about 85 per cent of the 45,018 housing units are apartment and low cost flats. However, what constitutes a high-density development in Malaysia remains unknown. This is because federal government policies do not specify density standards. The upper limit is typically constrained by a steep increase in unit cost for building 5 stories and above due to the statutory requirements for lifts and fire-fighting installations (Salleh and Lee, 1997, p26). In the context of high rise flats, Monerasinghe (1985, p50) argued that due to the Malaysian way of life where people traditionally needs lots of space to interact, high rise, low cost flats are not popular. The occupants of the high rise, low cost flats are mostly rural migrants who are finding it difficult to adjust to the new environment that is relatively small and congested (Sulaiman and Yahaya, 1987, p37).

Secondly, the physical size of Kuala Lumpur. Kuala Lumpur is only 94 square miles. At present some 70 per cent of its land have been developed but the pressure for further development are growing.

Thirdly, an absence or out-of-date Structure Plan. In general, a structure plan is a planning tool for a local authority to regulate development activities within its area of jurisdiction. It specifies areas designated for different types of developments: residential, industrial, commercial, agricultural, and also a local authority's goals, strategies, policies and proposals for future development of the area under its jurisdiction. The current Structure Plan for Kuala Lumpur is outdated. It was prepared in 1978-81 and gazetted for implementation in 1984. Since then Kuala Lumpur has seen significant changes. In addition, there are numerous shortcomings in the Structure Plan including the absence of a written statement or goal to assist and guide decision-making process with regards to development activities. It also lacks future direction in terms of future physical and socio-economic development scenarios. Abdul Razak (1993, p60) indicated that due to the lack of up-to-date structure plan, the Kuala Lumpur City Hall resorts to ad-hoc approaches in granting planning permissions. As a consequence, there is a mismatch between development products and the socio-economic needs of Kuala Lumpur.

Monerasinghe (1985, p55) and Bank Negara Malaysia (1992, p71) argued that the shortage of land for development in urban areas has caused price of land to go up and in turn has given rise to widespread land speculation. They argued that the price of land in urban areas is becoming increasingly and unreasonably expensive. According to a study by the Bank Negara Malaysia (1992, p75) the price of industrial land in Malaysia increased by 10 per cent annually for the period 1972-92. The highest retail price index between 1984-92 was 4.7 per cent, in 1992 (data before 1984 is not readily available). The increases in the price of industrial land far exceeded the general level of inflation. Similarly, there has been significant increases in the price of residential land. For instance, in Kuala Lumpur the price of residential land in 1989 ranged from RM 88 to RM 351 per square metre, but in 1991 the range of grew to RM 1,430 per square metre. High increases in land prices were also experienced in other parts of Malaysia (Bank Negara Malaysia, 1992, p75). In order to curb the activities of land speculators, the government enforced that Real Property Gains Tax Act, 1978.

According to Choo (1979) land speculation is most distinct between 1973-75 due to the boom of the property prices. Land speculation raises the prices of landed properties notably housing. He pointed out that the first known Land Speculation Tax Act was introduced in 1974. The Act provided for a 50 per cent tax on gains from disposal of a property. He also that the imposition of the Act has proved to be effective in reducing the price increases of the 1974-78 period whereby prices remains stable. However, the Act could not prevent gradual increase in price of land due to strong effective demand and other economic factors. Choo (1979) discussed other measures to curb land speculation including through administrative controls, through other forms of taxation and an effective site value rating system. These measures are not be discussed here because the concern of the present study is not on land speculation per se and therefore, they are considered to be outside the scope of the present research.

Monerasinghe (1985, p55) also argued that the lack of up-to-date structure plan controlling and defining the areas available for urban development makes attempt to purchase land for development fraught with uncertainty and risks. The Star (19 June 1996) reported that from 96 local authorities in Peninsular Malaysia, only one-third had completed and gazetted their structure plans. In the context of Kuala Lumpur, Abdul Razak (1993, p62) and Ahmad (1993, p64) call for a new and up dated Structure Plan that incorporates latest government policies including Privatisation, OPP2, NEP and Vision 2020.

There have been a variety of other suggestions by different commentators to alleviate the shortage of land suitable for development in Malaysia. For instance, The Star (3 April 1996) reported that the authorities in Penang are considering building high rise factories to meet investors' demand for industrial space. Under the proposed plan, factories of between 5 and 10 stories that could "accommodate high value-to-weight ratio products" will be developed if all existing industrial areas in Penang are fully occupied. Penang is the darling of Malaysia's electronic and semi-conductors industries. Others suggested that land traditionally considered to be unsuitable for development such as former tin mines, swampland in coastal areas and derelict land in urban areas needs to be examined for potential to be redeveloped at cheaper costs. For example, The Star (27 February 1997) reported that more research is required in order to develop new techniques for construction on peat soil. The report claimed that Sarawak has some 30 per cent or 1.6 million hectares of peat soil and current techniques such as 'geo-textiles' are expensive.

Ahmad (1993, p64) argued that development in the Central Business District of Kuala Lumpur should be on a moderate form. He argued that a more aggressive development should be made on the outskirts of the city and, therefore, could afford a more balanced development. In this instance, the completion of the North South Highway in 1994 saw the emergence of new urban and industrial sites along the highways. Businesses should consider locating their manufacturing units away from Kuala Lumpur or other urban areas, into areas where land and labour costs are relatively cheaper. Such areas may include land currently being occupied by large-scale labour intensive agricultural estates. Due to the acute shortage of labour in the plantation sector, oil palm and rubber estates have been shifted to neighbouring countries such as Indonesia where labour and suitable land for farming are not known to be constrained.

As discussed under Section 8.5.1 of this chapter, matters concerning land are complex and bureaucratic. In a study conducted by the Bank Negara Malaysia (1992, p73) on private sector investment in Malaysia suggests that up to 34 per cent of the time taken in procurement involved the processes of land acquisition and conversion. As a consequence of delays in the processes, holding cost to clients increased significantly, and restricts the supply of land temporarily. The Bank Negara Malaysia suggests that government administrative mechanism, in particular the co-ordination of functions between the three levels of governments: local, state and federal, needs to be reviewed in order to speed up the processes of land acquisition and conversion. In addition, it calls for a review of the National Land Code, the legislation that governs land matters, in order to achieve optimum land use policy.

Seeley (1996, p113-117) studied the economics of residential development in the UK. He pointed out that within a local planning authority, areas for residential development are designated and their permitted density specified. During the earlier post-war public housing schemes, net residential density of about 30 houses per hectare were used. (Net residential density is the area's population or accommodation divided by the area in hectares; dwellings, gardens, open spaces and one-half of the width of boundary roads included). However, in 1962 the government called for residential densities to be increased in order to reduce total demand for land, to help preserve rural environment and to protect farming lands. There were a number of factors that caused demand for land to increase, notably higher population increases in the 1960s, people marry at much younger age than before, healthier and more prosperous society that means more families could afford to have a home of their own. In addition, the rate of occupancy of dwellings declined from 3.30 persons in 1951 to 2.74 persons in 1980. These factors indicate that the number of households were on the rise.

Seeley (1996) claimed that many public sector-housing schemes aim to have residential density in the region of 100 to 150 persons per hectare. As a consequence, substantial savings in land may be achieved, given that some development contains about 60 persons per hectare. In the case of high rise residential buildings, higher densities of 350 persons or more per hectare may be secured. Seeley (1996, p380) observed that the trends of the 1980s and 1990s in the UK have been the "lower rise but often compact" urban development.

Efforts are underway in the UK, including undertaking research work (such as the Nottingham Trent University's MSc in Contaminated Land), to revive contaminated land. Contaminated land is often considered unsuitable for development because of their potential hazard that may involve expensive site works.

Walker and Flanagan (1991, p126-137) studied the domestic property market in Japan. They pointed out that Japan is the most expensive place on the globe, and that land prices are continuously on the rise notably in the metropolitan areas such as Tokyo. High population densities could be found in most urban areas and shortages for housing prevail. Although it has the technology to overcome the physical constraints (for instance, the Takenaka Corporation possesses the expertise to build a 1 km high building) Japanese cities are conventionally two or three storeys in height. According to Levy (1990, p57) some 90 per cent of Japan's population lives on only

30 per cent of the land and that is why real estate is so expensive in urban areas and in the major cities.

According to Walker and Flanagan (1991, p128) the property tax system in Japan discourages sale of land. This is because profits on sale of long-term assets are assessed at 56 per cent for businesses and between 30 per cent and 40 per cent for individuals. They claimed that individuals prefer to pass down land to their heirs as inheritance tax is assessed at a lower value than market value of the land. As a consequence, a very fragmented land ownership pattern emerged. The system also encourages companies to hoard land.

In respond to the growing problems of land shortages and over concentration of population in urban areas in Japan in the 1980s and beyond, the government formulated the Fourth Comprehensive National Development Plan in 1987. Plans are underway to correct over concentration of population and functions in Tokyo by creating new urban areas in the provincial regions and improvement of transportation and telecommunication systems to facilitate inter regional links. Initial results suggest that the post war trend of high migration of rural population into Tokyo stopped for the first time in 1993, instead greater number of people are now willing to move out of Tokyo to live in provincial regions (Research Institute of Construction and Economy (1995, p8).

According to Levy (1990, p59) and Walker and Flanagan (1991, p132-135) land speculation activities in Japan are high, notably among corporate enterprises. Banks have been criticised for being indiscriminate and fuelling the speculative activities, the problem being identified as excess liquidity. Banks are over indulged in funding real estate deals. In order to curb the activities of land speculators, the government introduced three measures in 1987:

1. All land transaction over 100 square metre have to be submitted and registered with the Tokyo Metropolitan Authority;

2. Tax on short-term gain was imposed, the corporate tax on sale of land within 2 years of acquisition was increased to around 90 per cent; and

3. Banks were instructed to reduce their lending to the property sector.

According to Walker and Flanagan, the strategies were able to slow down land speculation activities in the short term. But in the longer term, the strategy could be counter productive in restricting the supply even further.

Kim (1995, p148-159) studied land use policy in the context of the housing system and low income housing in South Korea. He observed that the government responds to land and housing shortages have been to encourage (rather compelled) public and private sectors to build high rise houses at high residential densities. Such a policy, however benefits the suppliers of low income housing in the sense that they respond by building standardised high rise apartments that would minimise costs and meet the ceiling price of houses set by the government. In the 1990s there is the domination of high rise development in South Korea, a consequence of both inherent profitability of suppliers of housing under the Korean housing system and the government policy of trying to reduce housing shortage as quickly as possible.

The South Korean's Ministry of Construction, reviews land use policy every ten years. Each local government provides estimates of land needed for residential, commercial and industrial purpose and the Ministry of Construction would execute land use zonings accordingly. In order to curb land speculation activities, the government established a "real estate transfer income tax" and "vacant land tax", the latter makes land hoarding by individuals and organisations more difficult.

8.5.10 Procurement Practices in relation to Constraint 11

Constraint 11 refers to constraints in availability of timber. The concern of the present study is timber of Malaysian origin for use in construction.

Lim (1994, p1-10) discusses the use of timber in Malaysian buildings. He explains, among others, that timber in Malaysia is readily available, plentiful, comparatively inexpensive, indigenous and is contextual to the Malaysian environment. Timber grows naturally in the tropical rain forests, thus is in many ways self generating and is therefore self sustaining.

In construction, timber is used both in temporary works (such as formwork and scaffolding) and in permanent works. Lim observed that many traditional buildings of timber are outstanding in the manner they were detailed and their structure formed. He strongly recommend the use of timber to be continued for reasons including beauty, availability indigenously, workability, durability and strength and renewable and sustainable.

There are a variety of timber species in Malaysia and timber are graded into four categories: Group A, Group B, Group C, and Group D timber; on the basis of their strength and natural durability (Malaysian Standard M.S 544). Timber graders registered with the Malaysian Timber Industry Board carry out grading of timber. Some of the Group A and B timber species require wood preservative treatment (unless for use in temporary works) but all Group C and D timber species require treatment.

In construction, Group A timber is often used for structural frames such as column, beams, trusses, rafters and purlins; Group B timber for staircases, flooring and walling and external doors and windows. Group C timber is often used for non-structural components such as internal wall boardings, ceiling strips and soffit battens, and internal doors and windows (*Ketua Pengarah Kerja Raya*, 1992).

It is observed that in recent years there has been an increase in the use of rubber wood (wood from rubber trees), notably in the furniture industry. Rubber trees are abundant in Malaysia. Traditionally, rubber trees are felled once their economic life expires, the wood being used as domestic fuel by rural villagers and in the manufacturing of clay bricks and tiles. This is because rubber wood is non-durable and is therefore, very susceptible to attacks by insects such as termites. With the advance in wood preservative treatment technology, rubber wood has been found to be suitable and cheaper than other timber species for use in the furniture industry. Perhaps its use could be extended to construction where appropriate. In the present research, timber species obtained from the forests are referred to as primary timber while timber derived from agricultural by-products such as rubber wood is referred to as secondary timber.

According to Lim (1994, p2-3, 8) Malaysia's natural forest has been sustained and under proper sustainable forest management practice since 1901. Full sustainability would be achieved by the year 2000. Out of Malaysia total land area of 32.86 million hectares, some 72 per cent are under forest and tree plantations.

Natural forest accounts for 19.4 million hectares and 4.2 million hectares are under tree plantations. To ensure future generation will be able to enjoy Malaysia's natural forest, some 14.1 million hectares of forest is set aside as permanent forest reserve; no logging is permitted in the areas designated as permanent forest reserve.

According to Ismail and Md Isa (1995, p157) the rapid expansion of timber production, particularly after 1960 has brought about a serious erosion in the country's forest resources. As a consequent, the government is taking strong measures to control and reduce logging activities. The measures included strategies contained in the National Forestry Policy, in the Compensatory Forest Project (launched in 1982 to establish fast growing species for general utility timber), and in the establishment of the Permanent Forest Estate to be managed on a sustainable yield basis.

Table 8.9 shows the production of sawn timber in Malaysia during the first seven months of 1994-96, respectively. It suggests that there has been a decline in timber production since 1994 and that the decline has been significant. According to the Ministry of Finance (1996, 77) the drop in production was due to a drop in the quantity of logs available for processing as Malaysia moves towards more sustainable forest management. As a consequent, several mills in the country were closed. In order to help protect the timber industry, the government encourages the production of higher value added wood products in the downstream processing industries such as plywood and veneer and other wood products.

Table 8.9 - Sawn Timber Production, 1994-96 (January – July)

1994	1995	1996
5.0 million cubic metres (6.9% less than 1993)	4.3 million cubic metres (10.4% less than 1994)	2.9 million cubic metres (32.6% less than 1995)

Source: Ministry of Finance (1995, p74; 1996, p77).

The construction boom in Malaysia has led to an increase in demand for timber, especially plywood, veneer and block board (Ministry of Finance, 1995, p75). This coupled with high demand for Malaysian timber by countries abroad has led to seasonal shortage of timber. Lim (1994, p5) claimed that the shortage of timber for Malaysian consumption is because of foreign demand.

In Malaysia, reinforced concrete with brick-fill buildings is preferred (Lim, 1994, p2; Tapsir, et al., 1996, p13). As a consequence, large quantities of timber are required for formwork. In addition, it is observed that contractors often use timber scaffolding during construction particularly of low and medium rise buildings.

The need to seek alternative materials to timber for use in construction in the UK, Japan and South Korea arise because timber is not available in sufficient quantities indigenously in these countries. For instance, Harvey and Ashworth (1993, p75) claimed that in the UK certain construction materials, "particularly timber, need to be imported in order to meet the demands of the construction industry."

8.6 Summary

The constraints identified in Survey 1 were synthesised. The synthesis produced 11 main types of constraints (Table 8.1). The development of proposed strategies focuses on the synthesised constraints.

Procurement practices of the construction industries of the UK, Japan and South Korea are chosen as models in the development of proposed strategies for Malaysia on the basis that these economies and construction industries have experienced a period of sustained growth.

In relation to the aim of this part of Chapter Eight, the examination of the literature identified the best practice in construction procurement for consideration as proposed strategies for Malaysia.

Descriptions of the methodology adopted in the development of proposed strategies and the carrying out of a survey to appraise the proposed strategies are the focus of second part of this chapter.

Part 2

This part describes the methodology and the processes involved in the development and appraising of proposed strategies designed to remove or alleviate the constraints identified within the processes of construction procurement in Malaysia. Appraisal of the proposed strategies is carried out through a questionnaire survey, referred to as Survey 2. The constraints have been identified in Survey 1 (see Chapter Seven of this thesis).

8.7 Strategy Development, A General View

According to Yeoh (1993, p3, 15) strategy formulation, in the context of an organisation in Malaysia, often begins with an appraisal of a company's mission, objectives and its strength and weaknesses. It also involves assessing the broader business environment within which the company operates. In addition, Yeoh (1993, p3) argues that the starting point in the formulation of a strategy is having a strategic vision. In this regard, he pointed out that Vision 2020 is the strategic vision;

> "... in that it gives the nation a clear strategic direction, focuses the energy of the public and private sector to work together to transform Malaysia into a fully developed nation by the year 2020..."

In the context of an organisation, strategies exist at different levels: corporate, business and operational (Johnson and Scholes, 1993, p10-13; Yeoh, 1993, p66). At the corporate level, the key issues concern on the overall scope of the organisation; in terms of structural organisation, of financial and of allocation of resources. At the business level, the concern is on products or services of the organisation in terms of their development, market niche and growth and measures of efficiency. And at the operational level, the concern is implementation of the strategies in terms of the way in which the functions of the organisation are carried out and their activities integrated so as to meet the overall objectives of the organisation.

In the present research, the strategic vision is the ninth challenge of Malaysia's Vision 2020's. If the Malaysian construction industry could be considered to be an organisation, then the focus of the present research is akin to the development of strategies at a corporate level. This is because the concern of the present research is the development of broad plans or methods to be employed at a Malaysian construction-industry-wide level, the goal being to remove or to alleviate the constraints identified in Survey 1. It concerns the construction industry of Malaysia as a whole rather than a particular sector of it, or the individual organisation, or geographical locations of organisations or construction projects.

The development of strategies at business level such as considerations of types of construction (e.g. residential or non-residential buildings, civil engineering or repair and maintenance works) or types of services (e.g. property development; architectural, engineering or quantity surveying consultancies; or management of construction or construction production) is considered to be not within the scope of the present research. In addition, the development of strategies at operational level such as individual steps to implement the strategies that have been developed is also considered to be not within the scope of the present research. The approach taken does not in any way indicate that strategies at business or operational levels are less or not important. Their exclusion from the present study is because of the limitations of the present research in terms of human, time and financial resources.

According to Yeoh (1993, p4, 15) following the formulation of the strategic vision, the formulation of strategies involves an appraisal of a company's mission, objectives and its strength and weaknesses as well as assessing the broader business environment within which the organisation operates. In the present research, considerations of these issues, in the context of the construction industry of Malaysia, have been carried out through Survey 1 (Chapter Seven of this thesis). It identified the types and extent of constraints in major resources and functions, currently experienced and those perceived to exist in the future for up to 2001, within the Malaysian construction procurement processes. The strategies to be developed therefore are specific in terms of (1) the constraint identified, and (2) Malaysia's specific needs, conditions and environments, currently and in the future up to 2001.

According to Johnson and Scholes (1993, p20) in formulating strategies, organisations should consider examining several possible courses of action or "strategic options". They argue that:

> "… in developing strategies, a potential danger is that managers do not consider any but the most obvious course of action – and the most obvious is not necessarily the best."

Subsequent to the generation of strategic options, Johnson and Scholes (1993, p20) suggest that "the search for strategic fit or suitability of the strategy" should be carried out. It involves examining the range of strategies that have been formulated, in the context of the organisation's strength and weaknesses, opportunities and threats; and to assess the extent as to the acceptance of the chosen strategy or strategies, for instance to the stakeholders.

Finally, the strategies that have been found to be suitable for implementation will be selected. According to Johnson and Scholes (1993, p21) the selection of strategy is "the process of selecting those options which the organisations will pursue." In the context of the final strategy or strategies being selected, they argue:

> "There could be just one strategy chosen or several. There is unlikely to be a clear-cut 'right' or 'wrong' choice because any strategy must inevitably have some dangers or disadvantages. So in the end, choice is likely to be a matter of management judgement. It is important to understand that the selection process cannot always be viewed or understood as purely objective, logical act. It is strongly influenced by the values of managers and other groups with interest in the organisation, and ultimately may very much reflect the power structure in the organisation."

The present research endeavours to develop a range of strategies considered to be viable and feasible for implementation in Malaysia to remove or alleviate the constraints identified. A panel of experts comprising individuals who are considered to be international construction procurement experts then subjected the initial strategies to a review (to be discussed in Section 8.8). Thereafter, the range of strategies were presented to senior management personnel of the respondent organisations involved with the processes of construction procurement in Malaysia for their appraisal on the basis of viability and feasibility for implementation in Malaysia. Finally, the strategies that emanate from the appraisal process were presented to senior management personnel of respondent organisations and representatives of professional institutions related to the construction industry of Malaysia for the purpose of validation.

In addition to the general issues concerning strategy development, the present research also examines the works of earlier researchers and writers relating to construction industry development such as Ofori (1980), the World Bank (1984), Edmonds and Miles (1984), Wells (1986), Hillebrandt (1988), Miles and Neale (1991) and Sharif (1996). The aim of the examination is to establish general guidelines in the approach towards developing strategies for the constraints identified.

According to Wells (1986, p35, 63, 66-67) immediate improvement in construction capability may be achieved through a variety of measures including importation of the constrained construction resources such as skills, materials, technologies and procedures. However, if long-term sustainability is to be achieved, resources need to be created in both quantitatively and qualitatively, and then refined, matured and developed indigenously. Wells (1986, p63) expressed optimism that:

> "Providing such measure are taken, it may be argued that with sufficient investment, time and favourable economic climate, the issue of supply inadequacy in the construction sector will be resolved."

But it is contended that not all countries possess all the above conditions suggested by Wells (1986). Wells recognised this, and therefore argued that strategies for growth for a country's construction industry must also take into consideration factors such as "limits imposed by foreign-exchange and other constraints."

In considering strategies for expanding construction output, Hillebrandt (1988, p184) proposes a schematic basis. The schematic basis, adapted to suit the present research aims and scope, is as shown in Table 8.10. She suggests that the time categories for the strategy overlaps, thus some actions for removing or alleviating the future constraints may be started in the current term, and vice-versa.

In addition, Hillebrandt (1988, p181) suggests that the capability of a construction industry is dynamic in terms that it varies over time and responds to demand over time thus,

> "What is acceptable will vary according to the economic and political objectives of the government of the time and the social climate."

Table 8.10 - Guidance for Development of Proposed Strategies

Resource	Strategies for current constraints	Strategies for future constraints
Materials.	Stocks held by suppliers. Imports from established sources. Substitution for scarce resources.	Under-utilised and mothballed plant. Imports Substitution for scarce materials. New factories.
Labour.	Unemployed labour. Overtime.	Workers in other industries, abroad and retired. Increased productivity. Delayed retirement. Increased level of recruiting and training.
Professionals and semi-professionals.	Underemployed. Unemployed.	Professionals and semi-professionals with construction qualifications and/or experience but working in other industries, abroad and retired. Increase responsibility to existing staff. Delayed retirement. Increased level of recruiting and training.
Technology.	Substitution of existing technologies.	Substitution of existing technologies. Develops new technologies.
Firms	Slack in existing structure.	Expansion with existing structure. Reorganisation for larger output. Formation of new firms.

Source: Adapted from Hillebrandt (1988, p186-187).

Sharif (1996, p407-411) examined the evolution of construction industries, in the context of systems of procurement in developed and in developing countries. He claims that the construction industry in most developed countries has evolved gradually developing the skills, materials, technologies and procedures that meet the requirement of the country over long-term duration. In contrast, most developing countries have a neglected construction sector and are plagued with a variety of problems, some are country-specific but others are common to all developing countries. He suggested that a range of indigenous institutions associated with the processes of construction procurement, either government, corporate groups or individuals, is needed in order to establish or promote the development and sustainability of competencies in developing countries.

In the context of the present research, the aim of the government of Malaysia is to achieve the objectives of Vision 2020. Its achievement is dependent upon various factors in particular rapid and sustained growth rate of 7 per cent per annum in real GDP for thirty years, from 1991 to 2020. This therefore, is a critical consideration in the development of the proposed strategies.

On the basis of the above discussions, a general guideline on the approach towards developing strategies for the constraints identified in the present research has been identified. They are;

1. For constraints that are currently experienced, the main concern would be to improve productivity and efficiency, economical use of resources and functions and to give value for money; and
2. For constraints that are perceived to exist in the future, the main concern would be to enhance the supply side of the construction industry in terms of the constraints identified. This requires time, capital and other inputs.

8.8 Methodology Adopted in the Development of Proposed Strategies

In the present research, the development of proposed strategies to remove or alleviate the constraints identified is carried out using the triangulation approach. In this instance, the triangulation approach combines three data sources of (1) extensive literature review, (2) personal observation of the researcher and (3) an expert panel.

The first data source involves extensive examination of literature relating to procurement practices of construction industries of the UK, Japan and South Korea; which have construction industries that have experienced sustained growth. This aspect of the strategy development has been carried out and incorporates as Part 1 of this chapter. In general each constraint possesses a variety of aspects; each aspect would require detailed examination. Given the fact that the development of strategies also involve examining these aspects in the context of the UK, Japan and South Korea; the scope of the examination would seem to be very wide. Therefore, the detailed examination of all aspects associated with each type of constraint identified is a difficult process and its scope may become too ambitious in relation to the resources available in terms of human, time and financial and methodological. As a consequence, the examination of those aspects has been confined to those considered fundamental to the processes of construction procurement in Malaysia.

The second data source relates to personal observations of the researcher. The researcher has 12 years experiences working in the construction industry of Malaysia, initially as a quantity surveyor with the JKR for 11 years and later with the CIDB prior to his current sabbatical leave. This has been helpful in terms of understanding better the nature and characteristics of the constraints identified and procurement practices currently used in Malaysia.

The third and final data source in the development of proposed strategies came from a panel of experts. The panel comprises 3 British and 2 Malaysians who are considered to be procurement experts of their respective construction industries. The experts from the UK are Professor Roy Morledge, Director of Construction Procurement Research Unit and Professor J.A.J Moohan, both attached with the Nottingham Trent University; and the late Emeritus Professor Ivor. H. Seeley; former Dean of Faculty of Environmental Studies of the Nottingham Trent University. The Malaysian experts are two senior staff of *JKR* Malaysia. In a series of individual discussions with the panel members, procurement practices of construction industries of the UK, Japan and South Korea in relation to the constraints identified were examined in detail. The primary aims of the discussions are (1) to solicit views and comments in particular in terms of viability and feasibility of the strategies to remove or to alleviate the constraints identified, and (2) to reduce potential bias associated with the methodology used. The discussions with the UK experts were personal face-to-face while discussions with the Malaysian experts were through telecom and communications via e-mail.

The outcome of the processes described above is a range of proposed strategies that are considered to be suitable for implementation in Malaysia to remove or alleviate each type of constraints identified. The strategies were composed into a questionnaire in order to facilitate their appraisal. The final questionnaire that was used in the appraisal is attached, as Appendix C. It is strongly believed that by adopting the triangulation approach the development of proposed strategies is sufficiently robust.

8.9 Appraisal of Proposed Strategies

The appraisal of the proposed strategies is carried out through a questionnaire survey, Survey 2.

8.9.1 Objective of Survey 2

The key objective of Survey 2 is to appraise each proposed strategy designed to remove or alleviate current, and or perceived future constraints within the processes of construction procurement in Malaysia.

The appraisal seeks to establish the viability and feasibility of each strategy in the context of both the type of constraint identified and Malaysia's needs and conditions and environment.

8.9.2 Questionnaire Design

The concepts to be measured in Survey 2 have been discussed in Section 6.4 of Chapter Six of this thesis.

Questionnaire for Survey 2 (shown as Appendix C) consists of 2 parts, over 15 pages. The parts are:

1. Part 1: Characteristics of respondent organisations
2. Part 2: Appraisal of strategies to remove or to alleviate the type of constraint identified within the processes of construction procurement in Malaysia.

Guidance notes for completion of the questionnaire is also included.

In the questionnaire, all questions are closed-ended and almost all require respondents to tick the appropriate box or boxes or a number circled. Where appropriate, respondents were given the option to suggest a non-presented alternative and were informed that written comments could be brief and hand-written. These approaches represent an attempt to seek factual responses and to facilitate respondents adding further views in answering the questionnaires.

8.9.3 Questionnaire Part 1: Characteristics of respondent organisations

Part 1 contains questions relating to respondents' organisations. There are 6 questions concerning: (1) type of organisation, (2) size in terms of number of employees, (3) head office location, (4) current projects' locations, (5) types of current projects, and (6) total value of current projects. Respondents were asked to tick a box or boxes representing an answer or answers that reflect their organisations' characteristics. The data serves to provide details of subject's statistics.

8.9.4 Questionnaire Part 2: Appraisal of strategies to remove or to alleviate the constraints identified within the processes of construction procurement in Malaysia

The aim of Part 2 of the questionnaire is to let respondent organisations appraise proposed strategies designed to remove or to alleviate the constraints identified.

In the questionnaire, each of the 11 main types of constraints identified (see Table 8.1) is presented in shaded boxes. For each constraint a list of proposed strategies is presented, respondent organisations are asked to appraise all proposed strategies.

The appraisal of each proposed strategy, in terms of its viability and feasibility to remove or to alleviate the constraints identified, is through respondent organisations expressing their opinions by circling a number on a rating scale. The rating scale, one for each proposed strategy, is standardised for all proposed strategies.

For constraints that were considered to be simultaneous, i.e., the constraints are current and the constraints are perceived to continue for at least up to 2001, a standard list of proposed strategies is used. To each proposed strategy, two rating scales are provided. The first rating scale is for the respondent organisations to appraise the viability and suitability of the proposed strategy to remove or to alleviate the current constraint identified. The second rating scale is for the respondent organisations to do the same for the perceived future constraint identified. The rating scales are presented side by side, immediately following each proposed strategy.

The approaches taken in the questionnaire design attempts to (1) achieve economy in the size of the questionnaire, in particular the number of pages, and (2) to assist respondent organisations in giving their responses.

8.9.5 Rating scale for Questionnaire Part 2

A subjective assessment approach was used to record the expert opinions of respondent organisations.

In the questionnaire, a list of proposed strategies was provided for each type of constraint identified. Respondent organisations were asked to appraise, on a Likert style scale of 1 to 5, the viability and feasibility of each strategy in the context of both the types of constraint and the Malaysian needs, conditions and environment. The scoring system is set as follows: 1 = strongly disagree with the proposed strategy, 2 = disagree with the proposed strategy, 3 = neither agree nor disagree with the proposed strategy, 4 = agree with the proposed strategy, and 5 = strongly agree with the proposed strategy.

For the purpose of the present research, a rating of 1 indicates that the strategy is not viable, unfeasible and its successful implementation would not lead to success in removing or alleviating the type of constraints identified. A rating of 5 indicates that the strategy is highly viable, feasible and its successful implementation would lead to success in removing or alleviating the type of constraints identified. The respondent organisations were asked to circle one number on the scale that reflected their organisations' appraisal of each proposed strategy.

8.9.6 Method of analysis of data for Questionnaire part 2

It has been established in Chapter Six (Section 6.6.6.2) of this thesis that only those strategies that passed rigorous tests and do so with the highest level of support are considered to be worthy of recommendation as proposed strategies. The tests comprise (1) a review of the developed strategies by a panel of international experts on construction procurement (as discussed in Section 8.8), (2) appraisal through Survey 2, and (3) validation through a series of semi-structured interviews.

In the context of appraisal of strategies by respondent organisations through Survey 2, a strategy that pass the test with the highest level of support is one that:

1. Received a rating of 4 and above by eighty per cent or more of the respondent organisations overall, and
2. Received a rating of 4 and above by eighty per cent or more from each of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

The analysis of data for the survey is set as above.

A strategy that meets both criteria is considered to be a suitable strategy. A suitable strategy is defined as a strategy that is viable and feasible to be implemented in Malaysia and that its successful implementation would lead to success in removing or in alleviating the type of constraint that the strategy is designed for.

The above approach is adopted in the analysis of data because it is felt that a significantly high level of agreement to a proposed strategy is critical in order to:

1. Increase the potential of a proposed strategy in terms of its effectiveness in removing or alleviating the constraints identified; and
2. Draw a high level of support during implementation. This is particularly important because effectiveness of a strategy is dependent upon several factors, including support of the majority, if not all, of the participant involved in the processes of construction procurement in Malaysia.

There is no limit to the number of suitable strategies. Respondent organisations may consider to chose just one strategy or several strategies, on the basis of their own appraisal of each strategy in relation to the contexts that they have been provided for.

Strategies that are considered to be suitable are given relative ranking to indicate priority in implementation. The ranking is based on the percentage of respondent organisations indicating agreement (a score of 4) and strong agreement (a score of 5) with the proposed strategies.

8.9.7 Other aspects of the questionnaire

Respondent organisations were given the option to suggest non-presented strategy or strategies. In the questionnaire, to each type of constraint, a space is provided at the end of the list of strategies for respondent organisations to specify other strategies that they considered being viable and feasible to be implemented.

In further attempts to minimise the exclusion of important data relating to strategies to remove or to alleviate the types of constraints identified from the present research, a space is provided at the end of Part 2 of the questionnaire for respondents to write their comments.

At the end of the questionnaire, a short note is added to inform respondents of the next stage of the present research concerning semi-structure interviews to be conducted in Malaysia to validate both the constraints identified (Survey 1) and the proposed strategies (Survey 2). In order to achieve consistency, respondents were invited to participate. They were asked to indicate their willingness to co-operate by stating their name and contact numbers (telephone and facsimile) and their organisation's name and address in the space provided. The researcher's name, full postal and e-mail addresses, and contact numbers (telephone and facsimile) were also provided at the end of the questionnaire in order to facilitate respondents organisations contacting the researcher should they wish to do so.

8.10 Questionnaire Piloting

Before the questionnaire was administered, it underwent a series of tests in attempts to minimise shortcomings including ambiguity, to ensure that the questions were easily understood, to remove obvious problematic aspects of the questionnaire and to validate the form and content of the questionnaire before the main survey.

The initial test involved piloting the questionnaire among the researcher's colleagues, several final year undergraduate Malaysian student pursuing the BSc Honours Degree in Quantity Surveying and experts from the Nottingham Trent University. The experts were Professor R. Morledge and Dr A. Sharif of the Construction Procurement Research Unit, Professor J.A.J. Moohan from the Department of Surveying and Ms J. Lincoln from the Department of Mathematics, Statistics and Operational Research. Various comments concerning shortcomings and views considered to be useful including aspects of strategies to be added or omitted, wordings, contents, layout and in the presentation of the questionnaire, the rating scales and the analysis of data were received, all were addressed.

The outcome of the initial test, the third draft of the questionnaire, was posted to 20 senior officials of organisations, some known to the researcher and others conveniently selected from the database for Survey 2 of respondent organisations (the database to be discussed in Section 8.11). The questionnaire piloting was administered between 24 March 1997 and 24 April 1997. From the 20 organisations, 16 organisations participated in the piloting. The piloting represents a dry run of the processes of postal questionnaire survey that the research will employ.

Arising from the piloting with the Malaysian respondents, the whole content was examined and changes made to improve it. On the basis of the comments and suggestions from the pilot tests, the questionnaire was recomposed until a satisfactory format, the fifth draft, has been achieved and finalised. The final version was administered. However, it is acknowledged that some problems do not become apparent until the actual survey has been administered.

8.11 Carrying out of Survey 2

The whole process of Survey 2, unless otherwise stated, was conducted entirely by the researcher.

The database for Survey 2 was compiled from the respondent organisations in Survey 1 that indicated willingness to participate in appraising the proposed strategies. From the 205 respondent organisations of Survey 1, 91 per cent or 186 respondent organisations were willing to participate in Survey 2 (Table 7.13 of Chapter Seven). The breakdown of the 186 respondent organisations according to the category and type of organisations is provided in Table 28 of Appendix B. Briefly there were:

1. 11 organisations representing clients in the public and private sectors (6 per cent);

2. 127 organisations representing designers in the public and private sectors (68 per cent); and

3. 48 contracting organisations (26 per cent).

The questionnaire, addressed to senior management personnel, was mailed to all 186 organisations in the database for Survey 2 on 25 April 1997. The reasons for including the entire population in the database as subject for the research have been discussed in Chapter Six this thesis and consequently, a conventional random sampling was not done. To each questionnaire two covering letters written on The Nottingham Trent University's letter headed paper, in English and its version in *Bahasa Malaysia* were attached. The covering letter explains the objective of the research and reassurance on confidentiality of data to be gathered.

In order to facilitate questionnaire returns, a self-addressed freepost envelope was attached to each questionnaire. For this purpose, an account known as International Business Reply Service (IBRS) that was opened with the Royal Mail through The Nottingham Trent University's postal services for carrying out of Survey 1 was reactivated (see Section 7.4 of Chapter Seven of this thesis).

Each respondent organisation was requested to kindly respond within 5 weeks from the date the questionnaire was mailed from the UK. This was stated in the covering letters. The researcher took advice from experts on postal questionnaire surveys from The Nottingham Trent University and consider that 5 weeks is sufficient for the questionnaire to reach the organisations and for the respondent organisations to provide their responses. Follow-up actions through letters, emails (where email addresses were available) and facsimile were undertaken. On 28 May 1997, a standard letter of reminder was sent to all organisations that have not responded and in order to afford them more time, an additional four weeks were given to the organisations to provide responses. On 25 June 1997, a second standard letter of reminder was sent and another 4 weeks were given to the organisations to provide responses.

All together, 54 valid responses (29.03 per cent) were received; there were no invalid responses. Fifty responses were received by 10 July 1997, the balance of 4 responses was received by the 29 July 1997. The survey was closed on 31 July 1997. As expected no further response was received after the closing date.

The response rate achieved is rather disappointing. The boom in construction and the size of the questionnaire, 15-page altogether, probably influenced the rate of response.

All 54 valid responses received were used in the analysis of the research findings. Full details of subject's statistics (Questionnaire Part 1) are given in Tables 1 – 12 of Appendix E. Data on key areas of the subject's statistics indicates that:

1. The majority (65 per cent) of the respondent organisations are designers;
2. The majority (76 per cent) of the respondent organisations are from the private sector;
3. The majority (61 per cent) of the respondent organisations have less than 50 employees;
4. The largest proportion of responding organisations (26 per cent) have their head office in Kuala Lumpur;
5. The largest proportion of responding organisations (37 per cent) have their current projects located in the state of Selangor (a state in the central region, surrounding Kuala Lumpur);
6. The types of projects currently undertaken by respondent organisations, in order of importance, based on frequency of responses are: (1) other buildings excluding housing, (2) housing, and (3) civil engineering works; and

7. The majority (57 per cent) of respondent organisations were undertaking projects with the total value in excess of RM 40 millions

On the basis that (1) the entire population was included in the survey, and (2) due to the degree of consistency of responses received from the wide range of respondent organisations used in the investigation, the response in terms of the number of valid responses received, i.e., 54 responses; was considered to be adequate for the intended purposes of this investigation.

8.12 Coding the Questionnaire

In the questionnaire, each proposed strategy represents a statement of plan or method to be employed to remove or to alleviate the constraint it relates. In order to accelerate identification of the strategy and to facilitate the process of analysis of data, a coding system was applied to all strategies.

The coding system is illustrated in Appendix D. The same coding system has been used to identify and to analyse the results of the interviews (to be described later in Part 3).

8.13 Results

In the analysis of data advice were sought from experts in particular from The Nottingham Trent University's Professor R. Morledge of the Construction Procurement Research Unit, Professor J.A.J Moohan of the Department of Surveying and Ms J. Lincoln of the Department of Mathematics, Statistics and Operational Research. However, it is acknowledged that the analysis of data is the responsibility of the researcher and that the advice from these experts does not make them in any way responsible for the results of the survey.

8.13.1 Appraisal of proposed strategies

Full details of the results are given in Tables 13 - 20 of Appendix E. Tables 13 and 14 show detailed results of the appraisal of proposed strategies to remove or to alleviate current, and perceived future constraints, respectively, by all respondent organisations. Table 15 and 16 show the results of the appraisal of proposed strategies to remove or to alleviate current, and perceived future constraints, respectively, by client, designer and contractor. Tables 17 and 18 provide a summary and relative ranking of suitable strategies to remove or to alleviate the type of current constraint or perceived future constraint they relate, respectively. Tables 19 and 20 show the results of Chi-square Test of Independence between each suitable strategy and categories of organisation of client, designer and contractor, for current constraints and for future constraints, respectively.

In examining the responses received, it appears that respondent organisations were unwilling to specify other strategies, in addition to the ones being presented, that might be suitable to be implemented in order to remove or alleviate the constraints identified. This could imply that the respondent organisations were contended with the strategies being presented in the questionnaire.

Tables 8.11 and 8.12 show the results on the suitable strategies for current constraints and for future constraints, respectively.

Chi-square Test of Independence was performed on each suitable strategy in relation to the categories of organisations of clients, designers and contractors. The value of p was set a <0.05. The researcher is cautious in interpreting the results of the Chi-square Test of Independence (Tables 19 and 20 of Appendix E for suitable strategies for current constraints, and for suitable strategies for future constraints, respectively). This is because the results were for two categories of organisations, i.e., designer and contractor. Data from client organisations were excluded in an attempt to reduce the number of cells with expected frequency of less than 5. Initial tests results indicate that when data from client organisations were included there were more than 20 per cent of cells having an expected frequency of less than 5. According to Bryman and Cramer (1997, p124, 168-172) and other commentators, Chi-square can be unreliable if 20 per cent or more of the cells have an expected frequency of less than 5.

The results of the Chi-square Test of Independence suggest that there were no significant relationship between a majority of the suitable strategies and the categories of respondent organisations. However, the results of the Chi-square Test of Independence also indicate that there were several suitable strategies that did not receive a full consensus amongst the respondent organisations.

As a consequence, it might be unsafe to suggest as suitable strategies to those that did not receive a full consensus. The latter illustrates the need for carrying out the validation interviews (to be described later in Part 3).

On current constraints in availability of Malaysian cement, among the strategies presented for its removal or alleviation is the setting up of new cement plant in specific locations (coded as C2/S2). Respondent organisations that agree with this strategy were asked to state the two most suitable locations of the new cement plant. The written answers were classified into the different Malaysian states and percentages are calculated as a proportion of the number of organisations responding (and therefore, add up to more than 100 per cent). Full details of the results are given in Table 21 of Appendix E. The results suggest the two most suitable locations to set up new cement plant were in the states of Sabah and Kelantan, respectively. In examining the locations of cement plants in Malaysia, currently there is a cement plant in Sabah, but none in the state of Kelantan (Okuda, 1996, p32). However, the results suggests that setting up of new cement plants in specific locations has not been considered as suitable strategies.

Table 8.11 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia

Constraint and strategy	p (%)	r	c
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations			
Streamline and standardise administrative procedures in Local Authorities (C1/S2)	88.89	1	1,2
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between government departments and the private utility providers (CI/S3)	84.61	3	1,2
Simplify and standardise approval procedures nation-wide (C1/S4)	85.18	2	1,2
Revise planning legislation with the objective of achieving faster planning approval (C1/S9)	83.02	4	1,2,3
Constraints in availability of Malaysian produced cement			
Existing cement plant should increase production to relieve shortages (C2/S1)	92.31	2	1,2,3
Improve enforcement to curb hoarding and black marketeering of cement (C2/S4)	94.23	1	1,2,3
Initiate research into alternative materials to cement in construction (C2/S12)	84.90	3	1,3
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour			
Increase the productivity of labour (C3/S2)	92.31	3	1,2,3
Increase intake of new trainees (C3/S7)	94.31	1	1,2,3
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (C3/S8)	84.91	5	1,2,3
Contractor should move towards greater use of plant to reduce the use of labour (C3/S9)	92.45	2	1,2,3
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (C3/S13)	84.31	6	1,3
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (C3/S14)	88.23	4	1,2,3
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (C3/S15)	82.35	7	1,2,3

Table 8.11 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	r	c
Constraints in availability of facilities for training skilled labour			
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (C4/S1)	96.15	1	1,2,3
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (C4/S2)	90.38	2	1,2,3
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (C4/S3)	88.46	3	1,2,3
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (C4/S4)	86.54	4	1,2,3
Private sectors should be more active in providing training facilities (C4/S5)	82.69	6	1,2
Contractors should provide adequate training facilities for their workers (C4/S6)	84.60	5	1,2
Constraints in availability of key design team members - architects, engineers and quantity surveyors and their assistants			
Increase their productivity (C5/S2)	88.68	7	1,2,3
Increase use of technology in design process to reduce manpower requirements (C5/S4)	90.56	4	1,2,3
Local professional firms to form alliances to increase key manpower capacity (C5/S9)	80.77^{+}	8	1,3
Promote the construction industry and its key professions to schools (C5/S16)	96.15	2	1,2,3
Expand the capacity of existing university/colleges to train more students in key construction courses (C5/S17)	98.11	1	1,2,3
Increase the number of entrants into key construction courses (C5/S18)	92.45	3	1,2,3
Set up new educational institutions to train more students in key construction courses (C5/S19)	90.38^{+}	5	1,2
Professional institutions should oversee training of key professional and semi-professionals (C5/S21)	90.38^{+}	6	1,2,3
Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry (C5/S25)	80.77^{+}	9	1,2

Table 8.11 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	r	c
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors			
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (C6/S3)	86.79	2	1,2,3
Provide facilities for training specialist contractors (C6/S5)	81.13	6	1,3
Local specialist contractors to form alliances to increase their level of expertise and financial capability (C6/S6)	84.90^{+}	4	1,2,3
Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability (C6/S7)	83.02	5	1,2,3
Develop mechanisms to allow local specialist contractors to gain experience (C6/S9)	88.46	1	1,2
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (C6/S10)	84.90^{+}	3	1,3
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities			
Streamline and standardise administrative procedures in Local Authorities (C7/S2)	92.31	2	1,2,3
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between government departments and the private utility providers (C7/S3)	90.20	3	1,2,3
Simplify and standardise approval procedures nation-wide (C7/S4)	88.46^{+}	4	1,2
Disseminate information on approval procedures (C7/S5)	94.00	1	1,2,3
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (C7/S6)	88.46^{+}	6	1,2,3
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (C7/S9)	88.46^{+}	5	2,3
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (C7/S10)	86.54	7	1,2,3

Table 8.11 – Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	r	c
Constraints in contract administration due to political and or bureaucratic interference			
Client to appoint full time Supervising Officer - S.O. - to supervise each project (C8/S1)	80.76	4	1,3
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (C8/S2)	88.46	3	2,3
Superintending Officer should be fully qualified and experienced professional (C8/S3)	98.08	1	1,2,3
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (C8/S4)	92.31	2	1,2,3
Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities)			
Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals (C9/S1)	94.34^{+}	5	1,2,3
Local Authorities should make transparent all matters pertaining to approval process (C9/S2)	94.34^{+}	4	1,2,3
CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry (C9/S3)	96.15^{+}	3	1,2,3
CIDB should take the lead in research and development and publications and co-ordinate research and development and publication of works of others (C9/S4)	86.54	7	1,2,3
Disseminate information on project opportunities through major newspapers, technical and professional journals (C9/S5)	88.68	8	1,2,3
Encourage greater participation of private sector in relevant research and development and in publishing the findings (C9/S6)	92.31	6	1,2,3
Encourage local universities/colleges to conduct relevant research and development and in publishing the findings (C9/S7)	96.15^{+}	1	1,2,3
Encourage professional institutions to conduct relevant research and development and in publishing the findings (C9/S8)	96.15^{+}	2	1,2,3

Table 8.11 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	**p (%)**	**r**	**c**
General strategies			
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (CG/S1)	88.46	2	1,2,3
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (CG/S2)	90.38	1	1,2,3
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (CG/S3)	80.77	5	1,3
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry (CG/S4)	84.61^{+}	4	1,3
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (CG/S6)	84.61^{+}	3	1,3

Questionnaire coding is shown in bracket.

In the present research, suitable strategies are the ones that:

1. Received a rating of 4 and above by 80 per cent or more of the respondent organisations overall, and
2. Received a rating of 4 and above by 80 per cent or more from each of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

p Percentage of respondent organisations (overall) indicating agreement and strong agreement with the proposed strategy (i.e. scoring more than or equal to 4).

r Relative ranking in accordance with percentage of respondent organisations (overall) indicating agreement and strong agreement with the proposed strategy.

$^{+}$ Equal percentages; ranked in accordance with the number of respondent organisations (overall) indicating strong agreement (a rating of 5) with the proposed strategy.

c Eighty per cent or more of the respondent organisations indicating agreement and strong agreement with the proposed strategy, where:
1 = Client
2 = Designer
3 = Contractor.

Table 8.12 – Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia

Constraint and strategy	p (%)	r	c
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations			
Streamline and standardise administrative procedures in Local Authorities (F1/S2)	92.31	2	1,2,3
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district – and between government departments and the private utility providers (FI/S3)	95.92	1	1,2,3
Simplify and standardise approval procedures nation-wide (F1/S4)	88.23	3	1,2,3
Revise planning legislation with the objective of achieving faster planning approval (F1/S9)	84.00	4	1,2,3
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour			
Increase the productivity of labour (F3/S2)	90.00	4	1,2,3
Increase intake of new trainees (F3/S7)	92.16	3	1,2,3
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (F3/S8)	86.00	7	1,2,3
Contractor should move towards greater use of plant to reduce the use of labour (F3/S9)	98.00	1	1,2,3
Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour (F3/S10)	83.67	9	1,2,3
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (F3/S13)	87.50	6	1,2,3
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (F3/S14)	93.75	2	1,2,3
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (F3/S15)	89.58	5	1,2,3

Table 8.12 – Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	p	c
Constraints in availability of facilities for training skilled labour			
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (F4/S1)	93.88	1	1,2,3
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (F4/S2)	91.84^{+}	2	1,2,3
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (F4/S3)	91.84^{+}	3	1,2,3
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (F4/S4)	87.75	6	1,2,3
Private sectors should be more active in providing training facilities (F4/S5)	91.84^{+}	4	1,2,3
Contractors should provide adequate training facilities for their workers (F4/S6)	89.79	5	1,2,3
Constraints in availability of key design team members – architects, engineers and quantity surveyors and their assistants			
Increase their productivity (F5/S2)	92.00^{+}	4	1,2,3
Increase use of technology in design process to reduce manpower requirements (F5/S4)	92.00^{+}	3	1,2,3
Local professional firms to form alliances to increase key manpower capacity (F5/S9)	83.67	8	1,2,3
Promote the construction industry and its key professions to schools (F5/S16)	97.96	2	1,2,3
Expand the capacity of existing university/colleges to train more students in key construction courses (F5/S17)	98.00	1	1,2,3
Increase the number of entrants into key construction courses (F5/S18)	90.00	6	1,2,3
Set up new educational institutions to train more students in key construction courses (F5/S19)	86.00	7	1,2,3
Professional institutions should oversee training of key professional and semi-professionals (F5/S21)	92.00^{+}	5	1,2,3
Encourage greater use of information technology to provide opportunities for qualified women to work from home (F5/S27)	83.33	9	1,2,3

Table 8.12 – Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	r	c
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors			
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (F6/S3)	80.00^{+}	4	1,3
Local specialist contractors to form alliances to increase their level of expertise and financial capability (F6/S6)	80.00^{+}	3	1,3
Develop mechanisms to allow local specialist contractors to gain experience (F6/S9)	87.75	1	1,2,3
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (F6/S10)	82.35	2	1,3
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities			
Streamline and standardise administrative procedures in Local Authorities (F7/S2)	97.96	1	1,2,3
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district - and between government departments and the private utility providers (F7/S3)	93.75	2	1,2,3
Simplify and standardise approval procedures nation-wide (F7/S4)	91.84	4	1,2,3
Disseminate information on approval procedures (F7/S5)	93.62	3	1,2,3
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (F7/S6)	88.00	6	1,2,3
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (F7/S9)	87.50	7	2,3
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (F7/S10)	89.79	5	1,2,3

Table 8.12 – Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	r	c
Constraints in contract administration due to political and or bureaucratic interference			
Client to appoint full time Supervising Officer - S.O. – to supervise each project (F8/S1)	83.67	4	1,2,3
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (F8/S2)	89.79	3	2,3
Superintending Officer should be fully qualified and experienced professional (F8/S3)	100.00	1	1,2,3
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (F8/S4)	93.88	2	1,2,3
Constraints in availability of suitable sites			
Strictly enforce the Real Property Gains Tax Act to curb land speculation (F10/S1)	84.61	5	1,2,3
Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development) (F10/S2)	94.34	2	1,2,3
Revive derelict land in urban areas (F10/S6)	90.38	4	1,2,3
Create new urban and industrial sites in suitable locations (F10/S7)	96.15	1	1,2,3
Speed-up land acquisition and land conversion process (F10/S9)	92.31	3	1,2,3
Constraint in availability of timber			
Government policies on sustainable forest management should be implemented strictly and urgently (F11/S1)	94.34	1	1,2,3
Use alternative materials to replace or to minimise the use of timber in temporary works (e.g. formwork and scaffolding) (F11/S3)	81.48	4	1,2,3
Encourage the use of secondary timber (e.g. rubber wood) in construction (where appropriate) (F11/S4)	82.35	3	1,3
Encourage research to identify alternative materials to replace or to minimise using primary timber in construction (F11/S5)	88.68	2	1,2,3

Table 8.12 – Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (Cont'd)

Constraint and strategy	p (%)	R	c
General strategies			
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (FG/S1)	91.84	2	1,2,3
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (FG/S2)	93.88	1	1,2,3
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (FG/S3)	81.63^{+}	4	1,3
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction Industry (FG/S4)	81.63^{+}	5	1,3
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (FG/S6)	83.67	3	1,3

Questionnaire coding is shown in bracket.

In the present research, suitable strategies are the ones that:

1. Received a rating of 4 and above by 80 per cent or more of the respondent organisations overall, and
2. Received a rating of 4 and above by 80 per cent or more from each of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

p Percentage of respondent organisations (overall) indicating agreement and strong agreement with the proposed strategy (i.e. scoring more than or equal to 4).

r Relative ranking in accordance with percentage of respondent organisations (overall) indicating agreement and strong agreement with the proposed strategy.

$^{+}$ Equal percentages; ranked in accordance with the number of respondent organisations (overall) indicating strong agreement (a rating of 5) with the proposed strategy.

c Eighty per cent or more of the respondent organisations indicating agreement and strong agreement with the proposed strategy, where:

1 = Client
2 = Designer
3 = Contractor.

8.13.2 Respondent organisations willing to participate in the third part of the research (the interview)

Forty-four per cent (24 respondent organisations) indicated that they were willing to participate in the interview to validate the proposed strategies (Table 8.13).

Full details of the results showing the number of respondent organisations willing to participate in the interview according to the category and type of organisations are provided in Table 22 of Appendix E.

Table 8.13 – Respondent Organisations Willing To Participate in the Third Stage of the Research (the interview)

Would participate in the interview	No	%
Yes	24	44.44
No	30	55.56
Total	54	100.00

8.14 Summary

Survey 2 sets out to appraise, on a construction industry-wide perspective, the viability and feasibility of proposed strategies designed to remove the current, and perceived future constraints identified within the processes of construction procurement in Malaysia.

In carrying out the survey, the postal questionnaire method was employed. The questionnaire was addressed to senior management personnel of 186 Malaysian organisations currently involved in the processes of construction procurement in Malaysia. The database for Survey 2 was compiled from those respondent organisations in Survey 1 who indicated willingness to appraise the proposed strategies. All together, 54 valid responses (29.03 per cent) were received. All were used in the analysis of the research findings. The survey was administered between 25 April 1997 and 31 July 1997.

The findings suggest the strategies and their respective ranking that indicate priority in implementation that could be implemented to remove or alleviate the constraints identified. However, several of the strategies did not receive a full consensus amongst the respondent organisations and as a consequent, it would be relatively unsafe to consider them as Malaysia construction industry-wide perspective strategies. This illustrates the need for carrying out the validation interviews, which is the focus of the following part, Part 3 of this chapter.

Part 3

This part describes the processes involved in carrying out a series of interviews to validate proposed strategies.

8.15 Objectives of the Interviews

The key objective of the interviews is primarily to validate the proposed strategies appraised by respondent organisations in Survey 2. In addition, the researcher attempts to solicit additional information including information to validate the constraints identified through Survey 1.

The interviews also serve as the third and final part of the triangulation research method adopted in the present research. This is achieved through interviewing representatives of professional institutions related to the Malaysian procurement processes. The institutions are not subjects in the questionnaire surveys and in the interviews with respondent organisations. Subsequently, data on constraints and on proposed strategies obtained from the literature, the questionnaire surveys and the interviews with respondents organisations can be integrated with data obtained from the interviews with the professional institutions.

8.16 Design of Recording Method for the Interviews

It has been established in Chapter Six (Section 6.6.3) of this thesis that it is considered more desirable to conduct semi-structured interviews.

Proposed strategies that have been appraised and considered to be suitable by the respondent organisations in Survey 2 form the basis of the questions to be asked in the interviews. The record for the interviews (shown as Appendix F) consists of 3 parts, over 11 pages. The parts are:

Part 1: Respondents' personal data;

Part 2: Characteristics of respondent organisations; and

Part 3: Validation of proposed strategies to remove or to alleviate the type of constraint identified within the processes of construction procurement in Malaysia.

Preceding the structured part of the interview some basic information of each interview is collected including: interview number, date, the time an interview starts and finishes, and method employed during the interview, i.e., personal face to face or over the telephone. Guidance notes for the administration of the interview is also included. The latter includes brief descriptions of Surveys 1 and 2, definitions of key concepts and instructions on the administration of the interviews.

In the interview to validate proposed strategies, all questions are closed-ended and almost all require the researcher to record answers by either placing a tick or a cross in the appropriate box or boxes or numbers written in the space provided. The researcher will record any verbal comment concerning the appraised strategies made by the respondents.

The researcher will record additional information including information that is related to the types of constraints identified through Survey 1.

The above approaches represent an attempt to minimise inconvenience to respondents, to seek factual responses and to facilitate administration of the interviews.

8.16.1 Interview Part 1: Respondents' personal data

Part 1 relates to respondents' characteristics. There are 10 questions concerning: (1) name, (2) position in organisation, (3) name of organisation, (4) address of organisation, (5) telephone number, (6) facsimile number, (7) sex, (8) age, (9) professional background and qualification, and (10) working experience in years. The researcher recorded the respondents' verbal answers to these questions. The data serves to provide details of respondents' statistics.

8.16.2 Interview Part 2: Characteristics of respondent organisations

Part 2 relates to respondents' organisations. There are 6 questions concerning: (1) type of organisation, (2) size in terms of number of employees, (3) head office location, (4) current projects' locations, (5) types of current projects, and (6) total value of current projects. Respondents were prompted the presented answer or answers and they chose the answer or answers that reflected their organisations' characteristics. The data serves to provide details of subject's statistics.

8.16.3 Interview Part 3: Validation of proposed strategies to remove or to alleviate the constraints identified within the processes of construction procurement in Malaysia

The aim of Part 3 of the interview was to let respondents validate the proposed strategies designed to remove or to alleviate the constraints identified that have been appraised by respondent organisations in Survey 2.

In the interview sheet (questionnaire), each of the 11 main types of constraints identified (see Table 8.1) is presented in bold letters. For each type of constraint, a list of suitable strategies, i.e., strategies that have passed the process of appraisal by the respondent organisations in Survey 2, is presented. The strategies are listed in order of priority in implementation. The respondents were asked to indicate their agreement or disagreement to each strategy in terms of its viability and feasibility for implementation in Malaysia to remove or to alleviate the constraint that the strategy has been designed for. If the respondents felt that the order of priority in implementation of the strategies was not appropriate, they would indicate their own order of priority in implementation by rank.

The approach taken in the interview record attempts to (1) achieves economy in the size of the record of the interview, in terms of the number of pages, and (2) to facilitate respondent organisations in giving their responses.

The method of analysis of data will be discussed later.

8.16.4 Review of proposed strategies

The proposed strategies that form the basis for Survey 2 were reviewed. Analyses and comments of the respondent organisations to Survey 2 formed the basis of the review. The outcome of the review suggests a high degree of consistency of the suitable strategies by the wide range of respondent organisations that participated in Survey 2. Consequently, the suitable strategies are considered to be appropriate for the purposes of validation.

8.16.5 Method of analysis of data for Interview part 3

It has been established in Chapter Six (Section 6.6.6.2) of this thesis that only those strategies that passed rigorous tests and do so with the highest level of support are considered to be worthy of recommendation as proposed strategies. The tests comprise (1) a review of the developed strategies by a panel of international experts on construction procurement (as discussed in Part 2 of this chapter), (2) appraisal through Survey 2 (as discussed in Part 2 of this chapter), and (3) validation through a series of semi-structured interviews.

In the context of validation of strategies by respondent organisations through the interviews, a strategy that pass the test is considered to be one that:

1. Received a simple majority, i.e., 50 per cent or more respondents (overall) indicated agreement; and
2. Received a simple majority, i.e., 50 per cent or more respondents representing at least two out of the three categories of organisations (client, designer or contractor) indicated agreement.

The analysis of data for the survey is set as above.

A strategy that meets the above criteria after the interviews is considered to be a validated strategy.

The analysis of data for the interviews could afford to adopt the simple majority agreement approach because each of the strategies being validated had received a significantly high level of agreement by the respondent organisations in Survey 2 (see Section 8.9.6). Through emphasising the majority agreement, both overall and by at least two out of the three categories of respondents' organisations, the researcher's confidence is boosted in terms of the potential for the validated strategy being effective. In addition, the majority agreement indicates that implementation of the validated strategies would receive support of a majority of the respondent organisations involved in the processes of construction procurement in Malaysia.

There is no limit as to the number of validated strategies. Respondents may consider agreeing to just one strategy or several strategies, on the basis of their own assessment of each strategy in relation to the contexts that they have been provided for.

From the order of priority in implementation by rank provided by the respondents; the mean score for each strategy is computed. On the basis of the mean scores, the relative ranking to indicate priority in implementation of the validated strategies could be determined. Since the respondents were asked to specify the order of priority by rank in ascending order of importance, the lowest mean score will receive the highest ranking.

8.17 Piloting of Questions for the Interview

Before carrying out the interviews, the question for the interview underwent a series of tests in attempts to minimise any shortcomings including in ambiguity, to ensure that the questions were easily understood, to remove obvious problematic aspects, and to validate the form and content of the questions.

The test involved piloting in personal face-to-face interviews with the researcher's colleagues Mr K. J. Owen and 3 experts from the Nottingham Trent University. The experts are Professor R. Morledge of the Construction Procurement Research Unit, Professor J.A.J. Moohan of the Department of Surveying and Ms J. Lincoln of the Department of Mathematics, Statistics and Operational Research. In addition, two separate interviews over the telephone with Malaysians considered being experts of the Malaysian construction industry were performed. The two Malaysian experts are senior officers of the *JKR* Malaysia, and architect and an engineer. They are currently on sabbatical leave in the UK with the University of De Montfort Leicester and University of Aberystwyth, respectively. Various comments concerning shortcomings and views considered to be useful including wordings, contents, and layout and in the presentation of the questions and the analysis of data were received, all were addressed.

Time taken to conduct each piloted interview were recorded; the average time taken to complete an interview is about 45 minutes and is therefore, considered to be satisfactory.

The piloted interviews were administered between 28 July 1997 to 31 July 1997. The piloting represents a dry run of the interviews, personal face-to-face and over the telephone, that the research will employ.

Arising from the piloting, the whole content of the question and the approach taken in the interviews were examined and changes made to improve it. On the basis of the comments and suggestions from the pilot tests, the list of questions was recomposed until a satisfactory format has been achieved. Six drafts were prepared before finalisation was considered to be possible. The final version was administered. However, it is acknowledged that some problems would not become apparent until the actual interviews have been administered.

8.18 Carrying out of the Interviews

The whole series of interviews were performed entirely by the researcher.

Names and addresses of respondent organisations for the interviews were compiled from:

1. The respondent organisations in Survey 2 that indicated willingness to participate in the interview (24 organisations); and
2. A stratified random sampling from the main database used in Survey 1 (40 organisations). To avoid double entries in the sampling processes, the sampling frame excluded the above 24 respondent organisations.

The breakdown of the above 64 respondents' organisations according to the category and type of organisations is provided in Table 1 of Appendix G, but briefly:

1. Four organisations representing clients in the public and private sectors (6 per cent);

2. Forty-four organisations representing designers in the public and private sectors (69 per cent); and

3. Sixteen contracting organisations (25 per cent).

The database for the interviews also included seven organisations: six professional institutions, one representing the clients (HDAM); three representing the designers (PAM, IEM and ISM); two representing the contractors – (MBA and PKMM); and the CIDB. A review of these institutions is provided in Section 6.6.4.4 of Chapter Six of this thesis. It is felt that these institutions, being professional bodies that are respected for their high level of integrity and reputation within Malaysia and internationally, would offer independent and unbiased opinions on the issues being investigated. This aspect of the interview forms a vital part of the triangulation research method adopted in the present research.

In all, the interview database comprised names and addresses of 71 organisations.

A standard letter, written on The Nottingham Trent University's letter headed paper, in English and its version in *Bahasa Malaysia* was sent to all 71 organisations on 16 July 1997. The letter was addressed to senior management personnel of each of the 71 organisations. It provides a brief introduction of the researcher and the present research work and requests (1) permission to conduct face-to-face interview at the organisation's premise or over the telephone and (2) to select, from the proposed dates, the most convenient date for the interview. A self-addressed freepost envelope (the Royal Mail IBRS service, see Section 7.4 of Chapter Seven of this thesis), the researcher's e-mail address and facsimile number were provided, organisations therefore had a choice in replying to the researcher's request to be interviewed. A standard letter of reminder was sent to all organisations ten days after mailing the first letter. Organisations were requested to respond to the researcher's request for the interview by 4 August 1997.

The response to the researcher's request for the interviews was very disappointing. After 4 weeks of sending the first letter, only 8 responses were received; 6 agreed to be interviewed. Due to the poor response, the researcher decided to contact all remaining organisation either in person or by telephone.

All interviews were performed between 18 August 1997 and 19 September 1997 in Malaysia by the researcher. Due to time and financial constraints, the researcher was not able to prolong his stay in Malaysia. In addition, the period between August and September 1997 coincided with the worst ever haze conditions in Malaysia, outdoor activities and air travel were seriously affected. The haze seriously affected the researcher's itinerary and several interviews were cancelled.

Prior to each interview, with senior staff nominated by the organisation, the researcher undertook the following tasks:

1. Introduced himself to the respondent;
2. Provided a brief outline of the present research;
3. Provided a brief explanation of Surveys 1 and 2 and their findings;
4. Explained the objective of the interview and the definitions of the main concepts to the respondent;
5. Explained the procedures to be followed during the interview; and
6. Reassure respondents that their answers were confidential and would be used only for statistical analysis.

Information relating to the above is provided on page 1 of the questionnaire.

During the interviews the researcher recorded the answers given by the respondents and all verbal comments they made relating to the constraints identified and the appraised strategies. In personal face-to-face interviews, where the respondents' permission was obtained, the interviews were audio recorded by the researcher. When requested by the respondents, the researcher provided clarification relating to specific aspects of the questionnaire or the constraints identified.

Appendix H provides the transcription of the verbal comments made by the respondents relating to the constraints identified and the strategies.

As anticipated, the average time taken for an interview was 45 minutes. However, the time taken for some interviews was much longer; the reasons for the extended time included enthusiasm of the respondents in discussing the issues being investigated or interruptions during the interviews (for example, respondents had to answer the telephone or was summoned by his or her superior).

At the end of each interview, a letter of appreciation for participation in the interview, written on The Nottingham Trent University's letter headed paper and signed by the researcher was presented (in the case of telephone interviews the letter was posted) to the respondents.

In all, forty-seven interviews, either in person or over the telephone, were performed. Forty-four interviews were with the representatives of the organisations contacted. The interview's response rate therefore was 61.97 per cent of the total 71 organisations contacted. The remaining three interviews were with the representatives of client organisations that were not selected as respondents for the interviews but offered data for the study.

The majority (30 interviews or 63.83 per cent) of the interviews were personal face to face. The remaining 17 interviews (36.17 per cent) were held over the telephone. The predominant reasons for the telephone interviews were (1) geography (thus minimising travelling and travelling costs), and (2) respondents' request for the interview to be held over the telephone for their own convenience. The list of personnel and organisations being interviewed and the dates of the interviews are provided in Appendix J. For reason of confidentiality, names of the respondents were omitted from the list.

All 47 interviews provided the basis for the research findings. Full details of subjects' statistics (Questionnaire Parts 1 and 2) are given in Tables 3 - 18 of Appendix G. Main characteristics of the respondents included:

1. The majority (55 per cent) of the respondents were from the designers category;
2. The number of professional institutions interviewed was five out of the total of 7 professional institutions visited in person by the researcher (or 11 per cent of total organisations interviewed). The professional institutions were PAM, IEM, MBA, PKMM and CIDB. The HDAM and the ISM declined the researcher's request for the interview; citing heavy workload and absent of board members' consent, respectively, as reasons;

3. The majority (85 per cent) of the respondents hold senior management position in their respective organisations, i.e., senior manager or higher;
4. The majority (85 per cent) of the respondents were male;
5. The average age of the respondents is 39.55 years old (s.d. = 7.01);
6. The average working experience of the respondent is 14.15 years (s.d. = 6.93); and
7. The majority (81 per cent) of the respondents are professionals related to the processes of construction procurement; either architects, engineers or quantity surveyors.

On the basis of the above characteristics, respondents of the interviews may be considered to possess (1) the knowledge, expertise and experiences of the processes of construction procurement in Malaysia, and (2) a helicopter view of the construction industry of Malaysia. As a consequence, the data obtained from the interviews is considered to be highly valuable for the intended purpose of this investigation.

8.19 Coding the Questionnaire

The questionnaire coding system used to identify the constraints and their respective strategies employed in Survey 2 has been used in the analysis of data in the interviews. The questionnaire coding system is illustrated in Appendix D.

In addition, verbal comments made by the respondents relating to the constraints identified were recorded and coded. A summary of the results of the verbal comments relating to the constraints identified is provided in Tables 23 of Appendix G.

8.20 Results of the Interviews

Full details of the results of the interviews are given in Tables 19 - 23 of Appendix G.

8.20.1 Results of the interviews with the respondent organisations

Tables 19 and 20 of Appendix G show detailed results of the validation of strategies to remove or to alleviate current, and perceived future constraints, respectively, by all respondent organisations. Tables 21 and 22 of Appendix G show the results of the validation of strategies to remove or to alleviate current, and perceived future constraints, respectively, by client, designer and contractor.

Tables 8.14 and 8.15 provide a summary of the results on the validation of strategies by the respondents' organisations for current constraints and for future constraints, respectively. The results indicate a predominantly high level of agreement and consensus amongst the three categories of the respondent organisations on each strategy and the order of priority in implementation.

Table 23 of Appendix G shows the results of the validation of the constraints identified through Survey 1 by the respondent organisations and the professional institutions. The table was constructed from verbal comments relating to the constraints identified made by the respondents during the course of the interviews. It suggests a significantly high level of agreement to each type of constraints identified in Survey 1.

From the analysis of the transcription of verbal comments relating to the strategies provided by the respondents (Appendix H), the majority of respondents indicated that it is the government, through its agencies such as the CIDB that should principally initiate and implement the strategies. The respondents view that the government possesses the legal framework and resources to do so. The respondents indicated however, that their organisations would support and assist the government in implementing the strategies.

8.20.2 Results on validation of proposed strategies by professional institutions

Tables 8.16 and 8.17 provide a summary of the results on the validation of strategies by the professional institutions for current constraints and for future constraints, respectively. The results indicate a high level of agreement with the majority of the strategies and the order of priority in implementation. But several strategies and order of priority in implementation failed to receive a full consensus.

Table 23 of Appendix G shows the results of the validation of the constraints identified through Survey 1 by the professional institutions (shown in bold italic). The table was constructed from verbal comments relating to the constraints identified made by the representatives of the institutions during the course of the interviews. It suggests a high level of agreement to each type of constraints identified in Survey 1.

From the analysis of the transcription of verbal comments relating to the strategies provided by the respondents (Appendix H), the majority of the professional institutions indicated that it is the government, through its agencies such as the CIDB that should principally initiate and implement the strategies. The respondents view that the government possesses the legal framework and resources to do so. The professional institutions indicated however, that their institutions would support and assist the government in implementing the strategies.

8.21 Summary

The interview sets out to validate the viability and feasibility of proposed strategies designed to remove or alleviate the current and perceived future constraints identified within the processes of construction procurement in Malaysia. The strategies have been appraised by respondent organisations in Survey 2. The interview also seeks to solicit additional information including information to validate the constraints identified.

In carrying out the interviews, the semi-structured interview approach was employed. The respondents to the interviews were experienced practitioners of the processes of construction procurement in Malaysia and representatives of Malaysian construction industry related professional institutions and the CIDB. All interviews were performed in Malaysia between 18 August 1997 and 18 September 1997.

Forty-seven 47 interviews were performed. All were used in the analysis of the research findings.

The results of the interviews with the respondent organisations show a high level of agreement to each strategy appraised in Survey 2 and the order of priority in implementation. In addition, the results also indicated a high level of agreement to each type of constraints identified in Survey 1.

The results of the interviews with the professional institutions also show a high level of agreement with a majority of the strategies appraised in Survey 2 and the order of priority in implementation. However, there were several strategies and order of priority in implementation that failed to receive full consensus amongst the professional institutions. The majority of the professional institutions however, indicated agreement to each type of constraints identified in Survey 1.

In relation to the proposed strategies, the majority of respondents indicated that it is the government through its agencies such as the CIDB that should principally initiate and implement the strategies. The respondents view that the government possesses the legal framework and resources to do so. The respondents indicated however, that their organisations would support and assist the government in implementing the strategies.

The next chapter focuses on the integration of the respective results of the triangulation research approach adopted in the present research study and to provide discussion of findings.

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations)

Constraint and strategy	a (%)	c	s	m	p	p[1]
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations						
Streamline and standardise administrative procedures in Local Authorities (C1/S2)	90.48	1,2,3	√	1.74	2	1
Simplify and standardise approval procedures nation-wide (C1/S4)	90.48	1,2,3	√	1.66	1	2
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district – and between government departments and the private utility providers (CI/S3)	90.48	1,2,3	√	2.63	3	3
Revise planning legislation with the objective of achieving faster planning approval (C1/S9)	83.33	1,2,3	√	3.97	4	4
Constraints in availability of Malaysian produced cement						
Improve enforcement to curb hoarding and black marketeering of cement (C2/S4)	90.48	1,2,3	√	1.39	1	1
Existing cement plant should increase production to relieve shortages (C2/S1)	100.00	1,2,3	√	1.62	2	2
Initiate research into alternative materials to cement in construction (C2/S12)	92.86	1,2,3	√	2.82	3	3
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour						
Increase intake of new trainees (C3/S7)	100.00	1,2,3	√	1.12	1	1
Contractor should move towards greater use of plant to reduce the use of labour (C3/S9)	100.00	1,2,3	√	2.12	2	2
Increase the productivity of labour (C3/S2)	97.62	1,2,3	√	3.15	3	3
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (C3/S14)	100.00	1,2,3	√	3.98	4	4
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (C3/S8)	88.10	1,2,3	√	4.97	5	5
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (C3/S13)	100.00	1,2,3	√	5.78	6	6

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p[1]
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (C3/S15)	100.00	1,2,3	√	6.55	7	7
Constraints in availability of facilities for training skilled labour						
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (C4/S1)	95.24	1,2,3	√	1.10	1	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (C4/S2)	100.00	1,2,3	√	1.95	2	2
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (C4/S3)	88.10	1,2,3	√	2.94	3	3
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (C4/S4)	95.24	1,2,3	√	3.92	4	4
Contractors should provide adequate training facilities for their workers (C4/S6)	97.62	1,2,3	√	4.80	5	5
Private sectors should be more active in providing training facilities (C4/S5)	97.62	1,2,3	√	5.76	6	6
Constraints in availability of key design team members - architects, engineers and quantity surveyors and their assistants						
Expand the capacity of existing university/colleges to train more students in key construction courses (C5/S17)	95.24	1,2,3	√	1.17	1	1
Promote the construction industry and its key professions to schools (C5/S16)	97.62	1,2,3	√	1.95	2	2
Increase the number of entrants into key construction courses (C5/S18)	97.62	1,2,3	√	2.95	3	3
Increase use of technology in design process to reduce manpower requirements (C5/S4)	97.62	1,2,3	√	3.95	4	4

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p[1]
Set up new educational institutions to train more students in key construction courses (C5/S19)	85.71	1,2,3	√	4.97	5	5
Professional institutions should oversee training of key professional and semi-professionals (C5/S21)	95.24	1,2,3	√	5.87	6	6
Increase their productivity (C5/S2)	97.62	1,2,3	√	6.80	7	7
Local professional firms to form alliances to increase key manpower capacity (C5/S9)	97.62	1,2,3	√	7.80	8	8
Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry (C5/S25)	88.10	1,2,3	√	8.86	9	9
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors						
Develop mechanisms to allow local specialist contractors to gain experience (C6/S9)	92.86	1,2,3	√	1.05	1	1
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (C6/S3)	92.86	1,2,3	√	2.02	2	2
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (C6/S10)	90.48	1,2,3	√	3.05	3	3
Local specialist contractors to form alliances to increase their level of expertise and financial capability (C6/S6)	92.86	1,2,3	√	3.95	4	4
Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability (C6/S7)	92.86	1,2,3	√	4.87	5	5
Provide facilities for training specialist contractors (C6/S5)	92.86	1,2,3	√	5.97	6	6

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p[1]
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities						
Disseminate information on approval procedures (C7/S5)	85.71	1,2,3	√	1.19	1	1
Streamline and standardise administrative procedures in Local Authorities (C7/S2)	88.10	1,2,3	√	1.92	2	2
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between government departments and the private utility providers (C7/S3)	88.10	1,2,3	√	2.94	3	3
Simplify and standardise approval procedures nation-wide (C7/S4)	88.10	1,2,3	√	4.02	4	4
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (C7/S9)	78.57	1,2,3	√	4.94	5	5
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (C7/S6)	83.33	1,2,3	√	5.86	6	6
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (C7/S10)	88.10	1,2,3	√	6.70	7	7
Constraints in contract administration due to political and or bureaucratic interference						
Superintending Officer should be fully qualified and experienced professional (C8/S3)	78.57	2,3	√	1.12	1	1
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (C8/S4)	78.57	2,3	√	1.91	2	2
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (C8/S2)	78.57	2,3	√	3.03	3	3

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	**a (%)**	**c**	**s**	**m**	**p**	**p[1]**
Client to appoint full time Supervising Officer - S.O. - to supervise each project (C8/S1)	78.57	2,3	√	3.94	4	4
Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities)						
Encourage local universities/colleges to conduct relevant research and development and in publishing the findings (C9/S7)	100.00	1,2,3	√	1.19	1	1
Encourage professional institutions to conduct relevant research and development and in publishing the findings (C9/S8)	100.00	1,2,3	√	2.05	2	2
CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry (C9/S3)	100.00	1,2,3	√	2.95	3	3
Local Authorities should make transparent all matters pertaining to approval process (C9/S2)	100.00	1,2,3	√	3.90	4	4
Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals (C9/S1)	100.00	1,2,3	√	4.93	5	5
Encourage greater participation of private sector in relevant research and development and in publishing the findings (C9/S6)	100.00	1,2,3	√	5.98	6	6
Disseminate information on project opportunities through major newspapers, technical and professional journals (C9/S5)	100.00	1,2,3	√	7.00	7	7
CIDB should take the lead in research and development and publications and co-ordinate research and development and publication of works of others (C9/S4)	100.00	1,2,3	√	8.00	8	8
General strategies						
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (CG/S2)	100.00	1,2,3	√	1.00	1	1
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (CG/S1)	97.62	1,2,3	√	2.00	2	2

Table 8.14 – Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p[1]
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (CG/S6)	97.62	1,2,3	√	3.00	3	3
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry (CG/S4)	100.00	1,2,3	√	4.00	4	4
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (CG/S3)	100.00	1,2,3	√	5.00	5	5

Questionnaire coding is shown in bracket.
In the present research, validated strategies are the ones that:
1. Received a majority support by 50 per cent or more of the respondent organisations overall, and
2. Received a majority support by 50 per cent or more from each of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

a Percentage of respondent organisations indicating agreement with the strategy.
c Category of respondent organisation indicating majority agreement (see definition of a validated strategy above), where:
1 = Client
2 = Designer
3 = Contractor.
s Status of strategy, where:
√ = strategy is viable and feasible for implementation (see definition of a validated strategy above).
× = strategy is not viable and feasible for implementation.
m Mean score.
p Priority after validation (ranked in accordance with the mean scores).
p[1] Priority prior to validation (see Table 8.11).

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations)

Constraint and strategy	a (%)	c	s	m	p	P[1]
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations						
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district – and between government departments and the private utility providers (FI/S3)	90.48	1,2,3	√	1.13	1	1
Streamline and standardise administrative procedures in Local Authorities (F1/S2)	90.48	1,2,3	√	2.08	2	2
Simplify and standardise approval procedures nation-wide (F1/S4)	90.48	1,2,3	√	2.87	3	3
Revise planning legislation with the objective of achieving faster planning approval (F1/S9)	83.33	1,2,3	√	3.91	4	4
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour						
Contractor should move towards greater use of plant to reduce the use of labour (F3/S9)	97.62	1,2,3	√	1.22	1	1
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (F3/S14)	97.62	1,2,3	√	2.24	2	2
Increase intake of new trainees (F3/S7)	97.62	1,2,3	√	3.14	3	3
Increase the productivity of labour (F3/S2)	97.62	1,2,3	√	3.93	4	4
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (F3/S15)	97.62	1,2,3	√	4.95	5	5
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (F3/S13)	97.62	1,2,3	√	5.85	6	6
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (F3/S8)	90.48	1,2,3	√	6.97	7	7

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	P[1]
Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour (F3/S10)	100.00	1,2,3	√	7.45	8	8
Constraints in availability of facilities for training skilled labour						
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (F4/S1)	95.24	1,2,3	√	1.10	1	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (F4/S2)	100.00	1,2,3	√	1.93	2	2
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (F4/S3)	88.10	1,2,3	√	2.97	3	3
Private sectors should be more active in providing training facilities (F4/S5)	97.62	1,2,3	√	3.85	4	4
Contractors should provide adequate training facilities for their workers (F4/S6)	97.62	1,2,3	√	4.85	5	5
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (F4/S4)	95.24	1,2,3	√	5.80	6	6
Constraints in availability of key design team members – architects, engineers and quantity surveyors and their assistants						
Expand the capacity of existing university/colleges to train more students in key construction courses (F5/S17)	95.24	1,2,3	√	1.00	1	1
Promote the construction industry and its key professions to schools (F5/S16)	97.62	1,2,3	√	1.97	2	2
Increase use of technology in design process to reduce manpower requirements (F5/S4)	97.62	1,2,3	√	2.97	3	3
Increase their productivity (F5/S2)	97.62	1,2,3	√	3.97	4	4
Professional institutions should oversee training of key professional and semi-professionals (F5/S21)	95.24	1,2,3	√	5.00	5	5

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	**a (%)**	**c**	**s**	**m**	**p**	**p[1]**
Increase the number of entrants into key construction courses (F5/S18)	97.62	1,2,3	√	5.95	6	6
Set up new educational institutions to train more students in key construction courses (F5/S19)	88.10	1,2,3	√	7.00	7	7
Local professional firms to form alliances to increase key manpower capacity (F5/S9)	97.62	1,2,3	√	7.85	8	8
Encourage greater use of information technology to provide opportunities for qualified women to work from home (F5/S27)	95.24	1,2,3	√	8.85	9	9
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors						
Develop mechanisms to allow local specialist contractors to gain experience (F6/S9)	92.86	1,2,3	√	1.00	1	1
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (F6/S10)	90.48	1,2,3	√	2.00	2	2
Local specialist contractors to form alliances to increase their level of expertise and financial capability (F6/S6)	92.86	1,2,3	√	2.97	3	3
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (F6/S3)	92.86	1,2,3	√	3.97	4	4
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities						
Streamline and standardise administrative procedures in Local Authorities (F7/S2)	88.10	1,2,3	√	1.16	1	1
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district - and between government departments and the private utility providers (F7/S3)	88.10	1,2,3	√	2.11	2	2

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p[1]
Disseminate information on approval procedures (F7/S5)	88.10	1,2,3	√	2.97	3	3
Simplify and standardise approval procedures nation-wide (F7/S4)	88.10	1,2,3	√	4.02	4	4
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (F7/S10)	88.10	1,2,3	√	4.94	5	5
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (F7/S6)	83.33	1,2,3	√	5.94	6	6
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (F7/S9)	78.57	1,2,3	√	6.79	7	7
Constraints in contract administration due to political and or bureaucratic interference						
Superintending Officer should be fully qualified and experienced professional (F8/S3)	78.57	2,3	√	1.09	1	1
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (F8/S4)	78.57	2,3	√	1.94	2	2
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (F8/S2)	78.57	2,3	√	3.03	3	3
Client to appoint full time Supervising Officer - S.O. – to supervise each project (F8/S1)	78.57	2,3	√	3.94	4	4
Constraints in availability of suitable sites						
Create new urban and industrial sites in suitable locations (F10/S7)	78.57	1,2,3	√	1.06	1	1
Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development) (F10/S2)	78.57	1,2,3	√	2.00	2	2

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	**a (%)**	**c**	**s**	**m**	**p**	**p[1]**
Speed-up land acquisition and land conversion process (F10/S9)	78.57	1,2,3	√	3.03	3	3
Revive derelict land in urban areas (F10/S6)	78.57	1,2,3	√	4.06	4	4
Strictly enforce the Real Property Gains Tax Act to curb land speculation (F10/S1)	78.57	1,2,3	√	4.85	5	5
Constraint in availability of timber						
Government policies on sustainable forest management should be implemented strictly and urgently (F11/S1)	95.24	1,2,3	√	1.00	1	1
Encourage research to identify alternative materials to replace or to minimise using primary timber in construction (F11/S5)	95.24	1,2,3	√	2.05	2	2
Encourage the use of secondary timber (e.g. rubber wood) in construction (where appropriate) (F11/S4)	95.24	1,2,3	√	3.00	3	3
Use alternative materials to replace or to minimise the use of timber in temporary works (e.g. formwork and scaffolding) (F11/S3)	95.24	1,2,3	√	3.95	4	4
General strategies						
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (FG/S2)	100.00	1,2,3	√	1.00	1	1
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (FG/S1)	97.62	1,2,3	√	2.00	2	2
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (FG/S6)	97.62	1,2,3	√	3.00	3	3
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (FG/S3)	100.00	1,2,3	√	3.98	4	4

Table 8.15 – Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by respondent organisations) (Cont'd)

Constraint and strategy	a (%)	c	s	m	p	p^1
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction Industry (FG/S4)	100.00	1,2,3	√	4.90	5	5

Questionnaire coding is shown in bracket.

In the present research, validated strategies are the ones that:

1. Received a majority support by 50 per cent or more of the respondent organisations overall, and
2. Received a majority support by 50 per cent or more from each of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

a Percentage of respondent organisations indicating agreement with the strategy.

c Category of respondent organisation indicating majority agreement (see definition of a validated strategy above), where:
1 = Client
2 = Designer
3 = Contractor.

s Status of strategy, where:
√ = strategy is viable and feasible for implementation (see definition of a validated strategy above).
× = strategy is not viable and feasible for implementation.

m Mean score.

p Priority after validation (ranked in accordance with the mean scores).

p^1 Priority prior to validation (see Table 8.12).

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations										
Streamline and standardise administrative procedures in Local Authorities (C1/S2)	√	1	√	1	√	1	√	1	√	2
Simplify and standardise approval procedures nation-wide (C1/S4)	√	2	√	2	√	2	√	2	√	1
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district – and between government departments and the private utility providers (CI/S3)	√	3	√	3	√	3	√	3	√	3
Revise planning legislation with the objective of achieving faster planning approval (C1/S9)	√	4	×	-	×	-	×	-	×	-
Constraints in availability of Malaysian produced cement										
Improve enforcement to curb hoarding and black marketeering of cement (C2/S4)	√	1	√	1	√	3	√	1	√	1
Existing cement plant should increase production to relieve shortages (C2/S1)	√	2	√	2	√	1	×	-	√	2
Initiate research into alternative materials to cement in construction (C2/S12)	√	3	√	3	√	2	×	-	√	3
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour										
Increase intake of new trainees (C3/S7)	√	1	√	1	√	1	√	1	√	1
Contractor should move towards greater use of plant to reduce the use of labour (C3/S9)	√	2	√	2	√	2	√	2	√	2
Increase the productivity of labour (C3/S2)	√	3	√	3	√	3	√	3	√	3
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (C3/S14)	√	4	√	4	√	4	×	-	√	4
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (C3/S8)	√	5	×	-	√	5	√	4	√	5
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (C3/S13)	√	6	√	5	√	6	√	5	√	6

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (C3/S15)	√	7	×	-	√	6	√	6	√	7
Constraints in availability of facilities for training skilled labour										
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (C4/S1)	√	1	√	1	√	1	√	1	√	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (C4/S2)	√	2	√	2	√	2	√	2	√	2
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (C4/S3)	√	3	√	3	√	3	√	3	×	-
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (C4/S4)	√	4	√	4	√	4	√	4	√	3
Contractors should provide adequate training facilities for their workers (C4/S6)	√	5	√	5	√	5	√	5	×	-
Private sectors should be more active in providing training facilities (C4/S5)	√	6	√	6	×	-	√	6	√	4
Constraints in availability of key design team members - architects, engineers and quantity surveyors and their assistants										
Expand the capacity of existing university/colleges to train more students in key construction courses (C5/S17)	√	1	√	1	√	1	√	1	√	1
Promote the construction industry and its key professions to schools (C5/S16)	√	2	√	2	√	2	√	2	√	2
Increase the number of entrants into key construction courses (C5/S18)	√	3	√	3	√	3	√	3	√	3

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions) (Cont'd)

Constraint and strategy	**PAM**		**IEM**		**PKMM**		**MBA**		**CIDB**	
	a	**p**	**a**	**p**	**a**	**p**	**a**	**p**	**a**	**p**
Increase use of technology in design process to reduce manpower requirements (C5/S4)	√	4	√	4	√	4	√	4	√	4
Set up new educational institutions to train more students in key construction courses (C5/S19)	√	5	√	5	√	5	√	7	×	-
Professional institutions should oversee training of key professional and semi-professionals (C5/S21)	√	6	√	6	√	6	√	8	√	5
Increase their productivity (C5/S2)	√	7	√	7	√	7	√	9	√	6
Local professional firms to form alliances to increase key manpower capacity (C5/S9)	√	8	√	8	√	8	√	6	√	7
Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry (C5/S25)	√	9	√	9	√	9	√	5	√	8
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors										
Develop mechanisms to allow local specialist contractors to gain experience (C6/S9)	√	1	√	1	√	1	n	-	√	1
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (C6/S3)	√	2	√	2	√	2	n	-	√	2
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (C6/S10)	√	3	√	3	√	3	n	-	√	3
Local specialist contractors to form alliances to increase their level of expertise and financial capability (C6/S6)	√	4	√	4	√	4	n	-	√	4
Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability (C6/S7)	√	5	√	5	√	5	n	-	√	5
Provide facilities for training specialist contractors (C6/S5)	√	6	√	6	√	6	n	-	√	6

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities										
Disseminate information on approval procedures (C7/S5)	√	1	√	1	√	1	√	1	√	1
Streamline and standardise administrative procedures in Local Authorities (C7/S2)	√	2	√	2	√	2	√	2	√	2
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between government departments and the private utility providers (C7/S3)	√	3	√	3	√	3	√	3	√	3
Simplify and standardise approval procedures nation-wide (C7/S4)	√	4	√	4	√	4	√	4	√	4
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (C7/S9)	√	5	√	5	√	5	√	5	√	5
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (C7/S6)	√	6	×	-	√	6	√	6	√	6
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (C7/S10)	√	7	√	6	√	7	√	7	√	7
Constraints in contract administration due to political and or bureaucratic interference										
Superintending Officer should be fully qualified and experienced professional (C8/S3)	√	1	√	1	√	1	√	1	√	1
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (C8/S4)	√	2	√	2	√	2	√	2	√	2
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (C8/S2)	√	3	√	3	√	3	√	3	√	3

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions) (Cont'd)

Constraint and strategy	**PAM**		**IEM**		**PKMM**		**MBA**		**CIDB**	
	a	**p**	**a**	**p**	**a**	**p**	**a**	**p**	**a**	**p**
Client to appoint full time Supervising Officer - S.O. - to supervise each project (C8/S1)	√	4	×	-	√	4	×	-	√	4
Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities)										
Encourage local universities/colleges to conduct relevant research and development and in publishing the findings (C9/S7)	√	1	√	1	√	1	√	1	√	1
Encourage professional institutions to conduct relevant research and development and in publishing the findings (C9/S8)	√	2	√	2	√	2	√	2	√	2
CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry (C9/S3)	√	3	√	3	√	3	√	3	√	3
Local Authorities should make transparent all matters pertaining to approval process (C9/S2)	√	4	√	4	√	4	√	4	√	4
Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals (C9/S1)	√	5	√	5	√	5	√	5	√	5
Encourage greater participation of private sector in relevant research and development and in publishing the findings (C9/S6)	√	6	√	6	√	6	√	6	√	6
Disseminate information on project opportunities through major newspapers, technical and professional journals (C9/S5)	√	7	√	7	√	7	√	7	√	7
CIDB should take the lead in research and development and publications and co-ordinate research and development and publication of works of others (C9/S4)	√	8	√	8	√	8	√	8	√	8
General strategies										
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (CG/S2)	√	1	√	1	√	1	√	1	√	1

Table 8.16– Validated strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia(by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (CG/S1)	√	2	√	2	√	2	√	2	√	2
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (CG/S6)	√	3	√	3	√	3	√	3	√	3
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry (CG/S4)	√	4	√	4	√	4	√	4	√	4
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (CG/S3)	√	5	√	5	√	5	√	5	√	5

Questionnaire coding is shown in bracket.

a Agree or disagree with the strategy (in terms of its viability and feasibility to be implemented in Malaysia to remove or to alleviate the constraint it relates) where:
√ = agree with the strategy
× = disagree with the strategy.

p Priority in implementation.

n The strategy is not applicable since the institution concerned feels that the constraint that it was designed for does not exist.

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations										
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between government departments and the private utility providers (FI/S3)	√	1	√	1	√	3	√	1	√	3
Streamline and standardise administrative procedures in Local Authorities (F1/S2)	√	2	×	-	√	1	√	2	√	2
Simplify and standardise approval procedures nation-wide (F1/S4)	√	3	√	2	√	2	√	3	√	1
Revise planning legislation with the objective of achieving faster planning approval (F1/S9)	√	4	×	-	×	-	×	-	×	-
Constraints in availability of unskilled, semi -skilled and skilled Malaysian labour										
Contractor should move towards greater use of plant to reduce the use of labour (F3/S9)	√	1	√	1	√	1	√	1	√	1
CIDB should speed-up its efforts on the accreditation and certification of skilled workers (F3/S14)	√	2	√	2	√	2	√	2	√	2
Increase intake of new trainees (F3/S7)	√	3	√	3	√	4	√	3	√	3
Increase the productivity of labour (F3/S2)	√	4	√	4	√	5	√	4	√	4
CIDB should produce a policy on construction workers (i.e., number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc) (F3/S15)	√	5	√	5	√	6	√	5	√	5
CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers (F3/S13)	√	6	√	6	√	8	√	6	√	6
Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers (F3/S8)	√	7	×	-	√	7	√	7	√	7

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions) (Cont'd)

Constraint and strategy	**PAM**		**IEM**		**PKMM**		**MBA**		**CIDB**	
	a	**p**	**a**	**p**	**a**	**p**	**a**	**p**	**a**	**p**
Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour (F3/S10)	√	8	√	7	√	3	√	8	√	8
Constraints in availability of facilities for training skilled labour										
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth (F4/S1)	√	1	√	1	√	1	√	1	√	1
CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry (F4/S2)	√	2	√	2	√	2	√	2	√	2
The Human Resource Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry (F4/S3)	√	3	√	3	√	3	√	3	×	-
Private sectors should be more active in providing training facilities (F4/S5)	√	4	√	4	×	-	√	4	√	3
Contractors should provide adequate training facilities for their workers (F4/S6)	√	5	√	5	√	4	√	5	√	4
The On Site Training Scheme administered by the Human Resource Ministry on government projects should be extended to include projects in the private sector (F4/S4)	√	6	√	6	√	5	√	6	×	-
Constraints in availability of key design team members – architects, engineers and quantity surveyors and their assistants										
Expand the capacity of existing university/colleges to train more students in key construction courses (F5/S17)	√	1	√	1	√	1	√	1	√	1
Promote the construction industry and its key professions to schools (F5/S16)	√	2	√	2	√	2	√	2	√	2
Increase use of technology in design process to reduce manpower requirements (F5/S4)	√	3	√	3	√	4	√	3	√	3
Increase their productivity (F5/S2)	√	4	√	4	√	5	√	4	√	4

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Professional institutions should oversee training of key professional and semi-professionals (F5/S21)	√	5	√	5	√	5	√	5	√	5
Increase the number of entrants into key construction courses (F5/S18)	√	6	√	6	√	6	√	6	√	6
Set up new educational institutions to train more students in key construction courses (F5/S19)	√	7	√	7	√	7	√	7	×	-
Local professional firms to form alliances to increase key manpower capacity (F5/S9)	√	8	√	8	√	8	√	8	√	7
Encourage greater use of information technology to provide opportunities for qualified women to work from home (F5/S27)	√	9	√	9	√	9	√	9	√	8
Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors										
Develop mechanisms to allow local specialist contractors to gain experience (F6/S9)	√	1	√	1	√	1	n	-	√	1
The 'umbrella' and 'dedicated contractors' scheme for training *Bumiputera* contractors by the government to be extended to include training for specialist contractors (F6/S10)	√	2	√	2	√	2	n	-	√	2
Local specialist contractors to form alliances to increase their level of expertise and financial capability (F6/S6)	√	3	√	3	√	4	n	-	√	3
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer (F6/S3)	√	4	√	4	√	4	n	-	√	4
Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) for completed facilities										
Streamline and standardise administrative procedures in Local Authorities (F7/S2)	√	1	√	1	√	1	√	1	√	1
Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments – federal, state and district - and between government departments and the private utility providers (F7/S3)	√	2	√	2	√	2	√	2	√	2

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Disseminate information on approval procedures (F7/S5)	√	3	√	3	√	3	√	3	√	3
Simplify and standardise approval procedures nation-wide (F7/S4)	√	4	√	4	√	4	√	4	√	4
Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements (F7/S10)	√	5	√	5	√	5	√	5	√	5
Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments (F7/S6)	√	6	√	6	√	6	√	6	√	6
Inspection for CF approval should be done progressively and to be based on standard inspection schedule (F7/S9)	√	7	√	7	√	7	√	7	√	7
Constraints in contract administration due to political and or bureaucratic interference										
Superintending Officer should be fully qualified and experienced professional (F8/S3)	√	1	√	1	√	1	√	1	√	1
Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks (F8/S4)	√	2	√	2	√	2	√	2	√	2
Supervising Officer should be given full powers to supervise projects in accordance with the conditions of contract (F8/S2)	√	3	√	3	√	3	√	3	√	3
Client to appoint full time Supervising Officer - S.O. - to supervise each project (F8/S1)	√	4	√	4	√	4	×	-	√	4
Constraints in availability of suitable sites										
Create new urban and industrial sites in suitable locations (F10/S7)	√	1	√	1	√	1	√	1	√	1
Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development) (F10/S2)	√	2	√	2	√	2	√	2	√	2

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions) (Cont'd)

Constraint and strategy	PAM		IEM		PKMM		MBA		CIDB	
	a	p	a	p	a	p	a	p	a	p
Speed-up land acquisition and land conversion process (F10/S9)	√	3	√	3	√	3	√	3	√	3
Revive derelict land in urban areas (F10/S6)	√	4	√	4	√	4	√	4	√	4
Strictly enforce the Real Property Gains Tax Act to curb land speculation (F10/S1)	√	5	√	5	√	5	√	5	√	5
Constraint in availability of timber										
Government policies on sustainable forest management should be implemented strictly and urgently (F11/S1)	√	1	√	1	√	1	√	1	√	1
Encourage research to identify alternative materials to replace or to minimise using primary timber in construction (F11/S5)	√	2	√	2	√	2	√	2	√	2
Encourage the use of secondary timber (e.g. rubber wood) in construction (where appropriate) (F11/S4)	√	3	√	3	√	3	√	3	√	3
Use alternative materials to replace or to minimise the use of timber in temporary works (e.g. formwork and scaffolding) (F11/S3)	√	4	√	4	√	4	√	4	√	4
General strategies										
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry (FG/S2)	√	1	√	1	√	1	√	1	√	1
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry (FG/S1)	√	2	√	2	√	2	√	2	√	2
Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources (FG/S6)	√	3	√	3	√	3	√	3	√	3

Table 8.17– Validated strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (by professional institutions) (Cont'd)

Constraint and strategy	**PAM**		**IEM**		**PKMM**		**MBA**		**CIDB**	
	a	**p**	**a**	**p**	**a**	**p**	**a**	**p**	**a**	**p**
Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised (FG/S3)	√	4	√	4	√	4	√	4	√	4
Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction Industry (FG/S4)	√	5	√	5	√	5	√	5	√	5

Questionnaire coding is shown in bracket.

a Agree or disagree with the strategy (in terms of its viability and feasibility to be implemented in Malaysia to remove or to alleviate the constraint it relates) where:
√ = agree with the strategy
× = disagree with the strategy.

p Priority in implementation.

n The strategy is not applicable since the institution concerned feels that the constraint that it was designed for does not exist.

CHAPTER 9

DISCUSSION OF FINDINGS

9.0 Introduction

In this chapter discussions of research findings are presented in four parts:

1. The findings on the current and perceived future constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output;
2. The findings on the proposed strategies designed to remove or to alleviate the constraints identified;
3. The findings on the conditions of the construction industry of Malaysia (an aspect considered to be subsidiary to the present research); and
4. Most recent development taking place in Malaysia and their potential impact on the findings of the present research.

It is unusual to carry out discussions of research findings in a chapter separate from those chapters that reported the results. However, due to the nature of the research, in particular the triangulation of data sources and research methods, it is thought to be more appropriate to present discussions in a chapter following the chapters reporting the results. A more meaningful integration of the results can thus be established. In short, this chapter attempts to link the different parts of the present research. The discussions of the first and second parts of this chapter will therefore integrate the results of the triangulation of data sources and research methods. In addition, the discussions will endeavour to relate the findings on the constraints identified and the proposed strategies to the context of the present research, that is, the ninth challenge of Malaysia's Vision 2020.

9.1 Findings on the Constraints Identified within the Processes of Construction Procurement in Malaysia that may inhibit the Level of Construction Output

Survey 1 identifies the types and extent of constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output.

Through the triangulation research approach, the constraints identified in Survey 1 were reviewed and subsequently validated through a series of semi-structured interviews in Malaysia. The respondents of the interviews were representatives of clients, designers and contractors' organisations and professional institutions related to the construction industry of Malaysia. The overall results of the interviews with the representatives of the clients, designers and contractors' organisations and the interviews with the professional institutions, respectively, (Table 23 of Appendix G) were highly consistent with the results of Survey 1. The highly consistent nature of the results obtained from (1) the two separate data sources of respondent organisations and professional institutions, and (2) the two separate research methods of postal questionnaire Survey 1 and the semi-structured interviews therefore, establish the validity of the constraints identified in Survey 1.

The results indicate that within the processes of construction procurement in Malaysia constraints in some resources and functions are currently experienced. In addition, constraints in some resources and functions are perceived to exist in the future until at least 2001. A summary of the areas where constraints exist now and are perceived to exist in the future until at least 2001 are listed in Tables 7.4 and 7.5 of Chapter Seven of this thesis. These constraint are considered by the respondent organisations and the professional institutions to be critical and could severely restrict or limit the Malaysian construction procurement processes that in turn may inhibit the level of construction output.

The above findings confirm opinion and speculation raised by several commentators that the construction industry of Malaysia suffers from constraints in some resources and functions (discussed in Chapters Five and Seven of this thesis). But more importantly, the findings provide empirical evidence of the type and extent of those constraints, both currently and in the future until at least 2001.

In examining the types of current and perceived future constraints identified, seven types of resources and functions have been identified to be suffering constraint currently and the constraints are perceived to continue into the future until at least 2001. In Section 8.2.2 of Chapter Eight of this thesis, these constraints were referred to as 'simultaneous'. They are:

1. Constraints at project planning stage caused by procedures in obtaining statutory approvals;
2. Constraints in availability of indigenous labour;
3. Constraints in availability of facilities for training skilled workers;
4. Constraints in availability of indigenous design team members;
5. Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors;
6. Constraints caused by procedures in obtaining the CF necessary for completed projects; and
7. Constraints in contract administration due to political and/or bureaucratic interference.

In addition, two types of resources and functions have been identified to be in constraint currently but are perceived to be unlikely to suffer constraint in the future. They are:

1. Constraint in the availability of local cement; and
2. Constraint in the availability of reliable sources of information relating to statutory requirements, cost data, and projects opportunities.

It appears that the government's efforts notably in liberalising the cement industry and the setting up of new cement plants (Section 8.4.2 of Chapter Eight of this thesis) may have prompted the respondents to perceive that availability of local cement would not be a constraint in the future. And the presence of the CIDB to promote and undertake research and to initiate and maintain a construction industry information system (Section 8.4.8 of Chapter Eight of this thesis) may have caused the respondents to perceive that reliable sources of information would not be a constraint in the future.

Furthermore, 2 types of resources and functions have been identified to be not in constraint currently but are perceived to be likely to suffer constraint in the future until at least 2001. They are:

1. Constraint in the availability of suitable sites; and
2. Constraint in the availability of Malaysian timber.

The literature review in Section 8.4.9 of Chapter Eight of this thesis established that among others there is continuous and high demand for land for development especially in urban areas, and clear policy on land use are lacking. These issues may have influenced the respondents to perceive that in the future availability of suitable sites for development may be a constraint. Additionally, the continuous and high demand for Malaysian timber and the government's strict policy on sustainable forest management (Section 8.4.10 of Chapter Eight of this thesis) may have influenced the respondents to perceive that availability of Malaysian timber would be a constraint in the future.

The findings on which state in Malaysia that has the most and the least constraints when acquiring construction projects indicate that Kuala Lumpur, the capital city, has the most and the least constraints. Initially, this finding appears to be inconclusive, but closer examination of Kuala Lumpur suggests that the findings are relatively consistent with the characteristics of the capital city. These characteristics suggest that the one hand it has been established that Kuala Lumpur has been the focus of intense development in recent years (Lee, 1993, p59; Abdul Razak, 1993, p60-61; and Ahmad, 1993, p65). Thus, high level of activities in construction and in other economic sectors taking place in an area of only 94 square miles may have caused bottlenecks including those in physical infrastructure and in government services. This appears to justify the respondents' view that the processes of construction procurement are most constrained in Kuala Lumpur. For instance, Interview 5 (Appendix H) commented that:

"The most constrained area is Kuala Lumpur where most development projects are taking place."

On the other hand, Kuala Lumpur being Malaysia's capital city, possesses the most sophisticated physical and social infrastructures and government procedures (Wang, 1987). Perhaps, the presence of sophisticated infrastructure and government procedures prompted the respondents to perceive that the processes of construction procurement are least constrained in Kuala Lumpur.

The findings also indicate that high demand for a particular resource or function is among the predominant reason for its currently experienced constraint. Perhaps the prolonged and rapid expansion in the Malaysian construction industry since 1988 may have led to higher demand for construction resources leading to the current constraints.

On the basis that the Malaysian Government's continuous efforts to modernise and industrialise the economy to achieve Vision 2020, it is inevitable that future demand for construction resources and functions will continue to rise. Therefore, the respondents' belief that constraints in resources and functions will continue in the future is justified.

The findings on the types of resources and functions that have been identified to be in constraint both currently and in the future suggest that the construction industry of Malaysia is facing two paradoxes. Firstly, the constraints in availability of unskilled indigenous construction labour and in availability of suitable sites for development appear not to be the constraints that were often associated with the construction industries of the developing countries. Secondly, some constraints that appear to be consistent with constraints that would normally be found in most construction industries in the developing countries exist in Malaysia currently and are perceived to exist in the future until at least 2001. They are constraints caused by government procedures and in contract administration that are complex and bureaucratic, and constraints in the availability of construction materials, of semi-skilled and skilled labours, of facilities for skills training, of key designers, and of specialist contractors. The types of constraints affecting the construction industries of developing and of developed countries have been established in Chapter Three of this thesis.

The two patterns of constraint in resources and functions identified above illustrate the transitional nature, in the context of the construction industry, of the Malaysian economy, i.e., a developing economy moving towards a developed economy. Consequently, it could be expected that characteristics of both developing and developed economies prevail in the Malaysian construction industry.

The presence of the constraints identified may jeopardise Malaysia's pursuit of securing an economy that is fully competitive, dynamic, robust and resilient by the year 2020 – the ninth challenge of Vision 2020 – unless radical changes are introduced.

There is therefore, an urgent need for strategies to remove or to alleviate the constraints identified in order to achieve more efficient and effective construction procurement that in turn would help boost construction output. In turn, increased construction output should facilitate appropriate and sustainable pace of growth of the economy.

9.2 Proposed Strategies to remove or to alleviate the Constraints Identified

The constraints identified provide a meaningful basis for the development of proposed strategies to promote and sustain appropriate level of growth in output of the construction industry of Malaysia. The approach taken in this study therefore, followed the recommendation of Miles and Neale (1991, pvii) that:

> "A prerequisite for the effective development of a nation's domestic construction industry is a better understanding of the constraints faced by that industry in its own environment, leading to specific measures to overcome them."

A list of proposed strategies designed to remove or alleviate the constraints identified, in order to promote and sustain appropriate level of growth in output of the construction industry of Malaysia, were appraised through Survey 2. Through the triangulation research approach, the results of Survey 2 on those strategies that the respondent organisations considered being suitable for implementation in Malaysia to remove the constraints identified were reviewed and subsequently validated through a series of semi-structured interviews in Malaysia. Respondents to the interviews were representatives of clients, designers and contractors' organisations and professional institutions related to the construction industry of Malaysia.

The overall results of the interviews with the representatives of the clients, designers and contractors' organisations show a high level agreement with those strategies that have been considered to be suitable by the respondent organisations in Survey 2 (Tables 8.15 and 8.16 of Chapter Eight of this thesis). They also agree with the respective ranking of the strategies in terms of priority for implementation.

The results of the interviews with the representatives of the professional institutions show a majority agreement (at least 3 out of the 5 institutions indicated agreement) with those strategies that have been considered to be viable and feasible by the respondent organisations in Survey 2 (Tables 8.17 and 8.18 of Chapter Eight of this thesis), except:

1. Current constraint 1: Constraint at project planning stage caused by procedures in obtaining statutory approvals. Only the PAM (the institution representing the architects) agreed with strategy C1/S9, i.e., 'revise planning legislation with the objective of achieving faster planning approval', and

2. Future constraint 1: Constraint at project planning stage caused by procedures in obtaining statutory approvals. Only the PAM (the institution representing the Architects) agreed with strategy F1/S9, i.e., 'revise planning legislation with the objective of achieving faster planning approval.'

In essence, strategies C1/F9 and F1/S9 are the same. They were designed to remove current and perceived future constraints at project planning stage caused by procedures in obtaining statutory approvals, in terms of planning permissions.

The interview afforded the researcher an opportunity to seek explanation as to the reasons for the lack of majority agreement among the professional institutions to strategies C1/S9 and F1/S9. In supporting these strategies, the representative of the PAM (Interview 10 of Appendix H) commented that:

> "The current planning legislation is not standardised nation-wide and therefore, its revision focusing on standardisation of the planning legislation for Malaysia as a whole might remove some of the inherent constraints. In addition, under a new procedure only the town planners are allowed to submit application for planning permissions whereas traditionally it was the architects. As a consequence, a conflict of interest prevails among the town planners and the architects. Hopefully, the revision would address this and other issues concerning land matters, planning permissions and building regulations."

However, a small proportion of the respondent organisations and the professional institutions (Interviews 3; 8, and 16 of Appendix H) commented that the current planning legislation is adequate and therefore does not require revision. They contended that the constraint relating to planning permission emanates from issues such as shortages of staff within the local authorities both in terms of quantity and quality of staff and inefficiencies in the processes of approving applications for planning permissions. For instance Interview 8 commented that:

> "The planning legislation is clear. Delays in obtaining planning permissions are due to inefficiencies in the approving process."

However, both strategies C1/S9 and F1/S9 received high level of agreement by the representatives of the clients, designers and contractors' organisations. The respective results of the interviews with these organisations show that 80 per cent or more agreed with strategies C1/S9 and F1/S9 (Tables 21 and 22 of Appendix G).

Examination of the processes of construction procurement in Malaysia (Chapter Five of this thesis) reveals that procedures in obtaining statutory approvals, in this instance obtaining planning permissions, is an issue closest to the architects. This is because architects would normally prepare and submit applications for planning permission to the planning authority concerned for construction projects on behalf of their clients. Therefore, they possess first-hand experience of the procedures and perhaps the constraints, in contrast to the other participants of the processes of construction procurement. As a consequence, the view of the PAM, which represents the architectural profession in Malaysia in relation to strategies C1/S9 and F1/S9, is considered to be credible. On this basis and since 80 per cent or more of the representatives of the clients, designers and contractors, respectively, supported strategies C1/S9 and F1/S9 during the interviews, it is believed that the disagreement by the 4 professional institutions of these strategies is considered to be not critical. It is therefore decided that strategies C1/S9 and F1/S9 and their respective ranking in terms of priority in implementation stay.

As a consequence, the overall results obtained from (1) the two separate sources of data of respondent organisations and professional institutions, and (2) the two separate research methods of postal questionnaire Survey 2 and the semi-structured interviews may be considered to be consistent. They therefore, establish the validity and the order of priority of the proposed strategies considered being suitable to be implemented in Malaysia by the respondent organisations in Survey 2 for removing or alleviating the constraints identified.

The findings indicate the strategies that could be implemented to remove or to alleviate the constraints identified within the processes of construction procurement in Malaysia. The proposed strategies are listed in Tables 8.12 and 8.13, of Chapter Eight of this thesis.

The overall high level of agreement to the proposed strategies emerging from the appraisal and the validation exercises imply two important points. Firstly, it suggests that those strategies are highly suitable to be implemented, in the context of the needs, conditions and environment specific to Malaysia, to remove or to alleviate the constraints identified, on condition that they are implemented successfully. As a consequence, appropriate and sustainable growth in construction output may be achieved. The latter has been established, at the beginning of this thesis (Chapter Four), as one of the key prerequisites for achieving rapid and sustainable growth in the economy of Malaysia envisaged by Vision 2020. Secondly, implementation of those strategies would receive the support of a majority of the organisations involved with the processes of construction procurement in Malaysia. The second point is considered to be highly significant in order to facilitate ensuring successful implementation of the strategies.

It has been established in Chapter Eight of this thesis that the scope of the present research excludes considerations of implementation of the strategies. However, during the interviews 21 representatives of the respondent organisations and professional institutions offered comments concerning implementation of the strategies. All in all, they perceived that it is the government that should principally initiate and implement the strategies. But some believe that full co-operation from all quarters is essential and therefore call for the government and the private sector to work together in implementing the strategies.

In addition, some representatives believe that in order to be successful, the implementation of the strategies requires strict enforcement. This makes the government as the most likely choice as leader to implement the strategies. The respondents indicated that the government possesses (1) the legal framework, and (2) the resources to both implement the strategies and to conduct strict enforcement. For instance:

> "The government is the best party to implement the identified strategies. It has the legal framework to do so. The private sector would not participate unless there is enforcement and incentives."
>
> Interview 2 (Appendix H).

> "The government should work together with the private sector to set up an overall framework to implement the strategies. The implementation of the strategies requires strict enforcement."
>
> Interview 27 (Appendix H).

Six out of those 21 representatives of the respondent organisations and professional institutions that offered comments concerning implementation of the strategies indicated that within the government, the CIDB is considered as the most appropriate party to provide leadership in the implementation of the strategies. This is because the CIDB is the government's agency that was established principally to develop the construction industry of Malaysia. For instance:

> "The government must conduct a review on the Malaysian construction industry. More importantly, there must be a real effort to revive and improve

the construction industry. I see the role of the Malaysian CIDB as paramount in developing the Malaysian construction industry."

Interview 26 (Appendix H).

"The government through the CIDB should take the lead to develop the Malaysian construction industry."

Interview 31 (Appendix H).

The CIDB acknowledges its tasks that lie ahead. However, the CIDB believes that full co-operation from all sectors of the construction industry of Malaysia is needed if successful implementation of the strategies is to be achieved. For instance, during the interview the representative of the CIDB commented that

"It is very unlikely that the Malaysian private sector would want to take the lead in implementing the strategies (since their existence is profit oriented). The main task of the CIDB is to develop and to expand the Malaysian construction industry. Therefore, implementation of the strategies should become the Board's task and the Board would call for full co-operation from all parties; the public and private sectors alike."

Interview 22 (Appendix H).

9.3 The Current Conditions of the Construction Industry of Malaysia

There are 4 aspects investigated in Survey 1 under the headings of current conditions of the construction industry of Malaysia. They are (1) the extent of use of procurement strategies, (2) performance of the construction industry, (3) level of foreign inputs used, and (4) the relation between the construction industry and Vision 2020.

The reason for seeking empirical data relating to the current conditions of the construction industry arises because published data are lacking. It is felt that by making this data available to the authorities responsible for implementing the proposed strategies identified in the present research, it would enlighten their understanding of the broader issues of the construction industry of Malaysia. As a consequence, it is believed that the authorities concerned would be better-equipped, information wise, in making their considerations of issues relating to the implementation of the strategies.

In this part of the research, the word 'current' refers to between 1 November 1996 and 31 January 1997, being the period when data on current conditions of the construction industry of Malaysia was gathered through Survey 1.

In relation to the procurement strategies used in the construction industry of Malaysia the findings, based on the results of the most frequently used procurement strategies as perceived by the respondent organisations of Survey 1, (Table 7.7 of Chapter Seven of this thesis) is listed below. (Procurement strategies here refer to the basis for appointing the different parties involved with the procurement processes and the contractual arrangement).

1. The basis of appointment of consultants is through fee competition;
2. The basis of selection of contractors is through the system of open tendering;
3. The basis of appointment of specialist contractors is through nomination;
4. Malaysian contractors prefer to form joint ventures with foreign contractors;
5. The traditional system of lump sum contract based on firm bills of quantities is the most preferred contractual arrangement; and
6. The JKR (PWD) 203 series and the PAM forms of contracts are the two most preferred standard forms of contract for use in the public and private sectors, respectively.

In relation to current performance of the construction industry of Malaysia (Table 7.8 of Chapter Seven of this thesis) the findings indicate that overall, it may be considered to be 'good'. Specifically, its performance in terms of the following indicators: design time, construction time, construction cost, quality, usage of modern technology in design and in construction, usage of modern project management tools, quality of local materials, standard of workmanship and investment in assets, respectively, is rated 'good'. Similarly, the performance of the construction industry of Malaysia in terms of export of contractors' services is rated 'good'. In addition, the performance of the various sectors of the construction industry, in terms of housing and residential buildings, commercial and industrial buildings, civil engineering, and in terms of public and private sectors, respectively, is rated 'good'. But the performance in terms of health and safety on sites, investment in research and development, export of consultants' services and success of technology transfer, respectively, is 'poor'.

In considering the results on the performance of the construction industry of Malaysia, they appear to broadly support the results on the constraints and proposed strategies. Perhaps, the construction industry of Malaysia could not achieve higher level of performance because of the presence of those current constraints identified.

As an example of the above point, the 'poor' rating scored by the performance indicators of research and development and export of consultants' services is considered. The lack of research and development and in the publications of their findings could have resulted in the constraint currently suffered in the availability of reliable sources of information. It concurs with strategies C9/S3, C9/S4, C9/S6, C9/S7 and C9/S8 that call for the CIDB and other bodies to undertake research and development and to publish their findings as measures for removing or alleviating the constraint in the availability of reliable sources of information. Additionally, the 'poor' rating in terms of export of consultants' services appear to support the findings on the constraints identified in the availability of key design team members. At a time when the construction industry is experiencing such constraint, it would be expected that Malaysian consultants would not consider exporting consultancy services abroad as they would be preoccupied with jobs at home.

The findings on the present use of foreign input (import) in the Malaysian construction industry show that foreign inputs of materials, labour, mechanical plant, designers and contractors are used by the construction industry of Malaysia. However, their extent of use has been found to be predominantly low or medium with the exception of unskilled labour. The extent of use of imported unskilled labour has been found to be high. The predominant reason for relying on imported labour is because of inadequate or shortage of local labour (Tables 7.9 and 7.10 of Chapter Seven of this thesis, respectively). These findings were expected since different commentators have suggested that the majority of the construction workers in Malaysia were foreign, about one-third were unskilled workers.

Finally the findings on the relationship between the construction industry of Malaysia and Vision 2020, in terms of types of projects procured and of the priorities in construction procurement, indicate that the construction industry of Malaysia has assimilated the aspirations of Vision 2020 since its introduction in 1991.

In terms of the types of projects procured, the results of Survey 1 suggest that prior to Vision 2020, the top 6 types of projects procured were (1) medium cost houses, (2) commercial buildings, (3) industrial buildings, (4) low cost houses, (5) civil engineering works, and (6) high cost houses. However, since Vision 2020 was introduced, the priority of the top 6 types of projects procured has changed to (1) industrial buildings, (2) civil engineering and others, (3) low cost houses, (4) commercial buildings, (5) medium cost houses, and (6) high cost houses.

In terms of the priorities in construction procurement, the results of Survey 1 suggest that prior to Vision 2020, the top 6 procurement priorities were (1) value for money, (2) price certainty, (3) speed to completion, (4) low maintenance cost, (5) aesthetic and/or prestige, and (6) technical complexity. However, since Vision 2020 was introduced, the top 6 procurement priorities have changed to (1) speed to completion, (2) value for money, (3) technical complexity, (4) price certainty, (5) aesthetic and/or prestige, and (6) low maintenance cost.

Under Vision 2020, Malaysia aims to become a fully developed country by 2020. In order to meet that objective, Malaysia requires rapid industrialisation and modernisation of its economy that requires socio-economic infrastructure facilities including affordable housing. The priority on the types of projects procured since Vision 2020 was introduced, in particular the top 3 types of projects; (1) industrial buildings, (2) civil engineering works, and (3) low cost houses, indicate that they are highly consistent with the aspiration of Vision 2020.

High level of consistency is also observed between the procurement priorities identified and Vision 2020, in particular the top 3 procurement priorities; (1) speed to completion, (2) value for money, and (3) technical complexity. It is to be expected that the fixed time frame for achieving Vision 2020 would make the clients and other parties involved in the processes of construction procurement more 'pressured' to achieve shorter projects' delivery periods. This implies the construction industry's commitment towards the objective of Vision 2020. In addition, the rapid industrialisation and modernisation of the economy as required by Vision 2020 was translated into higher priority in technical complexity. Prior to Vision 2020, priority for technical complexity was rated sixth that concurs with those literature suggesting that the products of the construction industry in the previous decades were rudimentary (Section 4.4.3.1 of Chapter Four of this thesis). However, the lowest priority (sixth out of six procurement priorities) accorded to low maintenance cost since Vision 2020 was introduced suggest that in the longer term the clients will have to pay more in terms of potentially higher maintenance costs.

It is acknowledged that the approach adopted in investigating the current conditions of the construction industry of Malaysia appears to be over simplified and relatively crude. However, in so far as the present research is concerned whereby the data on current conditions of the construction industry of Malaysia serves as subsidiary data that may contribute towards understanding better the construction industry of Malaysia, this is considered to be adequate.

9.4 Most Recent Development in the Economy of Malaysia and its Impact on the Findings of the Present Research

The present study was carried out during the period whereby the economy of Malaysia was experiencing a rapid and prominent rate of growth (see Section 1.1 of Chapter 1 of this thesis). However, towards the end of the study period the economy experiences a downturn. According to the Bank Negara Malaysia (Berita Harian, 28 August 1998) Malaysia's GDP for the first quarter of 1998 shrunk to -1.8 per cent while growth of the construction sector declined to -22 per cent.

As a consequence, the future of the economy of Malaysia and in particular the attainment of the economic objectives of Vision 2020 (the ninth challenge) looks a little less certain than before.

The downturn in the economy of Malaysia may have impact on the findings of the present research. For instance, the resources and functions that have been found to be a constraint to the processes of construction procurement in Malaysia may no longer be so while other resources and functions that were found to be not in constraint may now become a constraint. Similarly, some strategies that were found to be viable and feasible to be implemented might now become inappropriate while new strategies may be required to remove or to alleviate new constraints.

Those most recent developments were not within the scope of this study. But they illustrate the dynamics of a country's economy and the continuously changing environment within which a construction industry has to operate and therefore, could not be ignored.

There is a need therefore, for the Malaysian construction industry to critically review its status and performance vis-à-vis the processes of construction procurement and the economy on a regular basis. This is crucial if construction is to effectively fulfil its role in stimulating and sustaining growth in the economy as a whole. This study offers a methodology that may be applied towards making the review and to identify appropriate strategies for promoting appropriate growth in construction output.

9.5 Summary

This chapter integrates the results of the triangulation of data sources and of research methods adopted in the present research. The main outcomes of this chapter are the establishment of:

1. The validity of the constraints in some resources and functions within the processes of construction procurement that might inhibit upon the level of construction output;
2. The validity of the proposed strategies considered being viable and feasible to be implemented in Malaysia to remove or alleviate the constraints identified; and
3. The validity of the methodologies adopted in the establishment of constraints and the development of strategies.

The following chapter provides a conclusion to the present research. It also includes its potential contributions to the body of knowledge and to the processes of construction procurement in Malaysia, and suggestions for further research work thought necessary.

CHAPTER 10

CONCLUSIONS

10.1 Conclusions

This thesis has set out to seek answers to the following questions in relation to the construction industry of Malaysia in the context of the economic challenges (the ninth challenge) of 'Vision 2020':

1. Are there constraints in the processes of construction procurement that may inhibit the level of construction output?
2. If there are constraints, can the types of constraints be identified and their extent (in relative terms) ascertained?
3. If there are constraints and the types and extent of constraints identified, are there appropriate strategies which could be implemented to remove or alleviate the constraints identified?

In relation to the first research question, the findings suggest that constraints in some resources and functions within the processes of construction procurement in Malaysia which may inhibit the level of construction output are currently experienced. The findings also suggest that the constraints in some resources and functions are perceived to exist in the future until at least 2001.

In relation to the second research question, the findings indicate the types and extent of constraints (in relative terms) that exist now and are perceived to exist in the future until at least 2001.

In relation to the third research question, the findings suggest the strategies that could be implemented to remove or alleviate the constraints identified. The strategies have been appraised and subsequently validated by respondent organisations and representatives of professional institutions related to the construction industry of Malaysia. This illustrates that, in the context of the needs, conditions and environments specific to the construction industry of Malaysia, the strategies are suitable and that successful implementation would lead to removal or alleviation of the constraints identified.

Key elements of the strategies are provided in Table 10.1.

Removal or alleviation of the constraints identified therefore would promote effective construction procurement. This in turn should facilitate achieving and sustaining appropriate level of construction output consistent with Malaysia's endeavour to become a fully developed and industrialised country - 'Vision 2020'.

The findings suggest that the government, notably the CIDB, should be the prime mover in the implementation of the strategies. The respondents indicate however, that successful implementation of the strategies requires full co-operation of all sectors of the Malaysian construction industry.

The findings provide useful guidance for the authorities responsible for developing the construction industry in Malaysia. In this context, the CIDB could gain invaluable information of the Malaysian construction procurement processes, of the constraints it suffers and of the strategies that are likely to be effective to remove or alleviate the constraints identified that meet the needs, conditions and environments specific for Malaysia.

The use of the triangulation method of data sources and data collections enabled a robust study to be performed without a compromise on either the quality of the data or the findings.

The research methodology that has been developed in the present research may be utilised in construction industries elsewhere to help (1) identify the types and extent of constraints in resources and functions within the processes of construction procurement that may inhibit the level of construction output, and (2) develop, appraise and validate appropriate strategies to remove or alleviate the constraints identified.

Research limitations notably in terms of time, financial and human resources and the research methodology limited the scope of the present research. In particular, it is imperative to take note of the following four features which surround the present research:

1. The research concerns construction procurement in terms of the processes of initiation or promotion, funding, design, statutory approval, tendering, construction and the allocation of risks among the parties involved;
2. The research is focused at a construction industry-wide level perspective;
3. The research is focused on the formal sector of the construction industry; and
4. There may be inherent shortcomings arising from the research methodology used.

In this thesis, the areas of limitations, which may be present in the research, have been highlighted. In addition, alternative approaches that could have been employed have been discussed.

10.2 Suggestions for Further Research

The researcher feels that there should be more investigation conducted in the construction industry of Malaysia in the areas presently covered. This will enable much clearer and more robust conclusions to be drawn but will depend upon a significant investment in research resources. Specifically, future work relating to identification of any constraints and developing, appraising and validating proposed strategies should be conducted at micro level such as types of construction projects, categories of organisations that are involved in the procurement processes, or their size; or geographical locations of organisations or construction projects.

Future work should also consider investigating those procurement activities such as self-help, individual jobbers and rural construction that can be described as being in the informal sector of the Malaysian construction industry.

Chapter Nine of this thesis highlights the most recent developments that are taking place in the economy of Malaysia. These developments may have some impact on the conditions and workings of the construction industry. In the light of these new developments, the researcher suggests that the methodologies adopted in the present research could be repeated to review constraints and to develop strategies to remove or to alleviate any new constraints identified.

Table 10.1 – Key Elements of the Proposed Strategies

1. Local Authorities
- Reform the organisation structure and systems of statutory approvals.
- Revise the planning legislation.

2. Cement
- Increase production.
- Curb unfair trading practices.
- Initiate research into alternative materials.

3. Labour (Malaysian citizens)
- Increase productivity.
- CIDB should speed-up implementation of its policies on construction labour.
- Enhance the capacity of facilities for training skilled labour.
- Include the construction industry into the government's training initiatives.

4. Professionals and semi-professionals (Malaysian citizens)
- Increase productivity.
- Firms should form alliances to increase human resource capacity.
- Draw more students to pursue tertiary education relating to construction.
- Enhance the capacity of local educational institutions.
- Facilitate entry of non-construction graduates into the construction industry.

5. Specialist contractors (Malaysian)
- Enhance the transfer of technology.
- Firms should form alliances to increase expertise and financial capabilities.
- Provide training facilities for specialist contractors.
- Include specialist contractors into the government's contractors' training initiatives.

6. Contract administration
- Appoint full time S.O.s with full contractual powers to supervise projects.
- Reform the system of communication between the participating authorities.

7. Information
- CIDB should speed-up implementation of its policies on research and development and dissemination of information relating to the construction industry.
- Enhance efforts on research and development and in publication of findings.

Table 10.1 – Key Elements of the Proposed Strategies (Cont'd)

8. Land
- Curb land speculation activities.
- Local Authorities should speed-up preparing and gazetting structure plans.
- Revive derelict land in urban areas.
- Create new urban and industrial sites.

9. Timber
- Strictly enforce the government's sustainable forest management policies.
- Use alternative materials.
- Initiate research into alternative materials.

10. General/Government
- Develop mechanism to monitor construction demand and supply.
- Produce a policy on the construction industry.
- Take the lead in modernising the construction industry.

Source: Condensed from Tables 8.11 and 8.12 of Chapter Eight of this thesis.

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Chapter 9

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Appendix A

Questionnaire for Survey 1: A survey of constraints in the processes of construction procurement in Malaysia

Our Ref: (   ) in survey1/data/96 — 31 October 1996

The Nottingham Trent University

Faculty of Environmental Studies

Department of Surveying
Acting Head ~ Paul Collins MSc (Urb Plan) ARICS

Construction Procurement Research Unit

Dear Sir,

I am a Malaysian researcher undertaking research to identify current and future constraints in construction procurement process which might affect growth in the Malaysian Construction Industry. My study is sponsored by the Malaysian Government. The findings will be used in formulating strategies to develop the Malaysian Construction Industry. The work is carried out in partial fulfilment for the degree of PhD at The Nottingham Trent University, England.

Your organization is one of the organizations that has been specifically selected to provide data for the research. A set of questionnaires is attached. Most questions will only require a tick in the appropriate box. Where written answers are required these can be brief and handwritten.

Please answer all questions. Your answers are confidential and will be used only for statistical analysis.

The accuracy of the work will depend upon maximising the number of useful response received. **Please complete and return the questionnaire using the self addressed prepaid envelope provided. No postage is required.** I hope you could mail the questionnaire to me by no later than **Friday 29 November 1996.**

I thank you in advance for your cooperation.

Yours sincerely,

Khairuddin Bin Abdul Rashid
Construction Procurement Research Unit
Department of Surveying

Cc. Professor Roy Morledge
Construction Procurement Research Unit

Enc.

Burton Street
Nottingham NG1 4BU
Tel: (0115) 941 8418
Telex: 377534 Polnot G
Fax: (0115) 948 6507

A SURVEY OF CONSTRAINTS IN CONSTRUCTION PROCUREMENT PROCESS IN MALAYSIA

Part 1. About your organization

1. Your organization (please tick (/) one box only)
   - (a) Jabatan Kerja Raya Malaysia ☐
   - (b) Other Government Ministry/Department ☐
   - (c) Private Architectural firm ☐
   - (d) Private Engineering firm ☐
   - (e) Private Quantity Surveying firm ☐
   - (f) Property Developer ☐
   - (g) Contractor ☐
   - (h) Others, please specify ☐ __________

   (i) If your organization is a contractor, please state:
   (1) PKK Class of registration _____ and/or (2) CIDB Grade of registration _____
   (3) Category: (i) Building ☐ (ii) Civil Engineering ☐
   (iii) M & E ☐ (iv) Others, please specify ☐ _______________

2. Total number of employees in your organization (please tick (/) one box only)
   - (a) Under 5 ☐
   - (b) 5 to 9 ☐
   - (c) 10 to 19 ☐
   - (d) 20 to 29 ☐
   - (e) 30 to 49 ☐
   - (f) 50 to 99 ☐
   - (g) 100 to 199 ☐
   - (h) 200 to 499 ☐
   - (i) 500 to 999 ☐
   - (j) 1,000 and above ☐

3. Your head office is located in (please tick (/) one box only)
   - (a) Perlis ☐
   - (b) Kedah ☐
   - (c) Penang ☐
   - (d) Perak ☐
   - (e) Selangor ☐
   - (f) Kuala Lumpur ☐
   - (g) Negeri Sembilan ☐
   - (h) Melaka ☐
   - (i) Johor ☐
   - (j) Pahang ☐
   - (k) Terengganu ☐
   - (l) Kelantan ☐
   - (m) Sarawak ☐
   - (n) Sabah ☐
   - (o) Labuan ☐

4. Your current projects are located in (you can tick (/) more than one box)
   - (a) Perlis ☐
   - (b) Kedah ☐
   - (c) Penang ☐
   - (d) Perak ☐
   - (e) Selangor ☐
   - (f) Kuala Lumpur ☐
   - (g) Negeri Sembilan ☐
   - (h) Melaka ☐
   - (i) Johor ☐
   - (j) Pahang ☐
   - (k) Terengganu ☐
   - (l) Kelantan ☐
   - (m) Sarawak ☐
   - (n) Sabah ☐
   - (o) Labuan ☐

5. Types of current projects (you can tick (/) more than one box)
   - (a) Housing ☐
   - (b) Other buildings ☐
   - (c) Civil engineering ☐
   - (d) Specialist projects ☐ (e.g. mechanical, electrical, etc)
   - (e) Others, please specify ☐ _______________

6. Total value of current projects (please tick (/) one box only)
   - (a) Under RM 500,000 ☐
   - (b) RM 500,000 to RM 999,999 ☐
   - (c) RM 1,000,000 to RM 4,999,999 ☐
   - (d) RM 5,000,000 to RM 9,999,999 ☐
   - (e) RM 10,000,000 to RM 14,999,999 ☐
   - (f) RM 15,000,000 to RM 19,999,999 ☐
   - (g) RM 20,000,000 to RM 29,999,999 ☐
   - (h) RM 30,000,000 to RM 39,999,999 ☐
   - (i) RM 40,000,000 and above ☐

<u>For office use only</u>: (1) Type of organization: (i) Public sector ☐ (ii) Private sector ☐
(2) Organization's role: (i) Designer ☐ (ii) Client ☐ (iii) Contractor ☐

Part 2. Current and future constraints in resources and functions in construction procurement process in Malaysia

Constraints in construction procurement process are defined as limitations or restrictions imposed on the process of acquiring construction projects.

1. Are there constraints in terms of resources and/or functions in construction procurement processes currently experienced by your organization and/or which currently exist in on going construction projects with which your organization is involved?

   YES ☐ NO ☐

If your answer is **YES**, please **answer all questions on (a) current constraints; and (b) future constraints.** If your answer is **NO**, please **answer all questions on (b) future constraints only.**

For each question please rate by ticking (/) one box which best describes:
(a) **current constraints**, i.e. constraints that are currently experienced by your organization and/or currently exist in on going construction projects with which your organization is involved; and
(b) **future constraints**, i.e. constraints that will exist as perceived by your organization for up to 5 years from now.

(1 = No constraint **2** = Low Constraint **3** = Medium Constraint **4** = High Constraint)

	(a) **Current constraint** 1	2	3	4	(b) **Future constraint** 1	2	3	4
2. At project planning stage								
(a) Availability of suitable sites	☐	☐	☐	☐	☐	☐	☐	☐
(b) Availability of project finance	☐	☐	☐	☐	☐	☐	☐	☐
(c) Availability of expert advisers (Malaysian citizen)	☐	☐	☐	☐	☐	☐	☐	☐
(d) Constraint caused by procedures in obtaining statutory approval	☐	☐	☐	☐	☐	☐	☐	☐
3. Availability of key materials (Malaysian origin)								
(a) Cement	☐	☐	☐	☐	☐	☐	☐	☐
(b) Steel	☐	☐	☐	☐	☐	☐	☐	☐
(c) Aggregates	☐	☐	☐	☐	☐	☐	☐	☐
(d) Sand	☐	☐	☐	☐	☐	☐	☐	☐
(e) Bricks	☐	☐	☐	☐	☐	☐	☐	☐
(f) Timber	☐	☐	☐	☐	☐	☐	☐	☐
(g) Roofing materials	☐	☐	☐	☐	☐	☐	☐	☐
(h) Ceiling materials	☐	☐	☐	☐	☐	☐	☐	☐
(i) Steel and metal sections	☐	☐	☐	☐	☐	☐	☐	☐
(j) Plumbing materials	☐	☐	☐	☐	☐	☐	☐	☐
(k) Floor and wall tiles	☐	☐	☐	☐	☐	☐	☐	☐
(l) Sanitary fittings	☐	☐	☐	☐	☐	☐	☐	☐
(m) Ironmongery	☐	☐	☐	☐	☐	☐	☐	☐
(n) Glass	☐	☐	☐	☐	☐	☐	☐	☐

Part 2. Current and future constraints in resources and functions in construction procurement process in Malaysia (Cont'd)

	(a) Current constraint				(b) Future constraint			
	1	2	3	4	1	2	3	4
3. Availability of key materials (Cont'd)								
(o) Paints	☐	☐	☐	☐	☐	☐	☐	☐
(p) Automotive gas oil (diesoline)	☐	☐	☐	☐	☐	☐	☐	☐
(q) Fuel oil (light and medium)	☐	☐	☐	☐	☐	☐	☐	☐
(r) Bitumen	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)								
(s) ____________________	☐	☐	☐	☐	☐	☐	☐	☐
(t) ____________________	☐	☐	☐	☐	☐	☐	☐	☐

(u) If you have indicated current constraints in material please give the two most important reasons for the constraints: (1) ____________________
(2) ____________________

4. Availability of efficient transportation for distribution of materials	☐	☐	☐	☐	☐	☐	☐	☐

(a) If you have indicated current constraints in transportation please give the two most important reasons for the constraints: (1) ____________________
(2) ____________________

5. Availability of labour (Malaysian citizen)								
(a) Unskilled labour	☐	☐	☐	☐	☐	☐	☐	☐
(b) Semi-skilled labour	☐	☐	☐	☐	☐	☐	☐	☐
(c) Skilled labour (please indicate by trade):								
(1) Concretor	☐	☐	☐	☐	☐	☐	☐	☐
(2) Bar-bender	☐	☐	☐	☐	☐	☐	☐	☐
(3) Carpenter	☐	☐	☐	☐	☐	☐	☐	☐
(4) Bricklayer/mason	☐	☐	☐	☐	☐	☐	☐	☐
(5) Plasterer/pavior	☐	☐	☐	☐	☐	☐	☐	☐
(6) Tiler	☐	☐	☐	☐	☐	☐	☐	☐
(7) Painter	☐	☐	☐	☐	☐	☐	☐	☐
(8) Joiner	☐	☐	☐	☐	☐	☐	☐	☐
(9) Metalworker	☐	☐	☐	☐	☐	☐	☐	☐
(10) Drain-layer	☐	☐	☐	☐	☐	☐	☐	☐
(11) Glazier	☐	☐	☐	☐	☐	☐	☐	☐
(12) Welder	☐	☐	☐	☐	☐	☐	☐	☐
(13) Construction plant operator	☐	☐	☐	☐	☐	☐	☐	☐
(14) Plumber	☐	☐	☐	☐	☐	☐	☐	☐
(15) Licensed electrician	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)								
(16) ____________________	☐	☐	☐	☐	☐	☐	☐	☐
(17) ____________________	☐	☐	☐	☐	☐	☐	☐	☐

Part 2. Current and future constraints in resources and functions in construction procurement process in Malaysia (Cont'd)

	(a) Current constraint				(b) Future constraint			
	1	2	3	4	1	2	3	4

(d) If you have indicated current constraints in skilled labour please give the two most important reasons for the constraints: (1) ______________________________

(2) ______________________________

	1	2	3	4	1	2	3	4
6. Availability of facilities for training skilled labourers	☐	☐	☐	☐	☐	☐	☐	☐
7. Availability of an adequate supply of properly maintained and efficient mechanical plant by ownership or hire								
(a) Mobile crane	☐	☐	☐	☐	☐	☐	☐	☐
(b) Tipping vehicle	☐	☐	☐	☐	☐	☐	☐	☐
(c) Dumper	☐	☐	☐	☐	☐	☐	☐	☐
(d) Backhoe	☐	☐	☐	☐	☐	☐	☐	☐
(e) Air compressor	☐	☐	☐	☐	☐	☐	☐	☐
(f) Pneumatic concrete breaker	☐	☐	☐	☐	☐	☐	☐	☐
(g) Electric, steam, petrol, diesel or other pump of any type	☐	☐	☐	☐	☐	☐	☐	☐
(h) Concrete mixer	☐	☐	☐	☐	☐	☐	☐	☐
(i) Electric welding machine	☐	☐	☐	☐	☐	☐	☐	☐
(j) Road roller/grader	☐	☐	☐	☐	☐	☐	☐	☐
(k) Bulldozer	☐	☐	☐	☐	☐	☐	☐	☐
(l) Excavator with face showel	☐	☐	☐	☐	☐	☐	☐	☐
(m) Generator	☐	☐	☐	☐	☐	☐	☐	☐
(n) Piling plant	☐	☐	☐	☐	☐	☐	☐	☐
(o) Spare parts	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)								
(p) ____________________	☐	☐	☐	☐	☐	☐	☐	☐
(q) ____________________	☐	☐	☐	☐	☐	☐	☐	☐

(r) If you indicated current constraints in mechanical plant please give the two most important reasons for the constraints (1) ______________________________

(2) ______________________________

	1	2	3	4	1	2	3	4
8. Availability of key design team members (Malaysian citizen)								
(a) Professional (degree/professional qualifications)								
(1) Architects	☐	☐	☐	☐	☐	☐	☐	☐
(2) Civil & structural engineers	☐	☐	☐	☐	☐	☐	☐	☐
(3) Mechanical & electrical engineers	☐	☐	☐	☐	☐	☐	☐	☐
(4) Quantity surveyors	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)								
(5) ____________________	☐	☐	☐	☐	☐	☐	☐	☐
(6) ____________________	☐	☐	☐	☐	☐	☐	☐	☐

Part 2. Current and future constraints in resources and functions in construction procurement process in Malaysia (Cont'd)

	(a) Current constraint				(b) Future constraint			
	1	2	3	4	1	2	3	4
8. Availability of key design team members (Cont'd)								
(b) Semi-professional (tech. assist./technician)								
(1) Architectural	☐	☐	☐	☐	☐	☐	☐	☐
(2) Civil & structural engineering	☐	☐	☐	☐	☐	☐	☐	☐
(3) Mechanical & electrical engineering	☐	☐	☐	☐	☐	☐	☐	☐
(4) Quantity surveying	☐	☐	☐	☐	☐	☐	☐	☐
Others (please specify)								
(5) ______________	☐	☐	☐	☐	☐	☐	☐	☐
(6) ______________	☐	☐	☐	☐	☐	☐	☐	☐

(c) If you indicated current constraints in key design team members please give the two most important reasons for the constraints: (1) ______________________

(2) ______________________

9. Availability of technically competent, experienced and financially capable Malaysian contractors								
(a) Main contractors (Building and Civil Engineering)								
(1) Large/international (CIDB Grade 6-7)	☐	☐	☐	☐	☐	☐	☐	☐
(2) Medium (CIDB Grade 3-5)	☐	☐	☐	☐	☐	☐	☐	☐
(3) Small (CIDB Grade 1-2)	☐	☐	☐	☐	☐	☐	☐	☐
(b) Specialist contractors (eg. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	☐	☐	☐	☐	☐	☐	☐	☐

(c) If you indicated current constraints in contractor please give the two most important reasons for the constraints:(1) ______________________

(2) ______________________

10. Availability of credit facilities/financial backing to contractors	☐	☐	☐	☐	☐	☐	☐	☐

(a) If you indicated current constraints in credit facilities/financial backing to contractors please give the two most important reasons for the constraints:

(1) ______________

(2) ______________

11. Constraints caused by present statutory requirements at construction stage	☐	☐	☐	☐	☐	☐	☐	☐
12. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	☐	☐	☐	☐	☐	☐	☐	☐
13. Constraints caused by tendering procedures in terms of fair competition, adequacy of tender documents and tendering period for appointment of contractors	☐	☐	☐	☐	☐	☐	☐	☐

Part 2. Current and future constraints in resources and functions in construction procurement process in Malaysia (Cont'd)

	(a) Current constraint				(b) Future constraint			
	1	2	3	4	1	2	3	4
14. Constraints caused by the system of selection and appointment of consultants	☐	☐	☐	☐	☐	☐	☐	☐
15. Constraints in contract administration in terms of coordination of various parties involved	☐	☐	☐	☐	☐	☐	☐	☐
16. Constraints in contract administration due to political and/or bureaucratic interference	☐	☐	☐	☐	☐	☐	☐	☐
17. Constraints caused by present Conditions of Contract in terms of fair and equitable terms for all parties	☐	☐	☐	☐	☐	☐	☐	☐
18. Constraints in construction process due to problems in interim payments, inspections, and communications	☐	☐	☐	☐	☐	☐	☐	☐
19. Constraints caused by present design standards/specifications in terms of its appropriateness to local conditions and practice	☐	☐	☐	☐	☐	☐	☐	☐
20. Constraints caused by bonds requirements								
(a) Bid bond	☐	☐	☐	☐	☐	☐	☐	☐
(b) Performance bond	☐	☐	☐	☐	☐	☐	☐	☐
(c) Advance payment bond	☐	☐	☐	☐	☐	☐	☐	☐

(d) If you indicated current constraints in bond requirement please give the two most important reasons for the constraints: (1) ______________________

(2) ______________________

21. Availability of adequate insurance facilities to cover risks								
(a) Works insurance	☐	☐	☐	☐	☐	☐	☐	☐
(b) Professional indemnity	☐	☐	☐	☐	☐	☐	☐	☐

(c) If you indicated current constraints in insurance facilities please give the two most important reasons for the constraints: (1) ______________________

(2) ______________________

22. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	☐	☐	☐	☐	☐	☐	☐	☐
23. Other constraints (please specify)								
(a) ______________	☐	☐	☐	☐	☐	☐	☐	☐
(b) ______________	☐	☐	☐	☐	☐	☐	☐	☐

24. Based upon your organization's own experience in construction procurement process in Malaysia, please indicate the location (give the name of **one state only**) that has the **most** constraints when acquiring construction projects : ______________________

25. Based upon your organization's own experience in construction procurement process in Malaysia, please indicate the location (give the name of **one state only**) that has the **least** constraints when acquiring construction projects : ______________________

Part 3. Procurement strategies

For each question please rate by ticking (/) **one** box which best describes your organization's opinion on the present extent of use of the following procurement strategies in Malaysia.
(1 = Low frequency 2 = Medium frequency 3 = High frequency)

	1	2	3
1. Basis of appointment of consultants			
(a) Scale of fees	☐	☐	☐
(b) Fee competition	☐	☐	☐
(c) Others (please specify)			
(1) ____________________	☐	☐	☐
(2) ____________________	☐	☐	☐
2. Basis of appointment of main contractors (Building and Civil Engineering)			
(a) Open tendering	☐	☐	☐
(b) Selective tendering	☐	☐	☐
(c) Negotiation	☐	☐	☐
(d) Pre-qualification	☐	☐	☐
(f) Others (please specify)			
(1) ____________________	☐	☐	☐
(2) ____________________	☐	☐	☐
3. Basis of appointment of specialist contractors (eg. Electrical, Mechanical, Telecommunications)			
(a) Nominated sub-contractors	☐	☐	☐
(b) Non-nominated sub-contractors			
(1) Domestic sub-contractors	☐	☐	☐
(2) Directly employed by client	☐	☐	☐
(c) Others (please specify)			
(1) ____________________	☐	☐	☐
(2) ____________________	☐	☐	☐
4. Joint venture contracting			
(a) Malaysian and foreign	☐	☐	☐
(b) Malaysian and Malaysian	☐	☐	☐
5. Types of contractual arrangements			
(a) Lump sum based on drawings and specifications	☐	☐	☐
(b) Lump sum based on firm bills of quantities	☐	☐	☐
(c) Approximate bills of quantities	☐	☐	☐
(d) Design and build	☐	☐	☐
(e) Cost plus	☐	☐	☐
(f) Management contracting	☐	☐	☐
(g) Construction management	☐	☐	☐
(h) Others (please specify)			
(1) ____________________	☐	☐	☐
(2) ____________________	☐	☐	☐

Part 3. Procurement strategies (Cont'd)

6. Forms of contract used	1	2	3
(a) JKR (PWD) 203 series (original or modified)	☐	☐	☐
(b) PAM (original or modified)	☐	☐	☐
(c) Others (please specify)			
(1) ____________________	☐	☐	☐
(2) ____________________	☐	☐	☐

Part 4. Current performance of the Malaysian construction industry

For each question please rate by ticking (/) **one box which best describes** your organization's opinion on the current performance of the Malaysian construction industry.

(**1** = Poor **2** = Good **3** = Very Good **4** = Excellent)

	1	2	3	4
1. Design time (from briefing to tender invitation)	☐	☐	☐	☐
2. Construction time (from site possession to practical completion)	☐	☐	☐	☐
3. Construction cost (in terms of ability to combat cost increase during construction)	☐	☐	☐	☐
4. Quality (in meeting client's needs)	☐	☐	☐	☐
5. Use of modern technology				
(a) in design (eg. the use of computers in design, estimates, tender/contract documents)	☐	☐	☐	☐
(b) in construction (eg. the use of modern equipment, modern construction techniques, robotics)	☐	☐	☐	☐
6. Use of modern project management tools and techniques including computers (i.e. other than simple bar charts and schedules)	☐	☐	☐	☐
7. Quality of locally produced construction materials	☐	☐	☐	☐
8. Standard of workmanship	☐	☐	☐	☐
9. Health and safety on construction site	☐	☐	☐	☐
10. Level of investment in assets (fixed and current)	☐	☐	☐	☐
11. Level of investment in research and development	☐	☐	☐	☐
12. Sectoral performance (overall sectoral performance in terms of design time, construction time, construction cost and quality)				
(a) Housing and residential buildings	☐	☐	☐	☐
(b) Commercial and industrial buildings	☐	☐	☐	☐
(c) Civil engineering and others	☐	☐	☐	☐
(e) Public sector performance	☐	☐	☐	☐
(f) Private sector performance	☐	☐	☐	☐
13. Exports of construction services				
(a) Consultants	☐	☐	☐	☐
(b) Contractors	☐	☐	☐	☐
(c) Others (please specify) ____________________	☐	☐	☐	☐
14. The success of technology transfer	☐	☐	☐	☐

Part 5. Foreign inputs (imports) in the Malaysian Construction Industry
For questions 1, 3, 5, 7, 9 and 11 please rate by ticking (/) **one** box which best describes your organization's opinion on the present extent of use of foreign inputs (imports) in construction procurement process in Malaysia.
(1 = None 2 = Low 3 = Medium 4 = High)

	1	2	3	4
1. Imported key construction materials				
(a) Cement	☐	☐	☐	☐
(b) Steel	☐	☐	☐	☐
(c) Steel and metal sections	☐	☐	☐	☐
(d) Plumbing materials	☐	☐	☐	☐
(e) Sanitary fittings	☐	☐	☐	☐
(f) Others (please specify)				
(1) ____________	☐	☐	☐	☐
(2) ____________	☐	☐	☐	☐

(If any of your answer is either High, Medium or Low, please answer question 2, if all your answers are None, ignore question 2 and go to question 3).

2. Reason for using imported materials (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Superior in quality ☐ (b) taste and style ☐
   (c) Inadequate or shortage of locally produced material ☐
   (d) Not produced locally ☐
   (e) Others (please specify) ☐
   (1) ____________
   (2) ____________

	1	2	3	4
3. Imported construction labour				
(a) Unskilled	☐	☐	☐	☐
(b) Semi-skilled	☐	☐	☐	☐
(c) Skilled	☐	☐	☐	☐

(If any of your answer is either High, Medium or Low please answer question 4, if all your answer are None, ignore question 4 and go to question 5).

4. Reason for using imported labour (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Superior standard of workmanship ☐
   (b) Inadequate or shortage of local labour ☐
   (c) Others (please specify) ☐
   (i) ____________
   (ii) ____________

	1	2	3	4
5. Imported mechanical plant and spare parts	☐	☐	☐	☐

(If your answer is either High, Medium or Low please answer question 6, if your answer is None, ignore question 6 and go to question 7).

6. Reason for using imported mechanical plant and spare parts (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Superior quality and reliability ☐
   (b) Inadequate or shortage of locally manufactured mechanical plant and spare parts ☐
   (c) Not produced locally ☐
   (e) Others (please specify) ☐ (1) ____________ (2) ____________

Part 5. Foreign inputs (imports) in the Malaysian Construction Industry (Cont'd)

7. Imported design team members (consultant) 1 2 3 4
   (a) Professionals ☐ ☐ ☐ ☐
   (b) Semi-professionals ☐ ☐ ☐ ☐

(If any of your answer is either High, Medium or Low please answer question 8, if all your answer are None, ignore question 8 and go to question 9).

8. Reason for using foreign design team members (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Technical expertise and experience ☐ (b) Taste and style ☐
   (c) Inadequate or shortage of local consultants ☐
   (d) Others (please specify) ☐
   (1) ____________ (2) ____________

9. Imported main contractors (Building and Civil Engineering) 1 2 3 4 ☐ ☐ ☐ ☐

(If any of your answer is either High, Medium or Low please answer question 10, if your answer is None, ignore question 10 and go to question 11).

10. Reason for using foreign main contractors (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Technical expertise and experience ☐
   (b) Financial capability ☐
   (c) Inadequate or shortage of local contractors ☐
   (c) Others (please specify) ☐
   (1) ____________
   (2) ____________

11. Imported specialist contractors (eg. Electrical, mechanical, Telecommunications, etc) 1 2 3 4 ☐ ☐ ☐ ☐

(If your answer is either High, Medium or Low please answer question 12, if your answer is None, ignore question 12 and go to Part 6).

12. Reason for using foreign specialist contractors (please identify by ticking (/) the box(s) which best describes your organization's opinion)
   (a) Technical expertise and experience ☐
   (b) Financial capability ☐
   (c) Inadequate or shortage of local specialist contractors ☐
   (c) Others (please specify) ☐ (1) ____________ (2) ____________

Part 6. The Malaysian construction industry and Vision 2020
(Vision 2020 was introduced in February 1991)

1. Were you already involved with the Malaysian Construction Industry prior to February 1991?

   YES ☐ NO ☐

If your answer is NO please ignore questions 2 and 3 and go to question 4 on page 11. If your answer is YES please answer all the questions on page 11.

Part 6. The Malaysian construction industry and Vision 2020 (Cont'd)

For questions 2 and 3 below please put your ranking appropriately in the space provided; 1 **as the most important priority, followed by 2, 3, 4, 5 and 6 as the least important priority.**

2. Based upon your own experience, please **rank in order of importance** the types of projects procured (a) **prior to**; and (b) **since**; the introduction of Vision 2020.

Types of projects procured	**(a) Prior to Vision 2020** Rank	**(b) Since the introduction of Vision 2020** Rank
Low cost houses	_____	_____
Medium cost houses	_____	_____
High cost houses	_____	_____
Commercial	_____	_____
Industrial	_____	_____
Civil engineering and others	_____	_____

3. Based upon your own experience please, **rank in order of importance** the priorities in construction procurement (a) **prior to**; and (b) **since**; the introduction of Vision 2020.

Priorities	**(a) Prior to Vision 2020** Rank	**(b) Since the introduction of Vision 2020** Rank
Technical complexity	_____	_____
Aesthetics/prestige	_____	_____
Value for money	_____	_____
Speed to completion	_____	_____
Price certainty	_____	_____
Low maintenance cost	_____	_____
Others (please specify)		
_____________	_____	_____

4. If you have further comments on constraints in construction procurement process in Malaysia, please write them in the space below.

____

____

____

____

This is the first part of the research work. In the second part, which would be administered in the second quarter of 1997, strategies to alleviate the constraints in construction procurement processes in Malaysia would be proposed. To achieve consistency, your organization's cooperation is highly appreciated. Please write your name and contact numbers in the space provided below so that any correspondence could be send directly to you. However, if your organization is not able to participate in the second part of the research, please detach the slip below.

Please return the completed questionnaire using the self-addressed prepaid envelope provided. No postage is required.

Thank you very much for your cooperation

Terima kasih diatas kerjasama yang telah anda berikan

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....

Organization's name and address:

Name: ____________________
Telephone: ____________________
Facsimile: ____________________

Appendix B

Results of survey of constraints in the processes of construction procurement in Malaysia

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 1 - Respondent organisations (by category and type)

Category and type	No	%
Client		
Government ministry and department	8	3.90
Developer	6	2.93
Total client	14	6.83
Designer		
(JKR) Public Works Department	36	17.56
Architect	58	28.29
Engineer	18	8.78
Quantity Surveyor	28	13.66
Total designer	140	68.29
Total contractor*	51	24.88
Total respondent organisations	205	100.00

* Tables 3 and 4 provide the breakdown of respondent contractors according to registration, classification and category of work, respectively.

Table 2 - Respondent organisations (by sector and type)

Sector and type	No	%
Public sector		
Government ministry and department	8	3.90
(JKR) Public Works Department	36	17.56
Total public sector	44	21.46
Private sector		
Developer	6	2.93
Architect	58	28.29
Engineer	18	8.78
Quantity Surveyor	28	13.66
Contractor	51	24.88
Total private sector	161	78.54
Total respondent organisations	205	100.00

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 3 - Respondent contractors (by registration with CIDB and PKK)

CIDB			PKK		
Grade	No	%	Class	No	%
3	19	37.25	D	19	37.25
4	3	5.88	C	3	5.88
5	5	9.80	BX	4	7.84
6	5	9.80	B	4	7.84
7	19	37.25	A	16	31.37
No reply	0	0.00	No reply	5	9.80
Total	51	100.00	Total	51	100.00

Table 4 - Respondent contractors (by work category)

Work category	No	%*
Building works	43	84.31
Civil engineering works	40	78.43
Mechanical and electrical works	5	9.80
Others	2	3.92

Where number of respondent contractor organisations = 51.

* Contractors were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent contractors and therefore add up to more than 100.

Table 5 - Size of respondent organisations (by number of employee)

Number of employee	No	%
Under 5	21	10.24
5 to 9	39	19.02
10 to 19	35	17.07
20 to 29	21	10.24
30 to 49	18	8.78
50 to 99	22	10.73
100 to 199	15	7.32
200 to 499	17	8.29
500 to 999	6	2.93
1000 and above	10	4.88
No reply	1	0.48
Total	205	100.00

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 6 - Size of respondent organisations (by number of employee and according to sector)

Number of employee	Public sector		Private sector	
	No	%	No	%
Under 5	2	4.55	19	11.80
5 to 9	0	0.00	39	24.22
10 to 19	0	0.00	35	21.74
20 to 29	1	2.27	20	12.42
30 to 49	0	0.00	18	11.18
50 to 99	4	9.09	18	11.18
100 to 199	13	29.55	2	1.24
200 to 499	10	22.73	7	4.35
500 to 999	5	11.36	1	0.62
1000 and above	9	20.45	1	0.62
No reply	0	0.00	1	0.62
Total	44	100.00	161	100.00

Table 7 - Location of head office of respondent organisations (by state)

State	No. of organisation	%
Perlis	4	1.95
Kedah	5	2.44
Pulau Pinang	15	7.32
Perak	6	2.93
Selangor	21	10.24
Kuala Lumpur	72	35.12
Negeri Sembilan	4	1.95
Melaka	4	1.95
Johor	17	8.29
Pahang	7	3.41
Terengganu	7	3.41
Kelantan	6	2.93
Sarawak	17	8.29
Sabah & Labuan	20	9.76
Total	205	100.00

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 8 - Locations of current projects of respondent organisations (by state)

State	No. of organisations	%*
Perlis	17	8.29
Kedah	50	24.39
Pulau Pinang	48	23.41
Perak	46	22.44
Selangor	86	41.95
Kuala Lumpur	91	44.39
Negeri Sembilan	45	21.95
Melaka	35	17.07
Johor	65	31.71
Pahang	45	21.95
Terengganu	32	15.61
Kelantan	22	10.73
Sarawak	33	16.10
Sabah & Labuan	64	31.22
No reply	1	0.49

Where number of respondent organisations = 205.
* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

Table 9 - Types of current projects undertaken by respondent organisations

Type of project	No	%*
Housing	135	65.85
Other buildings**	165	80.49
Civil engineering	88	42.93
Specialist project	27	13.17
Others	19	9.27
No reply	1	0.49

Where number of respondent organisations = 205.
* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.
** Other buildings refer to all types of building works excluding housing.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 10 - Types of current projects undertaken by respondent organisations (by sector)

Type of project	Public sector		Private sector	
	No	%*	No	%*
Housing	13	29.54	122	75.78
Other buildings**	34	77.27	131	81.34
Civil engineering	38	86.36	50	31.06
Specialist project	6	13.64	21	13.04
Others	3	6.19	16	9.93
No reply	0	0.00	1	0.62
Total organisation	44		161	

Where number of respondent organisations = 205.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

** Other buildings refer to all types of building works excluding housing.

Table 11 - Value of current projects undertaken by respondent organisations

Total value (in RM)	No	%
Under 500,000	5	2.44
500,000 to 999,999	10	4.88
1,000,000 to 4,999,999	14	6.83
5,000,000 to 9,999,999	23	11.22
10,000,000 to 14,999,999	12	5.85
15,000,000 to 19,999,999	5	2.44
20,000,000 to 29,999,000	10	4.88
30,000,000 to 39,999,999	8	3.90
40,000,000 and above	117	57.07
No reply	1	0.49
Total	205	100.00

Table 12 - Value of current projects undertaken by respondent organisations (by sector)

Total value (in RM)	Public sector		Private sector	
	No	%	No	%
Under 500,000	0	0.00	5	3.11
500,000 to 999,999	0	0.00	10	6.21
1,000,000 to 4,999,999	4	9.09	10	6.21
5,000,000 to 9,999,999	5	11.36	18	11.18
10,000,000 to 14,999,999	4	9.09	8	4.97
15,000,000 to 19,999,999	1	2.27	4	2.48
20,000,000 to 29,999,000	3	6.82	7	4.35
30,000,000 to 39,999,999	2	4.55	6	3.73
40,000,000 and above	25	56.82	92	57.14
No reply	0	0.00	1	0.62
Total	44	100.00	161	100.00

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 13 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by respondent organisations (overall)

Resource/function	nr	n	l	m	h	m^1	s.e.	e
1. At project planning stage								
(a) Availability of suitable sites	23	147	100	39	8	1.37	0.05	L
(b) Availability of project finance	25	145	93	41	11	1.43	0.05	L
(c) Availability of expert advisers (Malaysian citizens)	18	152	76	51	25	1.66	0.06	L
(d) Constraint caused by procedures in obtaining statutory approvals	19	151	44	52	55	2.07	0.07	M
2. Availability of key materials (Malaysian origin)								
(a) Cement	18	152	59	59	34	1.84	0.06	M
(b) Steel	20	150	82	50	18	1.57	0.06	L
(c) Aggregates	20	150	116	27	7	1.27	0.04	L
(d) Sand	19	151	110	33	8	1.32	0.05	L
(e) Bricks	20	150	118	27	5	1.25	0.04	L
(f) Timber	19	151	102	39	10	1.39	0.05	L
(g) Roofing materials	20	150	130	18	2	1.15	0.03	L
(h) Ceiling materials	20	150	131	17	2	1.14	0.03	L
(i) Steel and metal sections	21	149	113	30	6	1.28	0.04	L
(j) Plumbing materials	20	150	135	14	1	1.11	0.03	L
(k) Floor and wall tiles	19	151	139	11	1	1.09	0.02	L
(l) Sanitary fittings	19	151	138	11	2	1.10	0.03	L
(m) Ironmongery	19	151	140	10	1	1.08	0.02	L
(n) Glass	20	150	139	10	1	1.08	0.02	L
(o) Paints	21	149	141	8	0	1.05	0.02	L
(p) Automotive gas oil (diesoline)	25	145	139	6	0	1.04	0.02	L
(q) Fuel oil (light and medium)	27	143	136	6	1	1.06	0.02	L
(r) Bitumen	27	143	133	9	1	1.08	0.02	L
(s) Others	162	8	4	2	2	1.75	0.29	M
3. Availability of efficient transportation for distribution of materials	24	146	106	35	5	1.31	0.04	L
4. Availability of labour (Malaysian citizen)								
(a) Unskilled labour	17	153	37	59	38	1.88	0.06	M
(b) Semi-skilled labour	18	152	36	68	48	2.08	0.06	M
(c) Skilled labour (by trade)								
(1) Concretor	21	149	54	66	29	1.83	0.06	M
(2) Bar-bender	20	150	52	69	29	1.85	0.06	M
(3) Carpenter	20	150	40	66	44	2.03	0.06	M
(4) Bricklayer/mason	20	150	48	63	39	1.94	0.06	M
(5) Plasterer/pavior	19	151	40	62	49	2.06	0.06	M
(6) Tiler	19	150	42	78	31	1.93	0.06	M
(7) Painter	20	150	74	59	17	1.62	0.06	L
(8) Joiner	19	151	48	68	35	1.91	0.06	M
(9) Metalworker	20	150	51	74	25	1.83	0.06	M
(10) Drain-layer	20	150	80	51	19	1.59	0.06	L
(11) Glazier	21	149	76	56	17	1.60	0.06	L
(12) Welder	19	151	55	68	28	1.82	0.06	M
(13) Construction plant operator	21	149	52	62	35	1.89	0.06	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 13 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m^1	s.e.	e
(14) Plumber	22	148	65	63	20	1.70	0.06	M
(15) Licensed electrician	21	149	60	59	30	1.80	0.06	M
(16) Others	167	3	1	1	1	2.00	0.47	M
5. Availability of facilities for training skilled labourers	23	147	35	51	61	2.18	0.07	M
6. Availability of an adequate supply of properly maintained and efficient plant by ownership or hire								
(a) Mobile crane	30	140	94	38	8	1.39	0.05	L
(b) Tipping vehicle	29	141	98	36	7	1.35	0.05	L
(c) Dumper	30	140	104	27	9	1.32	0.05	L
(d) Backhoe	30	140	108	25	7	1.28	0.05	L
(e) Air compressor	30	140	117	17	6	1.21	0.04	L
(f) Pneumatic concrete breaker	31	139	102	29	8	1.32	0.05	L
(g) Electric, steam, petrol, diesel or other pump of any type	32	138	114	19	5	1.21	0.04	L
(h) Concrete mixer	32	138	122	13	3	1.14	0.03	L
(i) Electric welding machine	32	138	114	19	5	1.21	0.04	L
(j) Road roller/grader	32	138	108	25	5	1.25	0.04	L
(k) Bulldozer	32	138	108	25	5	1.25	0.04	L
(l) Excavator with face showel	32	138	109	24	5	1.25	0.04	L
(m) Generator	32	138	117	18	3	1.17	0.04	L
(n) Piling plant	31	139	99	31	9	1.35	0.05	L
(o) Spare parts	45	125	85	34	6	1.37	0.05	L
(p) Others	165	5	3	2	0	1.40	0.22	L
7. Availability of key design team members (Malaysian citizen)								
(a) Professional (degree / professional qualifications)								
(1) Architects	21	149	56	63	30	1.83	0.06	M
(2) Civil and structural engineers	17	153	43	74	36	1.95	0.06	M
(3) Mechanical and electrical engineers	21	149	39	70	40	2.01	0.06	M
(4) Quantity surveyors	20	150	45	60	45	2.00	0.06	M
(5) Others	154	16	3	11	2	1.94	0.14	M
(b) Semi-professional (technical assistant/technician)								
(1) Architectural	23	147	47	57	43	1.97	0.06	M
(2) Civil and structural engineering	23	147	40	65	42	2.01	0.06	M
(3) Mechanical and electrical engineering	26	144	34	67	43	2.06	0.06	M
(4) Quantity surveying	26	144	43	49	52	2.06	0.07	M
(5) Others	165	5	1	2	2	2.20	0.33	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 13 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m[1]	s.e.	e
8. Availability of technically competent, experienced and financially capable Malaysian contractors								
(a) Main contractors (Building and civil engineering)								
(1) Large/international (CIDB Grade 6 - 7)	34	136	71	45	20	1.63	0.06	L
(2) Medium (CIDB Grade 3 - 5)	30	140	87	44	9	1.44	0.05	L
(3) Small (CIDB Grade 1 - 2)	32	138	94	31	13	1.41	0.06	L
(b) Specialist contractors (e.g. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	36	134	59	51	24	1.74	0.06	M
9. Availability of credit facilities/ financial backing to contractors	36	134	80	45	9	1.47	0.05	L
10. Constraints caused by present statutory requirements at construction stage	18	152	88	47	17	1.53	0.06	L
11. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	17	153	65	58	30	1.77	0.06	M
12. Constraints caused by tendering procedures in terms of fair competition, adequacy of tender documents and tendering period for appointment of contractors	11	159	94	42	23	1.55	0.06	L
13. Constraints caused by the system of selection and appointment of consultants	19	151	97	43	11	1.43	0.05	L
14. Constraints in contract administration in terms of co-ordination of various parties involved	17	153	94	50	9	1.44	0.05	L
15. Constraints in contract administration due to political and/or bureaucratic interference	13	157	67	55	35	1.80	0.06	M
16. Constraints caused by present Conditions of Contract in terms of fair and equitable terms for all parties	15	155	104	34	17	1.44	0.05	L
17. Constraints in construction process due to problems in interim payments, inspections, and communications	14	156	102	35	19	1.47	0.06	L

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 13 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m^1	s.e.	e
18. Constraints caused by present design standards/specifications in terms of its appropriateness to local conditions and practice	14	156	105	38	13	1.41	0.05	L
19. Constraints caused by bonds requirements								
(a) Bid bond	36	134	107	18	9	1.27	0.05	L
(b) Performance bond	23	147	120	17	10	1.25	0.05	L
(c) Advance payment bond	31	139	104	26	9	1.32	0.05	L
20. Availability of adequate insurance facilities to cover risks								
(a) Works insurance	19	151	132	16	3	1.15	0.03	L
(b) Professional indemnity	22	148	107	27	14	1.37	0.05	L
21. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	25	145	71	44	30	1.72	0.07	M
22. Other constraints	161	9	2	2	5	2.33	0.27	M

Where total number of respondent organisations indicating current constraint = 170.

nr Number of organisations not responding.
n Number of organisations responding.
l Number of organisations indicating low constraint.
m Number of organisations indicating medium constraint.
h Number of organisations indicating high constraint.
m^1 Weighted mean score.
s.e. Standard error of the mean.
e Extent of constraint, where:
L = Low constraint (weighted mean score of 1.00-1.66),
M = Medium constraint (weighted mean score of 1.67-2.33), and
H = High constraint (weighted mean score of 2.34-3.00).

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 14 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by respondent organisations (overall)

Resource/function	nr	n	l	m	h	m[1]	s.e.	e
1. At project planning stage								
(a) Availability of suitable sites	52	153	74	53	26	1.69	0.06	M
(b) Availability of project finance	48	157	98	42	17	1.48	0.05	L
(c) Availability of expert advisers (Malaysian citizens)	46	159	93	44	22	1.55	0.06	L
(d) Constraint caused by procedures in obtaining statutory approvals	47	158	52	64	42	1.94	0.06	M
2. Availability of key materials (Malaysian origin)								
(a) Cement	43	162	85	47	30	1.66	0.06	L
(b) Steel	47	158	96	42	20	1.52	0.06	L
(c) Aggregates	47	158	109	37	12	1.39	0.05	L
(d) Sand	48	157	105	34	18	1.45	0.06	L
(e) Bricks	48	157	110	37	10	1.36	0.05	L
(f) Timber	47	158	84	41	33	1.68	0.06	M
(g) Roofing materials	47	158	134	15	9	1.21	0.04	L
(h) Ceiling materials	47	158	138	13	7	1.17	0.04	L
(i) Steel and metal sections	47	158	119	27	12	1.32	0.05	L
(j) Plumbing materials	47	158	137	16	5	1.16	0.04	L
(k) Floor and wall tiles	47	158	138	15	5	1.16	0.04	L
(l) Sanitary fittings	47	158	135	19	4	1.17	0.03	L
(m) Ironmongery	47	158	136	16	6	1.18	0.04	L
(n) Glass	48	157	131	21	5	1.20	0.04	L
(o) Paints	51	154	142	11	1	1.08	0.02	L
(p) Automotive gas oil (diesoline)	50	155	139	14	2	1.12	0.03	L
(q) Fuel oil (light and medium)	52	153	135	15	3	1.14	0.03	L
(r) Bitumen	51	154	135	15	4	1.15	0.03	L
(s) Others	198	7	2	3	2	2.00	0.29	M
3. Availability of efficient transportation for distribution of materials	48	157	121	25	11	1.30	0.05	L
4. Availability of labour (Malaysian citizen)								
(a) Unskilled labour	49	156	50	56	50	2.00	0.06	M
(b) Semi-skilled labour	51	154	40	60	54	2.09	0.06	M
(c) Skilled labour (by trade)								
(1) Concretor	49	156	50	56	50	2.00	0.06	M
(2) Bar-bender	49	156	50	59	47	1.98	0.06	M
(3) Carpenter	49	156	40	57	59	2.12	0.06	M
(4) Bricklayer/mason	49	156	49	53	54	2.03	0.07	M
(5) Plasterer/pavior	49	156	38	56	62	2.15	0.06	M
(6) Tiler	49	156	39	69	48	2.06	0.06	M
(7) Painter	49	156	68	53	35	1.79	0.06	M
(8) Joiner	49	156	49	56	51	2.01	0.06	M
(9) Metalworker	50	155	52	58	45	1.95	0.06	M
(10) Drain-layer	49	156	70	50	36	1.78	0.06	M
(11) Glazier	49	156	73	45	38	1.78	0.07	M
(12) Welder	49	156	56	55	45	1.93	0.06	M
(13) Construction plant operator	50	155	48	58	49	2.01	0.06	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 14 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m[1]	s.e.	e
(14) Plumber	49	156	58	62	36	1.86	0.06	M
(15) Licensed electrician	49	156	60	55	41	1.88	0.06	M
(16) Others	203	2	1	1	0	1.50	0.35	L
5. Availability of facilities for training skilled labourers	51	154	54	50	50	1.97	0.07	M
6. Availability of an adequate supply of properly maintained and efficient plant by ownership or hire								
(a) Mobile crane	60	146	91	42	12	1.46	0.05	L
(b) Tipping vehicle	59	146	101	37	8	1.36	0.05	L
(c) Dumper	61	144	101	33	10	1.37	0.05	L
(d) Backhoe	62	143	102	31	10	1.36	0.05	L
(e) Air compressor	62	143	108	27	8	1.30	0.05	L
(f) Pneumatic concrete breaker	62	143	101	33	9	1.36	0.05	L
(g) Electric, steam, petrol, diesel or other pump of any type	64	141	108	28	5	1.27	0.04	L
(h) Concrete mixer	63	142	114	25	3	1.22	0.04	L
(i) Electric welding machine	64	141	109	27	5	1.26	0.04	L
(j) Road roller/grader	63	142	104	31	7	1.32	0.05	L
(k) Bulldozer	63	142	104	28	10	1.34	0.05	L
(l) Excavator with face showel	63	142	101	32	9	1.35	0.05	L
(m) Generator	63	142	110	27	5	1.26	0.04	L
(n) Piling plant	63	142	92	36	14	1.45	0.06	L
(o) Spare parts	74	131	89	35	7	1.37	0.05	L
(p) Others	203	2	0	2	0	2.00	0.00	M
7. Availability of key design team members (Malaysian citizen)								
(a) Professional (degree / professional qualifications)								
(1) Architects	52	153	71	54	28	1.72	0.06	M
(2) Civil and structural engineers	49	156	59	62	35	1.85	0.06	M
(3) Mechanical and electrical engineers	50	155	52	66	37	1.90	0.06	M
(4) Quantity surveyors	49	156	57	60	39	1.88	0.06	M
(5) Others	189	16	5	7	4	1.94	0.19	M
(b) Semi-professional (technical assistant/technician)								
(1) Architectural	52	153	53	62	38	1.90	0.06	M
(2) Civil and structural engineering	53	152	45	68	39	1.96	0.06	M
(3) Mechanical and electrical engineering	53	152	45	66	41	1.97	0.06	M
(4) Quantity surveying	52	153	50	58	45	1.97	0.06	M
(5) Others	200	5	1	2	2	2.20	0.33	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 14 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m[1]	s.e.	e
8. Availability of technically competent, experienced and financially capable Malaysian contractors								
(a) Main contractors (Building and civil engineering)								
(1) Large/international (CIDB Grade 6 - 7)	60	145	82	40	23	1.59	0.06	L
(2) Medium (CIDB Grade 3 - 5)	56	149	90	47	12	1.48	0.05	L
(3) Small (CIDB Grade 1 - 2)	59	146	101	27	18	1.43	0.06	L
(b) Specialist contractors (e.g. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	60	145	72	48	25	1.68	0.06	M
9. Availability of credit facilities/ financial backing to contractors	56	149	89	42	18	1.52	0.06	L
10. Constraints caused by present statutory requirements at construction stage	44	161	94	45	22	1.55	0.06	L
11. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	42	163	79	52	32	1.71	0.06	M
12. Constraints caused by tendering procedures in terms of fair competition, adequacy of tender documents and tendering period for appointment of contractors	38	167	101	36	30	1.57	0.06	L
13. Constraints caused by the system of selection and appointment of consultants	50	155	96	42	17	1.49	0.06	L
14. Constraints in contract administration in terms of co-ordination of various parties involved	48	157	101	42	14	1.45	0.05	L
15. Constraints in contract administration due to political and/or bureaucratic interference	45	160	76	53	31	1.72	0.06	M
16. Constraints caused by present Conditions of Contract in terms of fair and equitable terms for all parties	46	159	112	31	16	1.40	0.05	L
17. Constraints in construction process due to problems in interim payments, inspections, and communications	45	160	106	36	18	1.45	0.05	L

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 14 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by respondent organisations (overall) (Continued)

Resource/function	nr	n	l	m	h	m[1]	s.e.	e
18. Constraints caused by present design standards/specifications in terms of its appropriateness to local conditions and practice	45	160	108	42	10	1.39	0.05	L
19. Constraints caused by bonds requirements								
(a) Bid bond	61	144	119	17	8	1.23	0.04	L
(b) Performance bond	53	152	124	18	10	1.25	0.05	L
(c) Advance payment bond	60	145	113	21	11	1.30	0.05	L
20. Availability of adequate insurance facilities to cover risks								
(a) Works insurance	49	156	136	17	3	1.15	0.03	L
(b) Professional indemnity	51	154	114	29	11	1.33	0.05	L
21. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	48	157	96	36	25	1.55	0.06	L
22. Other constraints	197	8	1	1	6	2.63	0.25	H

Where total number of respondent organisations = 205.

nr Number of organisations not responding.
n Number of organisations responding.
l Number of organisations indicating low constraint.
m Number of organisations indicating medium constraint.
h Number of organisations indicating high constraint.
m[1] Weighted mean score.
s.e. Standard error of the mean.
e Extent of constraint, where:
L = Low constraint (weighted mean score of 1.00-1.66),
M = Medium constraint (weighted mean score of 1.67-2.33), and
H = High constraint (weighted mean score of 2.34-3.00).

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 15 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by clients, designers and contractors

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
1. At project planning stage								
(a) Availability of suitable sites	1.37	L	1.89	M	1.37	L	1.27	L
(b) Availability of project finance	1.43	L	1.25	L	1.39	L	1.59	L
(c) Availability of expert advisers (Malaysian citizens)	1.66	L	1.50	L	1.66	L	1.71	M
(d) Constraint caused by procedures in obtaining statutory approvals	2.07	M	1.78	M	2.18	M	1.84	M
2. Availability of key materials (Malaysian origin)								
(a) Cement	1.84	M	1.56	L	1.77	M	2.08	M
(b) Steel	1.57	L	1.33	L	1.50	L	1.82	M
(c) Aggregates	1.27	L	1.22	L	1.24	L	1.37	L
(d) Sand	1.32	L	1.33	L	1.29	L	1.42	L
(e) Bricks	1.25	L	1.22	L	1.18	L	1.42	L
(f) Timber	1.39	L	1.22	L	1.41	L	1.37	L
(g) Roofing materials	1.15	L	1.11	L	1.10	L	1.29	L
(h) Ceiling materials	1.14	L	1.00	L	1.11	L	1.26	L
(i) Steel and metal sections	1.28	L	1.00	L	1.25	L	1.45	L
(j) Plumbing materials	1.11	L	1.00	L	1.07	L	1.24	L
(k) Floor and wall tiles	1.09	L	1.00	L	1.06	L	1.18	L
(l) Sanitary fittings	1.10	L	1.00	L	1.07	L	1.21	L
(m) Ironmongery	1.08	L	1.00	L	1.04	L	1.21	L
(n) Glass	1.08	L	1.00	L	1.07	L	1.13	L
(o) Paints	1.05	L	1.00	L	1.03	L	1.13	L
(p) Automotive gas oil (diesoline)	1.04	L	1.00	L	1.01	L	1.13	L
(q) Fuel oil (light and medium)	1.06	L	1.00	L	1.02	L	1.15	L
(r) Bitumen	1.08	L	1.00	L	1.04	L	1.18	L
(s) Others	1.75	M	0.00	-	2.00	M	1.00	L
3. Availability of efficient transportation for distribution of materials	1.31	L	1.11	L	1.32	L	1.31	L
4. Availability of labour (Malaysian citizen)								
(a) Unskilled labour	1.88	M	2.00	M	1.90	M	1.82	M
(b) Semi-skilled labour	2.08	M	2.22	M	2.10	M	2.00	M
(c) Skilled labour (by trade)								
(1) Concretor	1.83	M	1.67	M	1.87	M	1.76	M
(2) Bar-bender	1.85	M	2.00	M	1.85	M	1.79	M
(3) Carpenter	2.03	M	2.11	M	2.04	M	1.97	M
(4) Bricklayer/mason	1.94	M	2.00	M	1.95	M	1.89	M
(5) Plasterer/pavior	2.06	M	2.22	M	2.08	M	1.97	M
(6) Tiler	1.93	M	2.33	M	1.98	M	1.68	M
(7) Painter	1.62	L	1.56	L	1.64	L	1.58	L
(8) Joiner	1.91	M	2.11	M	1.93	M	1.82	M
(9) Metalworker	1.83	M	1.78	M	1.83	M	1.82	M
(10) Drain-layer	1.59	L	1.67	M	1.59	L	1.58	L
(11) Glazier	1.60	L	1.56	L	1.65	L	1.50	L

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 15 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by clients, designers and contractors (Continued)

Resource/function	Overall		Client		Designer		Contractor	
	m^1	e	m^1	e	m^1	e	m^1	e
(12) Welder	1.82	M	1.89	M	1.86	M	1.71	M
(13) Construction plant operator	1.89	M	1.89	M	1.88	M	1.89	M
(14) Plumber	1.70	M	1.67	M	1.74	M	1.59	L
(15) Licensed electrician	1.80	M	2.00	M	1.85	M	1.59	L
(16) Others	2.00	M	0.00	-	1.00	L	2.50	M
5. Availability of facilities for training skilled labourers	2.18	M	2.38	M	2.20	M	2.08	M
6. Availability of an adequate supply of properly maintained and efficient plant by ownership or hire								
(a) Mobile crane	1.39	L	1.14	L	1.35	L	1.53	L
(b) Tipping vehicle	1.35	L	1.13	L	1.33	L	1.47	L
(c) Dumper	1.32	L	1.00	L	1.28	L	1.49	L
(d) Backhoe	1.28	L	1.00	L	1.23	L	1.45	L
(e) Air compressor	1.21	L	1.00	L	1.16	L	1.37	L
(f) Pneumatic concrete breaker	1.32	L	1.13	L	1.28	L	1.47	L
(g) Electric, steam, petrol, diesel or other pump of any type	1.21	L	1.00	L	1.16	L	1.37	L
(h) Concrete mixer	1.14	L	1.00	L	1.11	L	1.24	L
(i) Electric welding machine	1.21	L	1.00	L	1.18	L	1.32	L
(j) Road roller/grader	1.25	L	1.00	L	1.24	L	1.34	L
(k) Bulldozer	1.25	L	1.00	L	1.24	L	1.34	L
(l) Excavator with face showel	1.25	L	1.00	L	1.22	L	1.37	L
(m) Generator	1.17	L	1.00	L	1.16	L	1.24	L
(n) Piling plant	1.35	L	1.00	L	1.33	L	1.47	L
(o) Spare parts	1.37	L	1.13	L	1.37	L	1.42	L
(p) Others	1.40	L	0.00	-	1.25	L	2.00	M
7. Availability of key design team members (Malaysian citizen)								
(a) Professional (degree / professional qualifications)								
(1) Architects	1.83	M	1.25	M	1.92	M	1.66	L
(2) Civil and structural engineers	1.95	M	2.13	M	2.01	M	1.76	M
(3) Mechanical and electrical engineers	2.01	M	2.13	M	2.05	M	1.86	M
(4) Quantity surveyors	2.00	M	2.13	M	1.99	M	2.00	M
(5) Others	1.94	M	0.00	-	2.00	M	1.75	M
(b) Semi-professional (technical assistant/technician)								
(1) Architectural	1.97	M	1.88	M	2.07	M	1.69	M
(2) Civil and structural engineering	2.01	M	2.13	M	2.07	M	1.83	M
(3) Mechanical and electrical engineering	2.06	M	2.13	M	2.13	M	1.85	M
(4) Quantity surveying	2.06	M	2.38	H	2.05	M	2.03	M
(5) Others	2.20	M	3.00	H	2.00	M	2.00	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 15 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by clients, designers and contractors (Continued)

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
8. Availability of technically competent, experienced and financially capable Malaysian contractors								
(a) Main contractors (Building and civil engineering)								
(1) Large/international (CIDB Grade 6 - 7)	1.63	L	1.25	L	1.66	L	1.60	L
(2) Medium (CIDB Grade 3 - 5)	1.44	L	1.00	L	1.51	L	1.35	L
(3) Small (CIDB Grade 1 - 2)	1.41	L	1.00	L	1.45	L	1.40	L
(b) Specialist contractors (e.g. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	1.74	M	1.50	L	1.76	M	1.72	M
9. Availability of credit facilities/ financial backing to contractors	1.47	L	1.29	L	1.35	L	1.81	M
10. Constraints caused by present statutory requirements at construction stage	1.53	L	1.88	M	1.50	L	1.54	L
11. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	1.77	M	1.75	M	1.78	M	1.76	M
12. Constraints caused by tendering procedures in terms of fair competition, adequacy of tender documents and tendering period for appointment of contractors	1.55	L	1.25	L	1.44	L	1.93	M
13. Constraints caused by the system of selection and appointment of consultants	1.43	L	1.38	L	1.44	L	1.40	L
14. Constraints in contract administration in terms of co-ordination of various parties involved	1.44	L	1.63	L	1.39	L	1.56	L
15. Constraints in contract administration due to political and/or bureaucratic interference	1.80	M	1.75	M	1.74	M	1.97	M
16. Constraints caused by present Conditions of Contract in terms of fair and equitable terms for all parties	1.44	L	1.38	L	1.34	L	1.74	M
17. Constraints in construction process due to problems in interim payments, inspections, and communications	1.47	L	1.13	L	1.39	L	1.77	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 15 - Type and extent of current constraint in resources and functions in the processes of construction procurement in Malaysia as experienced or perceived by clients, designers and contractors (Continued)

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
18. Constraints caused by present design standards /specifications in terms of its appropriateness to local conditions and practice	1.41	L	1.25	L	1.34	L	1.41	L
19. Constraints caused by bonds requirements								
(a) Bid bond	1.27	L	1.00	L	1.19	L	1.53	L
(b) Performance bond	1.25	L	1.00	L	1.18	L	1.49	L
(c) Advance payment bond	1.32	L	1.00	L	1.24	L	1.55	L
20. Availability of adequate insurance facilities to cover risks								
(a) Works insurance	1.15	L	1.00	L	1.14	L	1.18	L
(b) Professional indemnity	1.37	L	1.00	L	1.44	L	1.25	L
21. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	1.72	M	1.75	M	1.75	M	1.63	L
22. Other constraints	2.33	M	0.00	-	2.25	M	3.00	H

Where total number of respondent organisations indicating current constraints = 170, comprising 10 clients, 119 designers, and 41 contractors. The weighted mean scores are calculated based on the number of organisations in each category responding to each resource or function.

m[1] Weighted mean score.

e Extent of constraint, where:
L = Low constraint (weighted mean score of 1.00-1.66),
M = Medium constraint (weighted mean score of 1.67-2.33), and
H = High constraint (weighted mean score of 2.34-3.00).

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 16 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by clients, designers and contractors

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
1. At project planning stage								
(a) Availability of suitable sites	1.69	M	1.50	L	1.73	M	1.63	L
(b) Availability of project finance	1.48	L	1.17	L	1.41	L	1.79	M
(c) Availability of expert advisers (Malaysian citizens)	1.55	L	1.17	L	1.54	L	1.72	M
(d) Constraint caused by procedures in obtaining statutory approvals	1.94	M	1.42	L	2.01	M	1.89	M
2. Availability of key materials (Malaysian origin)								
(a) Cement	1.66	L	1.23	L	1.57	L	2.02	M
(b) Steel	1.52	L	1.25	L	1.41	L	1.90	M
(c) Aggregates	1.39	L	1.17	L	1.33	L	1.60	L
(d) Sand	1.45	L	1.50	L	1.40	L	1.56	L
(e) Bricks	1.36	L	1.17	L	1.29	L	1.63	L
(f) Timber	1.68	M	1.67	M	1.70	M	1.63	L
(g) Roofing materials	1.21	L	1.17	L	1.09	L	1.53	L
(h) Ceiling materials	1.17	L	1.08	L	1.08	L	1.43	L
(i) Steel and metal sections	1.32	L	1.08	L	1.23	L	1.65	L
(j) Plumbing materials	1.16	L	1.08	L	1.08	L	1.40	L
(k) Floor and wall tiles	1.16	L	1.08	L	1.08	L	1.38	L
(l) Sanitary fittings	1.17	L	1.08	L	1.10	L	1.38	L
(m) Ironmongery	1.18	L	1.08	L	1.11	L	1.38	L
(n) Glass	1.20	L	1.08	L	1.13	L	1.41	L
(o) Paints	1.08	L	1.00	L	1.05	L	1.20	L
(p) Automotive gas oil (diesoline)	1.12	L	1.00	L	1.10	L	1.20	L
(q) Fuel oil (light and medium)	1.14	L	1.00	L	1.11	L	1.24	L
(r) Bitumen	1.15	L	1.00	L	1.12	L	1.28	L
(s) Others	2.00	M	0.00	-	2.00	M	2.00	M
3. Availability of efficient transportation for distribution of materials	1.30	L	1.00	L	1.25	L	1.54	L
4. Availability of labour (Malaysian citizen)								
(a) Unskilled labour	2.00	M	1.75	M	1.99	M	2.10	M
(b) Semi-skilled labour	2.09	M	1.91	M	2.04	M	2.27	M
(c) Skilled labour (by trade)								
(1) Concretor	2.00	M	1.60	L	1.96	M	2.19	M
(2) Bar-bender	1.98	M	1.70	M	1.94	M	2.14	M
(3) Carpenter	2.12	M	1.80	M	2.10	M	2.26	M
(4) Bricklayer/mason	2.03	M	1.70	M	1.98	M	2.24	M
(5) Plasterer/pavior	2.15	M	1.90	M	2.13	M	2.29	M
(6) Tiler	2.06	M	1.90	M	2.05	M	2.12	M
(7) Painter	1.79	M	1.60	M	1.75	M	1.93	M
(8) Joiner	2.01	M	1.99	M	1.99	M	2.12	M
(9) Metalworker	1.95	M	1.88	M	1.88	M	2.22	M
(10) Drain-layer	1.78	M	1.71	M	1.71	M	2.00	M
(11) Glazier	1.78	M	1.74	M	1.74	M	1.93	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 16 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by clients, designers and contractors (Continued)

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
(12) Welder	1.93	M	1.90	M	1.90	M	2.05	M
(13) Construction plant operator	2.01	M	1.95	M	1.95	M	2.22	M
(14) Plumber	1.86	M	1.88	M	1.88	M	1.88	L
(15) Licensed electrician	1.88	M	1.88	M	1.88	M	1.93	L
(16) Others	1.50	L	1.00	L	1.00	L	2.00	L
5. Availability of facilities for training skilled labourers	1.97	M	1.82	M	1.95	M	2.08	M
6. Availability of an adequate supply of properly maintained and efficient plant by ownership or hire								
(a) Mobile crane	1.46	L	1.09	L	1.40	L	1.46	L
(b) Tipping vehicle	1.36	L	1.00	L	1.34	L	1.36	L
(c) Dumper	1.37	L	1.00	L	1.36	L	1.37	L
(d) Backhoe	1.36	L	1.00	L	1.30	L	1.36	L
(e) Air compressor	1.30	L	1.10	L	1.25	L	1.30	L
(f) Pneumatic concrete breaker	1.36	L	1.00	L	1.31	L	1.36	L
(g) Electric, steam, petrol, diesel or other pump of any type	1.27	L	1.00	L	1.24	L	1.27	L
(h) Concrete mixer	1.22	L	1.00	L	1.17	L	1.22	L
(i) Electric welding machine	1.26	L	1.00	L	1.25	L	1.26	L
(j) Road roller/grader	1.32	L	1.00	L	1.28	L	1.32	L
(k) Bulldozer	1.34	L	1.00	L	1.29	L	1.34	L
(l) Excavator with face showel	1.35	L	1.00	L	1.30	L	1.35	L
(m) Generator	1.26	L	1.00	L	1.24	L	1.26	L
(n) Piling plant	1.45	L	1.00	L	1.40	L	1.45	L
(o) Spare parts	1.37	L	1.10	L	1.28	L	1.37	L
(p) Others	2.00	M	0.00	-	2.00	M	2.00	M
7. Availability of key design team members (Malaysian citizen)								
(a) Professional (degree / professional qualifications)								
(1) Architects	1.83	M	1.25	L	1.92	M	1.66	L
(2) Civil and structural engineers	1.95	M	2.13	M	2.01	M	1.76	M
(3) Mechanical and electrical engineers	2.01	M	2.13	M	2.05	M	1.86	M
(4) Quantity surveyors	2.00	M	2.13	M	1.99	M	2.00	M
(5) Others	1.94	M	0.00	-	2.00	M	1.75	M
(b) Semi-professional (technical assistant/technician)								
(1) Architectural	1.97	M	1.88	M	2.07	M	1.69	M
(2) Civil and structural engineering	2.01	M	2.13	M	2.07	M	1.83	M
(3) Mechanical and electrical engineering	2.06	M	2.13	M	2.13	M	1.85	M
(4) Quantity surveying	2.06	M	2.38	M	2.05	M	2.03	M
(5) Others	2.20	M	3.00	H	2.00	M	2.00	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 16 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by clients, designers and contractors (Continued)

Resource/function	Overall		Client		Designer		Contractor	
	m[1]	e	m[1]	e	m[1]	e	m[1]	e
8. Availability of technically competent, experienced and financially capable Malaysian contractors								
(a) Main contractors (Building and civil engineering)								
(1) Large/international (CIDB Grade 6 - 7)	1.59	L	1.10	L	1.56	L	1.85	M
(2) Medium (CIDB Grade 3 - 5)	1.48	L	1.00	L	1.44	L	1.71	M
(3) Small (CIDB Grade 1 - 2)	1.43	L	1.00	L	1.42	L	1.59	L
(b) Specialist contractors (eg. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	1.68	M	1.20	L	1.67	M	1.85	M
9. Availability of credit facilities/ financial backing to contractors	1.52	L	1.17	L	1.44	L	1.83	M
10. Constraints caused by present statutory requirements at construction stage	1.55	L	1.42	L	1.50	L	1.74	M
11. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	1.71	M	1.42	L	1.65	L	1.95	M
12. Constraints caused by tendering procedures in terms of fair competition, adequacy of tender documents and tendering period for appointment of contractors	1.57	L	1.27	L	1.37	L	2.21	M
13. Constraints caused by the system of selection and appointment of consultants	1.49	L	1.27	L	1.51	L	1.50	L
14. Constraints in contract administration in terms of co-ordination of various parties involved	1.45	L	1.27	L	1.40	L	1.62	L
15. Constraints in contract administration due to political and/or bureaucratic interference	1.72	M	1.64	L	1.66	L	1.92	M
16. Constraints caused by present Conditions of Contract in terms of fair and equitable terms for all parties	1.40	L	1.25	L	1.29	L	1.74	M
17. Constraints in construction process due to problems in interim payments, inspections, and communications	1.45	L	1.18	L	1.35	L	1.79	M

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 16 - Type and extent of future constraint in resources and functions in the processes of construction procurement in Malaysia as perceived by clients, designers and contractors (Continued)

Resource or function	Overall		Client		Designer		Contractor	
	m¹	e	m¹	e	m¹	e	m¹	e
18. Constraints caused by present design standards /specifications in terms of its appropriateness to local conditions and practice	1.39	L	1.25	L	1.33	L	1.61	L
19. Constraints caused by bonds requirements								
(a) Bid bond	1.23	L	1.00	L	1.17	L	1.44	L
(b) Performance bond	1.25	L	1.00	L	1.16	L	1.54	L
(c) Advance payment bond	1.30	L	1.00	L	1.22	L	1.55	L
20. Availability of adequate insurance facilities to cover risks								
(a) Works insurance	1.15	L	1.10	L	1.14	L	1.18	L
(b) Professional indemnity	1.33	L	1.09	L	1.41	L	1.17	L
21. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	1.55	L	1.45	L	1.57	L	1.51	L
22. Other constraints	2.63	H	0.00	-	2.57	H	3.00	H

Where total number of organisations responding = 205, comprising 14 clients, 140 designers, and 51 contractors. The weighted mean scores are calculated based on the number of organisations in each category responding to each resource or function.

m^1 Weighted mean score.

e Extent of constraint, where:

L = Low constraint (weighted mean score of 1.00-1.66),
M = Medium constraint (weighted mean score of 1.67-2.33), and
H = High constraint (weighted mean score of 2.34-3.00).

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 17 - Summary and ranking of current and future constrained resources and functions[1] in the processes of construction procurement in Malaysia

Constrained resource/function	Current constraint			Future constraint		
	m[1]	r	c	m[1]	r	c
1. At project planning stage						
(a) Availability of suitable sites	-	-	-	1.69	29	2
(b) Constraint caused by procedures in obtaining statutory approval	2.07	3	1/2/3	1.94	15	2/3
2. Availability of key materials (Malaysian origin)						
(a) Cement	1.84	19	2/3	-	-	-
(a) Timber	-	-	-	1.68⁺	30	1/2
3. Availability of labour (Malaysian citizen)						
(a) Unskilled labour	1.88	17	1/2/3	2.00⁺	8	1/2/3
(b) Semi-skilled labour	2.08	2	1/2/3	2.09	3	1/2/3
(c) Skilled labour (by trade)						
(1) Concretor	1.83⁺	21	1/2/3	2.00⁺	8	2/3
(2) Bar-bender	1.85	18	1/2/3	1.98	9	1/2/3
(3) Carpenter	2.03	7	1/2/3	2.12	2	1/2/3
(4) Bricklayer/mason	1.94	13	1/2/3	2.03	5	1/2/3
(5) Plasterer/pavior	2.06⁺	5	1/2/3	2.15	1	1/2/3
(6) Tiler	1.93	14	1/2/3	2.06	4	1/2/3
(7) Painter	-	-	-	1.79	23	1/2/3
(8) Joiner	1.91	15	1/2/3	2.01⁺	6	1/2/3
(9) Metalworker	1.83⁺	22	1/2/3	1.95	14	1/2/3
(10) Drain-layer	-	-	-	1.78⁺	25	1/2/3
(11) Glazier	-	-	-	1.78⁺	24	1/2/3
(12) Welder	1.82	23	1/2/3	1.93	16	1/2/3
(13) Construction plant operator	1.89	16	1/2/3	2.01⁺	7	1/2/3
(14) Plumber	1.70	29	1/2	1.86	21	1/2
(15) Licensed electrician	1.80	24	1/2	1.88⁺	19	1/2
4. Availability of facilities for training skilled labourers	2.18	1	1/2/3	1.97⁺	10	1/2/3
5. Availability of key design team members (Malaysian citizens)						
(a) Professional (degree / professional qualifications)						
(1) Architects	1.83⁺	20	1/2	1.72⁺	27	2
(2) Civil and structural engineers	1.95	12	1/2/3	1.85	22	1/2/3
(3) Mechanical and electrical engineers	2.01⁺	9	1/2/3	1.90⁺	17	1/2/3
(4) Quantity surveyors	2.00	10	1/2/3	1.88⁺	20	1/2/3
(b) Semi-professional (technical assistant / technician)						
(1) Architectural	1.97	11	1/2/3	1.90⁺	18	1/2/3
(2) Civil and structural engineering	2.01⁺	8	1/2/3	1.96	13	1/2/3
(3) Mechanical and electrical engineering	2.06⁺	6	1/2/3	1.97⁺	12	1/2/3
(4) Quantity surveying	2.06⁺	4	1/2/3	1.97⁺	11	1/2/3

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 17 - Summary and ranking of current and future constrained resources and functions[1] in the processes of construction procurement in Malaysia

Constrained resource/function	Current constraint			Future constraint		
	m^1	r	c	m^1	r	c
6. Availability of technically competent, experienced and financially capable Malaysian contractors						
(a) Specialist contractor (e.g. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	1.74	27	2/3	1.68$^+$	31	2/3
7. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	1.77	26	1/2/3	1.71	28	3
8. Constraints in contract administration due to political/bureaucratic interference	1.80	25	1/2/3	1.72$^+$	26	3
9. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	1.72	28	1/2	-	-	-

[1] In this research a resource or function with a weighted mean score that falls into the category of either medium or high constraints (weighted mean score of 1.67- 2.33 or 2.34-3.00, respectively) is considered to be constrained.

m^1 Weighted mean score (overall).

r Relative ranking in accordance with weighted mean scores.

$^+$ Equal weighted mean scores; ranked in accordance with the number of organisations indicating high constraint.

c Category of organisation that indicated constrain, where:
1 = Client organisations
2 = Designer organisations
3 = Contractor organisations.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 18 - Results of Chi-square Test of Independence between constrained resources and functions and organisation roles in the processes of construction procurement in Malaysia[1]

Constrained resource/function	Current constraint			Future constraint		
	X^2	r^1	p	X^2	r^1	p
1. At project planning stage						
(a) Availability of suitable sites	-	-	-	2.42	I	0.05
(b) Constraint caused by procedures in obtaining statutory approval	5.69	I	0.05	3.31	I	0.05
2. Availability of key materials (Malaysian origin)						
(a) Cement	4.75	I	0.05	-	-	-
(a) Timber	-	-	-	4.43	I	0.05
3. Availability of labour (Malaysian citizen)						
(a) Unskilled labour	1.44	I	0.05	2.14	I	0.05
(b) Semi-skilled labour	3.34	I	0.05	10.62	I	0.01
(c) Skilled labour (by trade)						
(1) Concretor	2.30	I	0.05	2.87	I	0.05
(2) Bar-bender	4.61	I	0.05	5.62	I	0.05
(3) Carpenter	2.19	I	0.05	2.03	I	0.05
(4) Bricklayer/mason	1.08	I	0.05	3.96	I	0.05
(5) Plasterer/pavior	1.88	I	0.05	2.26	I	0.05
(6) Tiler	5.95	I	0.05	0.62	I	0.05
(7) Painter	-	-	0.05	1.58	I	0.05
(8) Joiner	2.50	I	0.05	1.20	I	0.05
(9) Metalworker	3.51	I	0.05	9.34	I	0.025
(10) Drain-layer	-	-	0.05	5.30	I	0.05
(11) Glazier	-	-	0.05	3.05	I	0.05
(12) Welder	4.29	I	0.05	3.05	I	0.05
(13) Construction plant operator	3.74	I	0.05	6.83	I	0.05
(14) Plumber	1.77	I	0.05	6.44	I	0.05
(15) Licensed electrician	5.80	I	0.05	2.29	I	0.05
4. Availability of facilities for training skilled labourers	3.70	I	0.05	2.18	I	0.05
5. Availability of key design team members (Malaysian citizens)						
(a) Professional (degree / professional qualifications)						
(1) Architects	3.88	I	0.05	0.68	I	0.05
(2) Civil and structural engineers	4.58	I	0.05	2.34	I	0.05
(3) Mechanical and electrical engineers	5.16	I	0.05	0.88	I	0.05
(4) Quantity surveyors	1.63	I	0.05	3.16	I	0.05
(b) Semi-professional (technical assistant / technician)						
(1) Architectural	6.27	I	0.05	1.07	I	0.05
(2) Civil and structural engineering	3.20	I	0.05	0.02	I	0.05
(3) Mechanical and electrical engineering	3.67	I	0.05	0.39	I	0.05
(4) Quantity surveying	1.45	I	0.05	6.22	I	0.05

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 18 - Results of Chi-square Test of Independence between constrained resources and functions and organisation roles in the processes of construction procurement in Malaysia[1] (Continued)

Constrained resource or function	Current constraint			Future constraint		
	X^2	r^1	p	X^2	r^1	p
6. Availability of technically competent, experienced and financially capable Malaysian contractors						
(a) Specialist contractor (e.g. electrical, mechanical, sanitary and water engineering, telecommunications, etc.)	6.05	I	0.05	5.88	I	0.05
7. Constraints caused by procedures in obtaining Certificate of Fitness (CF)	0.91	I	0.05	5.91	I	0.05
8. Constraints in contract administration due to political/bureaucratic interference	5.41	I	0.05	6.32	I	0.05
9. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	0.72	I	0.05	-	-	-

Where degree of freedom = 3, table chi-square value: at 0.01 = 11.34, at 0.025 = 9.35, at 0.05 = 7.82).

1 Results of the chi-square test were for two categories of organisations, i.e., designer and contractor. Client organisations were excluded in an attempt to reduce the number of cells with expected frequency of less than 5. This is because initial test results indicate that when responses from client organisations were included more than 20% of cells have an expected frequency of less than 5. According to Bryman and Cramer (1997, pp124,168-172) chi square can be unreliable if 20% or more of the cells have an expected frequency of less than 5.

X^2 Obtained chi square value.

r^1 Relationship, where:
I = Independent.
R = Related.

p Probability.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 19 - The most and the least constrained locations when undertaking construction procurement in Malaysia as experienced by respondent organisations (by state)

State	Most constrained		Least constrained	
	No	%	No	%
Perlis	1	0.49	2	0.98
Kedah	3	1.46	8	3.90
Pulau Pinang	12	5.85	6	2.93
Perak	3	1.46	6	2.93
Selangor	7	3.41	17	8.29
Kuala Lumpur	19	9.27	21	10.24
Negeri Sembilan	5	2.44	4	1.95
Melaka	2	0.98	5	2.44
Johor	10	4.88	5	2.44
Pahang	3	1.46	3	1.46
Terengganu	7	3.41	5	2.44
Kelantan	7	3.41	1	0.49
Sarawak	3	1.46	1	0.49
Sabah & Labuan	13	6.43	2	0.98
No reply	110	53.66	119	58.05
Total	205	100.00	205	100.00

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 20 - Reasons for current constraints in specific category of resources as perceived by respondent organisations

Resource category and reason for constraint	No	%*
1. Key construction materials (Malaysian origin)		
(a) High demand	85	85.00
(b) Monopoly	21	21.00
(c) Protection through government legislation	13	13.00
(d) Transportation constraints	10	10.00
(e) Others	4	4.00
(n = 100)		
2. Availability of efficient transportation for distribution of materials		
(a) High demand	31	49.21
(b) Monopoly	3	4.76
(c) Poor infrastructure (i.e. congestion, poor roads and ports)	34	53.97
(d) Strict enforcement by the Authorities	13	20.63
(e) Others	3	4.76
(n = 63)		
3. Availability of labour (Malaysian citizens)		
(a) High demand	77	69.34
(b) Competition with other economic sectors	47	42.34
(c) Emigration to other countries	15	13.51
(d) Inadequate training facilities	27	24.32
(e) Others	2	1.80
(n = 111)		
4. Availability of an adequate supply of properly maintained and efficient plant by ownership or hire		
(a) High demand	46	71.87
(b) High maintenance cost	9	14.06
(c) High capital cost	18	28.12
(d) Inadequate plant operators	13	20.31
(e) Others	5	7.81
(n = 64)		
5. Availability of key design team members (Malaysian citizens)		
(a) High demand	99	91.67
(b) Competition with other economic sectors	18	16.67
(c) Emigration to other countries	4	3.70
(d) Inadequate training facilities	19	17.59
(e) Others	4	3.70
(n = 108)		
6. Availability of technically competent, experienced and financially capable Malaysian contractors		
(a) High demand	30	48.39
(b) Contractors diversified into other economic sectors	3	4.84
(c) Inadequacy in trained staff and workers	14	22.58
(d) Inexperienced and or incompetent	30	48.39
(e) Others	2	3.23
(n = 62)		

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 20 - Reasons for current constraints in selected categories of resources as perceived by respondent organisations (Continued)

Resource group and reason for constraint	No	%*
6. Availability of technically competent, experienced and financially capable Malaysian contractors		
(a) High demand	30	48.39
(b) Contractors diversified into other economic sectors	3	4.84
(c) Inadequacy in trained staff and workers	14	22.58
(d) Inexperienced and or incompetent	30	48.39
(e) Others	2	3.22
(n = 62)		
7. Availability of credit facilities/financial backing to contractors		
(a) Lending prudence	34	79.07
(b) Inability to provide collateral	10	23.25
(c) High cost of borrowing	8	18.60
(d) Lengthy process of loan approval	2	4.65
(e) Others	1	2.32
(n = 43)		
8. Constraints caused by bonds requirements		
(a) Lack of confidence among guarantors	11	28.95
(b) Inability to provide collateral	16	42.10
(c) High cost of securing a bond	18	47.37
(d) Lengthy process of obtaining a bond	6	15.79
(e) Others	2	5.25
(n = 38)		
9. Availability of adequate insurance facilities to cover risks		
(a) High demand	4	13.33
(b) High cost of premium	15	50.00
(c) Inexperienced insurers	10	33.33
(d) Lengthy process of obtaining an insurance cover	2	6.67
(e) Others	5	16.67
(n = 30)		

Where total number of respondent organisations indicating current constraint = 170.

* Organisations were asked to state two key reasons for the constraint: percentages are calculated as a proportion of the number of organisations responding (n) and therefore add up to more than 100.

n Number of organisations responding.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 21 - The present extent of use of procurement strategies in Malaysia as perceived by respondent organisations

Procurement strategy	nr	n	l	m	h	pr
1. Basis of appointment of consultants						
(a) Scale of fees	22	183	77	68	38	l
(b) Fee competition	22	183	42	68	73	h
(c) Others	174	31	3	4	24	h
2. Basis of appointment of main contractors (Building and Civil engineering)						
(a) Open tendering	14	191	55	45	91	h
(b) Selective tendering	14	191	42	93	56	m
(c) Negotiation	13	192	93	66	33	l
(d) Pre-qualification	22	183	80	78	25	l
(f) Others	196	9	2	2	5	h
3. Basis of appointment of specialist contractors (e.g. electrical, mechanical, telecommunications)						
(a) Nominated sub-contractors	18	187	22	57	108	h
(b) Non-nominated sub-contractors						
(1) Domestic sub-contractors	25	180	59	84	37	m
(2) Directly employed by client	32	173	83	68	22	l
(c) Others	204	1	0	0	1	h
4. Joint venture contracting						
(a) Malaysian and foreign	29	176	75	75	26	l & m
(b) Malaysian and Malaysian	21	184	57	72	55	m
5. Types of contractual arrangements						
(a) Lump sum based on drawings and specifications	14	191	39	81	71	m
(b) Lump sum based on firm bills of quantities	15	190	35	74	81	h
(c) Approximate bills of quantities	22	183	58	84	41	m
(d) Design and build	20	185	108	62	15	l
(e) Cost plus	29	176	136	32	8	l
(f) Management contracting	28	177	122	44	11	l
(g) Construction management	34	171	110	51	10	l
(h) Others	203	2				
6. Forms of contract used						
(a) JKR (PWD) 203 series (original or modified)	24	181	43	43	95	h
(b) PAM (original or modified)	38	167	38	45	84	h
(c) Others	181	24	9	11	4	m

Where total number of respondent organisations = 205.

nr Number of organisations not responding.
n Number of organisations responding.
l Number of organisations indicating low frequency of use.
m Number of organisations indicating medium frequency of use.
h Number of organisations indicating high frequency of use.
pr Predominant response.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 22 - Current performance of the Malaysian construction industry as perceived by respondent organisations

Performance indicator	nr	n	p	g	vg	e[1]	pr
1. Design time (from briefing to tender invitation)	9	196	41	118	29	8	g
2. Construction time (from site possession to practical completion	8	197	44	121	32	0	g
3. Construction cost (in terms of ability to combat cost increase during construction)	9	196	51	110	35	0	g
4. Quality (in meeting client's needs)	7	198	48	118	27	5	g
5. Use of modern technology							
(a) in design (e.g. the use of computers in design, estimates tender/contract documents	8	197	27	88	74	8	g
(b) in construction (e.g. the use of modern equipment, modern construction techniques, robotics)	10	195	60	103	31	1	g
6. Use of modern project management tools and techniques including computers (i.e. other than simple bar charts and schedules)	9	196	65	84	40	7	g
7. Quality of locally produced construction materials	9	196	18	127	50	1	g
8. Standard of workmanship	9	196	62	112	18	4	g
9. Health and safety on construction site	9	196	106	77	10	3	p
10. Level of investment in assets (fixed and current)	22	183	37	120	25	1	g
11. Level of investment in research and development	15	190	127	54	9	0	p
12. Sectoral performance (overall performance in terms of design time, construction time, construction costs, and quality)							
(a) Housing and residential buildings	17	188	38	112	37	1	g
(b) Commercial and industrial buildings	19	186	14	113	54	5	g
(c) Civil engineering and others	19	186	16	116	54	0	g
(d) Public sector performance	20	185	55	109	21	0	g
(e) Private sector performance	23	182	9	116	56	1	g
13. Export of construction services							
(a) Consultants	33	172	82	78	11	1	p
(b) Contractors	33	172	75	82	14	1	g
(c) Others	205	0	0	0	0	0	-
14. The success of technology transfer	33	172	98	56	18	0	p

Where total number of respondent organisations = 205.

nr Number of organisations not responding.
n Number of organisations responding.
p Number of organisations indicating poor performance.
g Number of organisations indicating good performance.
vg Number of organisations indicating very good performance.
e[1] Number of organisations indicating excellent performance.
pr Predominant response.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 23 - The present extent of use of foreign inputs (imports) in construction procurement processes in Malaysia as perceived by respondent organisations

Resource	nr	n	n[1]	l	m	h	pr
1. Key construction materials							
(a) Cement	19	186	39	94	40	13	l
(b) Steel	18	187	54	78	41	14	l
(c) Steel and metal sections	18	187	37	71	62	17	l
(d) Plumbing materials	17	188	40	97	46	5	l
(e) Sanitary fittings	18	187	29	93	55	10	l
(f) Others	199	6	0	1	1	4	h
2. Construction labour							
(a) Unskilled	17	188	18	15	34	121	h
(b) Semi-skilled	18	187	17	39	78	53	m
(c) Skilled	16	189	25	81	48	35	l
3. Mechanical plant and spare parts	45	160	27	35	51	47	m
4. Design team members (consultant)							
(a) Professionals	11	194	40	94	46	14	l
(b) Semi-professionals	18	187	64	89	30	4	l
5. Main contractors (Building and Civil engineering)	36	169	41	83	40	5	l
6. Specialist contractors (e.g. Electrical, Mechanical, Telecommunication, etc.)	37	168	50	72	36	10	l

Where total number of respondent organisations = 205.

nr Number of organisations not responding.
n Number of organisations responding.
n[1] Number of organisations indicating no foreign inputs (import) used.
l Number of organisations indicating low foreign inputs (import) used.
m Number of organisations indicating medium foreign inputs (import) used.
h Number of organisations indicating high foreign inputs (import) used.
pr Predominant response.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 24 - Reasons for the present use of foreign inputs (imports) in construction procurement processes in Malaysia as perceived by respondent organisations

Resource and reason for import	No	%*
1. Key construction materials		
(a) Superior in quality	67	38.95
(b) Taste and style	92	53.49
(c) Inadequate or shortage of locally produced material	115	66.86
(d) Not produced locally	88	51.16
(e) Others	0	0.00
(n = 172)		
2. Construction labour		
(a) Superior standard of workmanship	9	5.08
(b) Inadequate or shortage of local labour	172	97.15
(c) Others	10	5.65
(n = 177)		
3. Mechanical plant and spare parts		
(a) Superior quality and reliability	38	24.84
(b) Inadequate or shortage of locally manufactured mechanical plant and spare parts	81	52.94
(c) Not produced locally	103	67.32
(d) Others	0	0.00
(n = 153)		
4. Design team members (consultant)		
(a) Technical expertise and experience	108	71.05
(b) Taste and style	27	17.76
(c) Inadequate or shortage of local consultants	72	47.37
(d) Others	2	1.31
(n = 152)		
5. Main contractors (Building and Civil engineering)		
(a) Technical expertise and experience	111	88.09
(b) Financial capability	75	59.52
(c) Inadequate or shortage of local contractors	21	16.67
(d) Others	3	2.38
(n = 126)		
6. Specialist contractors (e.g. Electrical, Mechanical, Telecommunications, etc.)		
(a) Technical expertise and experience	103	89.56
(b) Financial capability	34	29.56
(c) Inadequate or shortage of local contractors	31	26.96
(d) Others	1	0.87
(n = 115)		

Where total number of respondent organisations = 205.

* Organisations were allowed to indicate more than one reason for the import: percentages are calculated as a proportion of the number of organisations responding (n) and therefore add up to more than 100.

n Number of organisations responding.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 25 - Respondents' involvement with the Malaysian construction industry prior to Vision 2020

Respondent's involvement with the Malaysian construction industry prior to Vision 2020*	No	%
Yes	159	77.56
No	37	18.05
No reply	9	4.39
Total	205	100.00

* Respondents were asked to indicate whether they were personally involved with the Malaysian construction industry prior to February 1991. Vision 2020 was introduced and implemented in February 1991.

Table 26 - Types of projects procured prior to, and since, Vision 2020 as perceived by respondents

Type of project	Prior to Vision 2020				Since Vision 2020			
	n	m¹	s.e.	p	n	m¹	s.e.	p
1. Low cost houses	147	3.15	0.16	4	144	2.78	0.15	3
2. Medium cost houses	147	2.82	0.12	1	144	3.35	0.13	5
3. High cost houses	148	4.21	0.13	6	144	4.46	0.14	6
4. Commercial buildings	147	2.90	0.11	2	144	2.86	0.11	4
5. Industrial buildings	148	3.12	0.12	3	144	2.33	0.11	1
6. Civil engineering and others	144	3.31	0.14	5	141	2.47	0.14	2

Where total number of qualified respondents = 159.

n Number of respondents.

m¹ Mean.

s.e. Standard error of the mean.

p Priority.

Appendix B - Results of survey of constraints in the processes of construction procurement in Malaysia

Table 27 - Priorities in construction procurement prior to, and since, Vision 2020 as perceived by respondents

Priority	Prior to Vision 2020				Since Vision 2020			
	n	m^1	s.e.	p	n	m^1	s.e.	p
1. Technical complexity	141	3.82	0.15	6	142	3.05	0.15	3
2. Aesthetics and/or prestige	141	3.79	0.14	5	142	3.14	0.14	5
3. Value for money	141	1.88	0.10	1	142	2.39	0.12	2
4. Speed to completion	141	2.90	0.11	3	142	2.15	0.10	1
5. Price certainty	140	2.61	0.11	2	141	3.05	0.14	4
6. Low maintenance cost	139	3.62	0.14	4	140	3.66	0.16	6

Where total number of qualified respondents = 159.

n Number of respondents.

m^1 Mean.

s.e. Standard error of the mean.

p Priority.

Table 28 - Breakdown of respondent organisations willing to participate in the second part of the research (by category and type)

Category and type	No	%
Client		
Government ministry and department	7	3.76
Developer	4	2.15
Total client	11	5.91
Designer		
(JKR) Public Works Department	34	18.28
Architect	51	27.42
Engineer	15	8.06
Quantity Surveyor	27	14.52
Total designer	127	68.28
Contractor		
CIDB Grade 3	18	9.68
CIDB Grade 4	5	2.69
CIDB Grade 5	4	2.15
CIDB Grade 6	3	1.61
CIDB Grade 7	18	9.68
Total contractor	48	25.81
Total organisations	186	100.00

Appendix C

Questionnaire for Survey 2: A survey of strategies to remove/alleviate constraints in the processes of construction procurement in Malaysia

The Nottingham Trent University

Faculty of Environmental Studies

Department of Surveying
Acting Head ~ Paul Collins MSc (Urb Plan) ARICS

Construction Procurement Research Unit

Our Ref: (   ) in survey 2/data/97

25 April 1997

Dear Sir,

I am a Malaysian undertaking research to identify constraints and to propose strategies to remove/alleviate constraints in construction procurement processes in Malaysia. My study is sponsored by the Malaysian Government. The work is carried out in partial fulfilment for the degree of PhD at The Nottingham Trent University, England.

During November/December 1996 your organization was kind enough to complete a questionnaire relating to the first part of the research I was then carrying out i.e. on the identification of constraints in construction procurement processes in Malaysia. Also your organization had indicated willingness to participate in the second part of the research.

I am now starting on the second part of the research. The purpose of this part of the research is to appraise strategies designed to remove/alleviate the constraints identified in the first part of the research.

A questionnaire is attached. Please answer all questions. Your answers are confidential and will be used only for statistical analysis.The accuracy of the work will depend upon the number of responses received. Therefore, your response will be of the utmost importance.

I should be most grateful if you could complete the questionnaire and return it to me using the self-addressed international prepaid envelope provided. No postage is required. Due to time constraint, please post the questionnaire as soon as possible (no later than Friday 30 May 1997).

Thank you very much for your cooperation.

Yours sincerely

(KHAIRUDDIN BIN ABDUL RASHID)
Construction Procurement Research Unit
Department of Surveying

c.c. Professor Roy Morledge
Construction Procurement Research Unit

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22/4/97;23/4/97

Burton Street
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A SURVEY OF STRATEGIES TO REMOVE/ALLEVIATE CONSTRAINTS IN CONSTRUCTION PROCUREMENT PROCESSES IN MALAYSIA

QUESTIONNAIRE

The objective of this survey is to appraise strategies designed to remove/alleviate constraints within the construction procurement processes in Malaysia.

Constraints in construction procurement processes in Malaysia have been identified in a survey which was conducted in November/December 1996. The respondents to that survey were Malaysians representing organisations involved in construction procurement processes in Malaysia.

The constraints identified were categorised into three types: i.e. current constraints only; current and future constraints; and future constraints only. In this questionnaire, the constraints identified are presented in shaded boxes.

For each constraint identified, a list of strategies are proposed. The proposed strategies have been designed with the objective of removing/alleviating that constraint. **Please appraise all strategies.** Your appraisal of the strategies should be made on the basis on whether successful implementation would lead to success in removing/alleviating the constraints identified.

Guidance on completion of the questionnaire

The questionnaire is in two parts:

Part 1: About your organization
Part 2: Strategies to remove/alleviate constraints within construction procurement processes in Malaysia.

Please answer all questions. Your answers are confidential and will be used only for statistical analysis.

Most questions will only require either a tick in the appropriate box or a number circled. Where written answers are required these can be brief and handwritten.

Should you have any queries on this survey please contact the researcher, the contact address, telephone and facsimile numbers are given at the end of this questionnaire.

In this research the following definitions apply:

The term **'constraints in construction procurement processes'** is defined as limitations or restrictions imposed on the process of acquiring construction projects.

'Current constraints' are defined as constraints that are currently experienced.

'Future constraints' are defined as constraints that will exist for up to five years from now.

The current and future constraints have been identified by Malaysian organizations (including yours) that are involved in construction procurement processes in Malaysia in an earlier survey which was conducted in November/December 1996

A SURVEY OF STRATEGIES TO REMOVE/ALLEVIATE CONSTRAINTS IN CONSTRUCTION PROCUREMENT PROCESSES IN MALAYSIA

Part 1. About your organization

1. Your organization (please tick (/) one box only)
   - (a) Jabatan Kerja Raya Malaysia ☐
   - (b) Other Government Ministry/Department ☐
   - (c) Private Architectural firm ☐
   - (d) Private Engineering firm ☐
   - (e) Private Quantity Surveying firm ☐
   - (f) Property Developer ☐
   - (g) Contractor ☐
   - (h) Others, please specify ☐ ________

   (i) If your organization is a contractor, please state:
   (1) PKK Class of registration _____ and/or (2) CIDB Grade of registration _____
   (3) Category: (i) Building ☐ (ii) Civil Engineering ☐ (iii) M & E ☐ (iv) Others, please specify ☐ ____________

2. Total number of employees in your organization (please tick (/) one box only)
   - (a) Under 5 ☐
   - (b) 5 to 9 ☐
   - (c) 10 to 19 ☐
   - (d) 20 to 29 ☐
   - (e) 30 to 49 ☐
   - (f) 50 to 99 ☐
   - (g) 100 to 199 ☐
   - (h) 200 to 499 ☐
   - (i) 500 to 999 ☐
   - (j) 1,000 and above ☐

3. Your head office is located in (please tick (/) one box only)
   - (a) Perlis ☐
   - (b) Kedah ☐
   - (c) Penang ☐
   - (d) Perak ☐
   - (e) Selangor ☐
   - (f) Kuala Lumpur ☐
   - (g) Negeri Sembilan ☐
   - (h) Melaka ☐
   - (i) Johor ☐
   - (j) Pahang ☐
   - (k) Terengganu ☐
   - (l) Kelantan ☐
   - (m) Sarawak ☐
   - (n) Sabah ☐
   - (o) Labuan ☐

4. Your current projects are located in (you can tick (/) more than one box)
   - (a) Perlis ☐
   - (b) Kedah ☐
   - (c) Penang ☐
   - (d) Perak ☐
   - (e) Selangor ☐
   - (f) Kuala Lumpur ☐
   - (g) Negeri Sembilan ☐
   - (h) Melaka ☐
   - (i) Johor ☐
   - (j) Pahang ☐
   - (k) Terengganu ☐
   - (l) Kelantan ☐
   - (m) Sarawak ☐
   - (n) Sabah ☐
   - (o) Labuan ☐

5. Types of current projects (you can tick (/) more than one box)
   - (a) Housing ☐
   - (b) Other buildings ☐
   - (c) Civil engineering ☐
   - (d) Specialist projects ☐ (e.g. mechanical, electrical, etc)
   - (e) Others, please specify ☐ ____________

6. Total value of current projects (please tick (/) one box only)
   - (a) Under RM 500,000 ☐
   - (b) RM 500,000 to RM 999,999 ☐
   - (c) RM 1,000,000 to RM 4,999,999 ☐
   - (d) RM 5,000,000 to RM 9,999,999 ☐
   - (e) RM 10,000,000 to RM 14,999,999 ☐
   - (f) RM 15,000,000 to RM 19,999,999 ☐
   - (g) RM 20,000,000 to RM 29,999,999 ☐
   - (h) RM 30,000,000 to RM 39,999,999 ☐
   - (i) RM 40,000,000 and above ☐

For office use only: (1) Type of organization: (i) Public sector ☐ (ii) Private sector ☐
(2) Organization's role: (i) Designer ☐ (ii) Client ☐ (iii) Contractor ☐

Part 2. Strategies to remove/alleviate constraints within construction procurement processes in Malaysia

The constraints identified are presented in shaded boxes. Following each constraint a list of strategies are proposed. **Please appraise all strategies.**

For each proposed strategy either for current constraints only, for current and future constraints, or for future constraints only **you are required to circle one number between 1 to 5, where:**

1 = strongly disagree with the proposed strategy
2 = disagree with the proposed strategy
3 = neither agree nor disagree with the proposed strategy
4 = agree with the proposed strategy
5 = strongly agree with the proposed strategy

Constraint 1

Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations (current and future constraints).

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Increase the numbers of professional and technical staff in Local Authorities	1 2 3 4 5	1 2 3 4 5
2. Streamline and standardise administrative procedures in Local Authorities	1 2 3 4 5	1 2 3 4 5
3. Improve organisational and functional coordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers	1 2 3 4 5	1 2 3 4 5
4. Simplify and standardise approval procedures nationwide	1 2 3 4 5	1 2 3 4 5
5. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to coordinate statutory approval among the various departments	1 2 3 4 5	1 2 3 4 5
6. Allow professionally qualified and registered designers to certify that project conforms to regulations	1 2 3 4 5	1 2 3 4 5
7. Privatise the functions of processing applications for statutory approval	1 2 3 4 5	1 2 3 4 5
8. Revise land acquisition legislation with the objective of achieving faster land acquisition and land conversion process	1 2 3 4 5	1 2 3 4 5

Constraint 1 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 1 (Cont'd)

Constraint 1

Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations (current and future constraints)

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
9. Revise planning legislation with the objective of achieving faster planning approval	1 2 3 4 5	1 2 3 4 5
10. Formulate new, uniform and relevant building regulations for Malaysia as a whole	1 2 3 4 5	1 2 3 4 5
11. Others (please specify)	1 2 3 4 5	1 2 3 4 5

Constraint 2

Constraints in availability of Malaysian produced cement (current constraint only).

Strategies	**Appraisal for current constraint**
1. Existing cement plants should increase production to relieve shortages	1 2 3 4 5
2. Set up new cement plants in specific locations If you agree or strongly agree with this strategy, please state the two most suitable locations: (a) .... (b)	1 2 3 4 5
3. Ban the export of cement during periods of cement shortages	1 2 3 4 5
4. Improve enforcement to curb hoarding and black marketeering of cement	1 2 3 4 5
5. Suspend the regulation prefering the use of local cement in all construction projects	1 2 3 4 5
6. Minimise waste of cement on construction sites	1 2 3 4 5
7. Deregulate the cement industry to facilitate its expansion	1 2 3 4 5
8. Government should issue more lorry haulage permits for transporting cement	1 2 3 4 5
9. Facilitate import of cement	1 2 3 4 5
10. Minimise the use of cement in construction projects (eg. clay brick buildings in place of concrete, the use of coated macadam surfacing instead of concrete in roadworks)	1 2 3 4 5
11. Contractors should order cement in advance (i.e. allow for longer lead time)	1 2 3 4 5

Constraint 2 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 2 (Cont'd)

Constraint 2
Constraints in availability of Malaysian produced cement (current constraint only).

Strategies	**Appraisal for current constraint**
12. Initiate research into alternative materials to cement in construction	1 2 3 4 5
13. Others (please specify)	1 2 3 4 5

Constraint 3
Constraints in availability of unskilled, semi-skilled and skilled Malaysian labour (current and future constraints).

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
1. Extend the use of existing labour by working overtime	1 2 3 4 5	1 2 3 4 5
2. Increase the productivity of labour	1 2 3 4 5	1 2 3 4 5
3. Develop mechanisms to stop inter-industry mobility	1 2 3 4 5	1 2 3 4 5
4. Recruit Malaysian workers with construction skills but who are currently not working in the construction industry (i.e. they are either working in other economic sectors or working abroad)	1 2 3 4 5	1 2 3 4 5
5. Recruit more women	1 2 3 4 5	1 2 3 4 5
6. Discourage Malaysian workers from working abroad	1 2 3 4 5	1 2 3 4 5
7. Increase intake of new trainees	1 2 3 4 5	1 2 3 4 5
8. Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers	1 2 3 4 5	1 2 3 4 5
9. Contractors should move towards greater use of plant to reduce the use of labour	1 2 3 4 5	1 2 3 4 5
10. Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour	1 2 3 4 5	1 2 3 4 5
11. Government should take the lead towards rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour	1 2 3 4 5	1 2 3 4 5

Constraint 3 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 3 (Cont'd)

Constraint 3
Constraints in availability of unskilled, semi-skilled and skilled Malaysian labour (current and future constraints).

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
12. Facilitate import of foreign workers	1 2 3 4 5	1 2 3 4 5
13. CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers	1 2 3 4 5	1 2 3 4 5
14. CIDB should speed-up its efforts on the accreditation and certification of skilled workers	1 2 3 4 5	1 2 3 4 5
15. CIDB should produce a policy on construction workers (i.e. number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc)	1 2 3 4 5	1 2 3 4 5
16. Others (please specify)	1 2 3 4 5	1 2 3 4 5

Constraint 4
Constraints in availability of facilities for training skilled labour (current and future constraints).

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
1. Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth	1 2 3 4 5	1 2 3 4 5
2. CIDB and other bodies should set up new training centres specializing in the training of skills required by the construction industry	1 2 3 4 5	1 2 3 4 5
3. The Human Resources Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry	1 2 3 4 5	1 2 3 4 5
4. The On Site Training Scheme administered by the Human Resources Ministry on government projects should be extended to include projects in the private sector	1 2 3 4 5	1 2 3 4 5
5. Private sector should be more active in providing training facilities	1 2 3 4 5	1 2 3 4 5
6. Contractors should provide adequate training facilities for their workers	1 2 3 4 5	1 2 3 4 5

Constraint 4 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 4 (Cont'd)

Constraint 4
Constraints in availability of facilities for training skilled labour (current and future constraints)

Strategies	Appraisal for current constraint	Appraisal for future constraint
7. Impose levy on contractors who do not provide training facilities for their workers	1 2 3 4 5	1 2 3 4 5
8. Efforts should be made to increase the number of trainers. (This could include importing foreign trainers)	1 2 3 4 5	1 2 3 4 5
9. Send trainees to recognised training centres abroad	1 2 3 4 5	1 2 3 4 5
10. Set up local twinning training programmes with recognised foreign training centres	1 2 3 4 5	1 2 3 4 5
11. CIDB should be made the sole authority on training workers for the construction industry	1 2 3 4 5	1 2 3 4 5
12. Others (please specify)	1 2 3 4 5	1 2 3 4 5

Constraint 5
Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (current and future constraints).

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Extend the use of existing key professionals and key semi-professionals by working overtime	1 2 3 4 5	1 2 3 4 5
2. Increase the productivity of professionals and semi- professionals	1 2 3 4 5	1 2 3 4 5
3. Simplify pre-construction and construction processes through the use of standard design; standard detailing; standard specifications and standard tender and contract documents	1 2 3 4 5	1 2 3 4 5
4. Increase use of technology (eg. computers) in design process to reduce manpower requirements	1 2 3 4 5	1 2 3 4 5
5. Make better use of contractors' design and project management capacity and expertise by adopting procurement systems that allow contractors' involvement in the design process and in project management	1 2 3 4 5	1 2 3 4 5

Constraint 5 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 5 (Cont'd)

Constraint 5
Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (current and future constraints).

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
6. Strengthen the CIDB/PKK contractors' registration scheme. (Credibility in the contractors' registration scheme would reduce or remove the need for detailed verification of contractors' capabilities in tender exercises, thus reducing manpower requirements during tender evaluation)	1 2 3 4 5	1 2 3 4 5
7. Minimise the use of open tendering	1 2 3 4 5	1 2 3 4 5
8. Standardise tender evaluation methods	1 2 3 4 5	1 2 3 4 5
9. Local professional firms to form alliances to increase key manpower capacity	1 2 3 4 5	1 2 3 4 5
10. Local professional firms to form alliances with foreign professional firms to increase key manpower capacity	1 2 3 4 5	1 2 3 4 5
11. Facilitate imports of foreign key professionals and semi-professionals	1 2 3 4 5	1 2 3 4 5
12. Encourage foreign professional firms to set up offices in Malaysia	1 2 3 4 5	1 2 3 4 5
13. Recruit Malaysian key professionals and semi-professionals but who are currently not working in the construction industry (i.e. they are either working in other economic sectors or working abroad)	1 2 3 4 5	1 2 3 4 5
14 Facilitate re-employment of retirees	1 2 3 4 5	1 2 3 4 5
15. Discourage Malaysian professionals and semi-professionals from working abroad	1 2 3 4 5	1 2 3 4 5
16. Promote the construction industry and its key professions (architecture, engineering and quantity surveying) to schools	1 2 3 4 5	1 2 3 4 5
17. Expand the capacity of existing university/ colleges to train more students in key construction courses	1 2 3 4 5	1 2 3 4 5
18. Increase the number of entrants into key construction courses	1 2 3 4 5	1 2 3 4 5

Constraint 5 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 5 (Cont'd)

Constraint 5
Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (current and future constraints).

Strategies	**Appraisal for current constraint**	**Appraisal for future constraint**
19. Set up new educational institutions to train more students in key construction courses	1 2 3 4 5	1 2 3 4 5
20. Facilitate workers to acquire tertiary qualifications through part-time day release and evening classes	1 2 3 4 5	1 2 3 4 5
21. Professional institutions should oversee training of key professionals and semi-professionals	1 2 3 4 5	1 2 3 4 5
22. Revise current syllabuses in tertiary education with the objective of achieving quicker delivery of qualified and skilled professionals and semi-professionals	1 2 3 4 5	1 2 3 4 5
23. Send more students to recognised institutions abroad to increase supply of qualified personnel	1 2 3 4 5	1 2 3 4 5
24. Set up more twinning programmes with recognised foreign institutions	1 2 3 4 5	1 2 3 4 5
25. Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry	1 2 3 4 5	1 2 3 4 5
26. Facilitate part-time employment to enable qualified women with family responsibilities to work	1 2 3 4 5	1 2 3 4 5
27. Encourage greater use of information technology to provide opportunities for qualified women to work from home	1 2 3 4 5	1 2 3 4 5
28. Review qualifications of graduates from non accredited institutions and facilitate their employment in the construction industry	1 2 3 4 5	1 2 3 4 5
29. Others (please specify)	1 2 3 4 5	1 2 3 4 5

1 = strongly disagree; ... 5 = strongly agree

Constraint 6

Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors (current and future constraints)

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Invite foreign specialist contractors to tender for specialized projects	1 2 3 4 5	1 2 3 4 5
2. Encourage foreign specialist contractors to set up firms in Malaysia	1 2 3 4 5	1 2 3 4 5
3. Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer	1 2 3 4 5	1 2 3 4 5
4. Projects should be designed according to the availability and capability of local specialist contractors	1 2 3 4 5	1 2 3 4 5
5. Provide facilities for training specialist contractors	1 2 3 4 5	1 2 3 4 5
6. Local specialist contractors to form alliances to increase their level of expertise and financial capability	1 2 3 4 5	1 2 3 4 5
7. Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability	1 2 3 4 5	1 2 3 4 5
8. Government and private bodies should provide more financial assistance and loan facilities to assist local specialist contractors	1 2 3 4 5	1 2 3 4 5
9. Develop mechanisms to allow local specialist contractors to gain experience.	1 2 3 4 5	1 2 3 4 5
10. The 'umbrella' and 'dedicated contractors' scheme for training Bumiputra contractors by the government to be extended to include training for specialist contractors	1 2 3 4 5	1 2 3 4 5
11. Others (please specify)	1 2 3 4 5	1 2 3 4 5

1 = strongly disagree; ... 5 = strongly agree

Constraint 7

Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) (current and future constraints)

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Increase the number of professional and technical staff in Local Authorities	1 2 3 4 5	1 2 3 4 5
2. Streamline and standardise administrative procedures in Local Authorities	1 2 3 4 5	1 2 3 4 5
3. Improve organisational and functional coordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers	1 2 3 4 5	1 2 3 4 5
4. Simplify and standardise approval procedures nationwide	1 2 3 4 5	1 2 3 4 5
5. Disseminate information on approval procedures	1 2 3 4 5	1 2 3 4 5
6. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to coordinate CF approval among the various departments	1 2 3 4 5	1 2 3 4 5
7. Privatise the functions of processing applications for CF approval	1 2 3 4 5	1 2 3 4 5
8. Allow professionally qualified designers to certify that project conforms to Development Order requirements	1 2 3 4 5	1 2 3 4 5
9. Inspection for CF approval should be done progressively and to be based on standard inspection schedule	1 2 3 4 5	1 2 3 4 5
10. Local Authorities should confine criterias for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements	1 2 3 4 5	1 2 3 4 5
11. Others (please specify)	1 2 3 4 5	1 2 3 4 5

1 = strongly disagree; ... 5 = strongly agree

Constraint 8
Constraints in contract administration due to political and/or bureaucratic interference (current and future constraints)

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Client to appoint full time Superintending Officer - SO - to supervise each project	1 2 3 4 5	1 2 3 4 5
2. Superintending Officer should be given full powers to supervise projects in accordance with the conditions of contract	1 2 3 4 5	1 2 3 4 5
3. Superintending Officer should be fully qualified and experienced professional	1 2 3 4 5	1 2 3 4 5
4. Improve organizational and functional co-ordination between clients and other bodies (eg. banks, Federal Treasury, Local Authority, private utility providers, etc.) to avoid administrative bottlenecks	1 2 3 4 5	1 2 3 4 5
5. Clarify project objectives and implementation strategy with local residents and politicians prior to commencement	1 2 3 4 5	1 2 3 4 5
6. Others (please specify)	1 2 3 4 5	1 2 3 4 5

Constraint 9
Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities) (current constraint only).

Strategies	Appraisal for current constraint
1. Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals	1 2 3 4 5
2. Local Authorities should make transparent all matters pertaining to approval process	1 2 3 4 5
3. CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry	1 2 3 4 5
4. CIDB should take the lead in research and development and publications and coordinate research and development and publication of works of others	1 2 3 4 5
5. Disseminate information on project opportunities through major newspapers, technical and professional journals	1 2 3 4 5
6. Encourage greater participation of private sector in relevant research and development and in publishing the findings	1 2 3 4 5

Constraint 9 continue next page.../

1 = strongly disagree; ... 5 = strongly agree

Constraint 9 (Cont'd)

Constraint 9
Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities) (current constraint only).

Strategies	**Appraisal for current constraint**
7. Encourage local universities/colleges to conduct relevant research and development and in publishing the findings	**1 2 3 4 5**
8. Encourage professional institutions to conduct relevant research and development and in publishing the findings	**1 2 3 4 5**
9. Others (please specify)	**1 2 3 4 5**

Constraint 10
Constraints in availability of suitable sites (future constraint only).

Strategies	**Appraisal for future constraint**
1. Strictly enforce the Real Property Gains Tax Act to curb land speculation	**1 2 3 4 5**
2. Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development)	**1 2 3 4 5**
3. Demands in urban areas should be met by well designed high density development	**1 2 3 4 5**
4. Encourage research to develop techniques to develop wasteland (eg. former tin mines) and other land currently unsuitable or very expensive for development (eg. swampland)	**1 2 3 4 5**
5. Reclaim land in suitable coastal areas	**1 2 3 4 5**
6. Revive derelict land in urban areas	**1 2 3 4 5**
7. Create new urban and industrial sites in suitable locations	**1 2 3 4 5**
8. Relocate large scale labour intensive agricultural estates to suitable sites elsewhere.	**1 2 3 4 5**
9. Speed-up land acquisition and land conversion process	**1 2 3 4 5**
10. Review the National Land Code with the objective of achieving optimum land use policy	**1 2 3 4 5**
	1 2 3 4 5
11. Others (please specify)	**1 2 3 4 5**

1 = strongly disagree; ... 5 = strongly agree

Constraint 11
Constraints in availability of timber (future constraint only)

Strategies	Appraisal for future constraint
1. Government policies on sustainable forest management should be implemented strictly and urgently	1 2 3 4 5
2. Ban or discourage the export of timber	1 2 3 4 5
3. Use alternatives materials to replace or to minimise the use of timber in temporary works (eg. in formwork and scaffolding)	1 2 3 4 5
4. Encourage the use of secondary timber (eg. rubber wood) in construction (where appropriate)	1 2 3 4 5
5. Encourage research to identify alternative materials to replace or to minimise using primary timber in construction	1 2 3 4 5
6. Others (please specify)	1 2 3 4 5

General strategies

The following strategies are construction industry level strategies that have been designed within the context of the constraints identified. Please appraise all the strategies in terms of their potential for removing/alleviating the constraints identified.

Strategies	Appraisal for current constraint	Appraisal for future constraint
1. Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry	1 2 3 4 5	1 2 3 4 5
2. Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry	1 2 3 4 5	1 2 3 4 5
3. Construction demands that have potential for mass production (eg. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised	1 2 3 4 5	1 2 3 4 5
4. Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry	1 2 3 4 5	1 2 3 4 5
5. Local Authorities should discourage alteration and renovation of newly completed projects to save resources	1 2 3 4 5	1 2 3 4 5

General strategies continue next page.../

1 = strongly disagree; ... 5 = strongly agree

General strategies (Cont'd)

Strategies	**Appraisal for current constraint**					**Appraisal for future constraint**				
6. Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources	1	2	3	4	5	1	2	3	4	5
7. Others (please specify)										
....	1	2	3	4	5	1	2	3	4	5
....	1	2	3	4	5	1	2	3	4	5
....	1	2	3	4	5	1	2	3	4	5
....	1	2	3	4	5	1	2	3	4	5

Other comments (if any)

....
....
....
....
....

This is the second part of the research work. In the third part, which would be administered in the third quarter of 1997, structured interviews would be conducted in Malaysia to validate both the constraints identified and the proposed strategies. To achieve consistency, your organization's cooperation is highly appreciated. Please indicate by ticking the box and filling in the spaces provided below if your organization is interested to participate in the interview so that details of the interview could be sent directly to you. The interview would be either face to face interview or by telephone.

My organization would like to participate in the interview ☐

Name of person to contact: ______________________________
Position: ______________________________
Organization: ______________________________
Tel./Fax: ______________ / ______________
E-Mail address: ______________________________

Please return the completed questionnaire using the self-addressed international prepaid envelope provided. No postage is required.

Thank you very much for your cooperation
Terima kasih diatas kerjasama yang telah anda berikan

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Revision 5. After piloting and discussions with Prof R. Morledge on 19/4/97; 23/4/97 (23/4/97,24/4/97)

Appendix D

Questionnaire coding system for Survey 2 and the Interviews

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
Constraint 1. Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations (current and future constraints)		
1. Increase the numbers of professional and technical staff in Local Authorities	C1/S1	F1/S1
2. Streamline and standardise administrative procedures in Local Authorities	C1/S2	F1/S2
3. Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers	C1/S3	F1/S3
4. Simplify and standardise approval procedures nation wide	C1/S4	F1/S4
5. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate statutory approval among the various departments	C1/S5	F1/S5
6. Allow professionally qualified and registered designers to certify that project conforms to regulations	C1/S6	F1/S6
7. Privatise the functions of processing applications for statutory approval	C1/S7	F1/S7
8. Revise land acquisition legislation with the objective of achieving faster land acquisition and land conversion process	C1/S8	F1/S8
9. Revise planning legislation with the objective of achieving faster planning approval	C1/S9	F1/S9
10. Formulate new, uniform and relevant building regulations for Malaysia as a whole	C1/S10	F1/S10
11. Others	C1/S11	F1/S11
Constraint 2. Constraints in availability of Malaysian produced cement (current constraint only)		
1. Existing cement plants should increase production to relieve shortages	C2/S1	
2. Set up new cement plants in specific locations	C2/S2	
3. Ban the export of cement during periods of cement shortages	C2/S3	
4. Improve enforcement to curb hoarding and black marketeering of cement	C2/S4	
5. Suspend the regulation preferring the use of local cement in all construction projects	C2/S5	
6. Minimise waste of cement on construction site	C2/S6	
7. Deregulate the cement industry to facilitate its expansion	C2/S7	
8. Government should issue more lorry haulage permits for transporting cement	C2/S8	

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
9. Facilitate import of cement	C2/S9	
10. Minimise the use of cement in construction projects (e.g. clay brick buildings in place of concrete, the use of coated macadam surfacing instead of concrete in roadwork)	C2/S10	
11. Contractors should order cement in advance (i.e. allow for longer lead time)	C2/S11	
12. Initiate research into alternative materials to cement in construction	C2/S12	
13. Others	C2/S13	
Constraint 3. Constraints in availability of unskilled, semi-skilled and skilled Malaysian labour (current and future constraints)		
1. Extend the use of existing labour by working overtime	C3/S1	F3/S1
2. Increase the productivity of labour	C3/S2	F3/S2
3. Develop mechanisms to stop inter-industry mobility	C3/S3	F3/S3
4. Recruit Malaysian workers with construction skills but who are currently not working in the construction industry (i.e. they are either working in other economic sectors or working abroad)	C3/S4	F3/S4
5. Recruit more women	C3/S5	F3/S5
6. Discourage Malaysian workers from working abroad	C3/S6	F3/S6
7. Increase intake of new trainees	C3/S7	F3/S7
8. Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers	C3/S8	F3/S8
9. Contractors should move towards greater use of plant to reduce the use of labour	C3/S9	F3/S9
10. Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour	C3/S10	F3/S10
11. Government should take the lead towards rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour	C3/S11	F3/S11
12. Facilitate import of foreign workers	C3/S12	F3/S12
13. CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers	C3/S13	F3/S13
14. CIDB should speed-up its efforts on the accreditation and certification of skilled workers	C3/S14	F3/S14
15. CIDB should produce a policy on construction workers (i.e. number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc)	C3/S15	F3/S15
16. Others	C3/S16	F3/S16

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
Constraint 4. Constraints in availability of facilities for training skilled labour (current and future constraints)		
1. Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth	C4/S1	F4/S1
2. CIDB and other bodies should set up new training centres specialising in the training of skills required by the construction industry	C4/S2	F4/S2
3. The Human Resources Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry	C4/S3	F4/S3
4. The On Site Training Scheme administered by the Human Resources Ministry on government projects should be extended to include projects in the private sector	C4/S4	F4/S4
5. Private sector should be more active in providing training facilities	C4/S5	F4/S5
6. Contractors should provide adequate training facilities for their workers	C4/S6	F4/S6
7. Impose levy on contractors who do not provide training facilities for their workers	C4/S7	F4/S7
8. Efforts should be made to increase the number of trainers. (This could include importing foreign trainers)	C4/S8	F4/S8
9. Send trainees to recognised training centres abroad	C4/S9	F4/S9
10. Set up local twinning training programmes with recognised foreign training centres	C4/S10	F4/S10
11. CIDB should be made the sole authority on training workers for the construction industry	C4/S11	F4/S11
12. Others	C4/S12	F4/S12
Constraint 5. Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (current and future constraints)		
1. Extend the use of existing key professionals and key semi-professionals by working overtime	C5/S1	F5/S1
2. Increase the productivity of professionals and semi- professionals	C5/S2	F5/S2
3. Simplify pre-construction and construction processes through the use of standard design; standard detailing; standard specifications and standard tender and contract documents	C5/S3	F5/S3
4. Increase use of technology (e.g. computers) in design process to reduce manpower requirements	C5/S4	F5/S4

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
5. Make better use of contractors' design and project management capacity and expertise by adopting procurement systems that allow contractors' involvement in the design process and in project management	C5/S5	F5/S5
6. Strengthen the CIDB/PKK contractors' Registration scheme. (Credibility in the contractors' registration scheme would reduce or remove the need for detailed verification of contractors' capabilities in tender exercises, thus reducing manpower requirements during tender evaluation)	C5/S6	F5/S6
7. Minimise the use of open tendering	C5/S7	F5/S7
8. Standardise tender evaluation methods	C5/S8	F5/S8
9. Local professional firms to form alliances to increase key manpower capacity	C5/S9	F5/S9
10. Local professional firms to form alliances with foreign professional firms to increase key manpower capacity	C5/S10	F5/S10
11. Facilitate imports of foreign key professionals and semi-professionals	C5/S11	F5/S11
12. Encourage foreign professional firms to set up offices in Malaysia	C5/S12	F5/S12
13. Recruit Malaysian key professionals and semi-professionals but who are currently not working in the construction industry (i.e. they are either working in other economic sectors or working abroad)	C5/S13	F5/S13
14 Facilitate re-employment of retirees	C5/S14	F5/S14
15. Discourage Malaysian professionals and semi-professionals from working abroad	C5/S15	F5/S15
16. Promote the construction industry and its key professions (architecture, engineering and quantity surveying) to schools	C5/S16	F5/S16
17. Expand the capacity of existing university/ colleges to train more students in key construction courses	C5/S17	F5/S17
18. Increase the number of entrants into key construction courses	C5/S18	F5/S18
19. Set up new educational institutions to train more students in key construction courses	C5/S19	F5/S19
20. Facilitate workers to acquire tertiary qualifications through part-time day release and evening classes	C5/S20	F5/S20
21. Professional institutions should oversee training of key professionals and semi-professionals	C5/S21	F5/S21
22. Revise current syllabuses in tertiary education with the objective of achieving quicker delivery of qualified and skilled professionals and semi-professionals	C5/S22	F5/S22

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
23. Send more students to recognised institutions abroad to increase supply of qualified personnel	C5/S23	F5/S23
24. Set up more twinning programmes with recognised foreign institutions	C5/S24	F5/S24
25. Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry	C5/S25	F5/S25
26. Facilitate part-time employment to enable qualified women with family responsibilities to work	C5/S26	F5/S26
27. Encourage greater use of information technology to provide opportunities for qualified women to work from home	C5/S27	F5/S27
28. Review qualifications of graduates from non accredited institutions and facilitate their employment in the construction industry	C5/S28	F5/S28
29. Others	C5/S29	F5/S29
Constraint 6. Constraints in availability of technically competent, experienced and financially capable Malaysia specialist contractors (current and future constraints)		
1. Invite foreign specialist contractors to tender for specialised projects	C6/S1	F6/S1
2. Encourage foreign specialist contractors to set up firms in Malaysia	C6/S2	F6/S2
3. Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer	C6/S3	F6/S3
4. Projects should be designed according to the availability and capability of local specialist contractors	C6/S4	F6/S4
5. Provide facilities for training specialist contractors	C6/S5	F6/S5
6. Local specialist contractors to form alliances to increase their level of expertise and financial capability	C6/S6	F6/S6
7. Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability	C6/S7	F6/S7
8. Government and private bodies should provide more financial assistance and loan facilities to assist local specialist contractors	C6/S8	F6/S8
9. Develop mechanisms to allow local Specialist contractors to gain experience.	C6/S9	F6/S9
10. The 'umbrella' and 'dedicated contractors' scheme for training Bumiputra contractors by the government to be extended to include training for specialist contractors	C6/S10	F6/S10

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
11. Others	C6/S11	F6/S11
Constraint 7. Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF) (current and future constraint)		
1. Increase the number of professional and technical staff in Local Authorities	C7/S1	F7/S1
2. Streamline and standardise administrative procedures in Local Authorities	C7/S2	F7/S2
3. Improve organisational and functional co-ordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers	C7/S3	F7/S3
4. Simplify and standardise approval procedures nation wide	C7/S4	F7/S4
5. Disseminate information on approval procedures	C7/S5	F7/S5
6. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to co-ordinate CF approval among the various departments	C7/S6	F7/S6
7. Privatise the functions of processing applications for CF approval	C7/S7	F7/S7
8. Allow professionally qualified designers to certify that project conforms to Development Order requirements	C7/S8	F7/S8
9. Inspection for CF approval should be done progressively and to be based on standard inspection schedule	C7/S9	F7/S9
10. Local Authorities should confine criteria for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements	C7/S10	F7/S10
11. Others	C7/S11	F7/S11
Constraint 8. Constraints in contract administration due to political and/or bureaucratic interference (current and future constraints)		
1. Client to appoint full time Superintending Officer - SO - to supervise each project	C8/S1	F8/S1
2. Superintending Officer should be given full powers to supervise projects in accordance with the conditions of contract	C8/S2	F8/S2
3. Superintending Officer should be fully qualified and experienced professional	C8/S3	F8/S3
4. Improve organisational and functional co-ordination between clients and other bodies (e.g. banks, Federal Treasury, Local Authority, Private utility providers, etc.) to avoid administrative bottlenecks	C8/S4	F8/S4

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
5. Clarify project objectives and implementation strategy with local residents and politicians prior to commencement	C8/S5	F8/S5
6. Others	C8/S6	F8/S6
Constraint 9. Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities) (current constraints only)		
1. Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals	C9/S1	
2. Local Authorities should make transparent all matters pertaining to approval process	C9/S2	
3. CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry	C9/S3	
4. CIDB should take the lead in research and development and publications and co-ordinate research and development and publication of works of others	C9/S4	
5. Disseminate information on project opportunities through major newspapers, technical and professional journals	C9/S5	
6. Encourage greater participation of private sector in relevant research and development and in publishing the findings	C9/S6	
7. Encourage local universities/colleges to conduct relevant research and development and in publishing the findings	C9/S7	
8. Encourage professional institutions to conduct relevant research and development and in publishing the findings	C9/S8	
9. Others	C9/S9	
Constraint 10. Constraints in availability of suitable sites (future constraint only)		
1. Strictly enforce the Real Property Gains Tax Act to curb land speculation		F10/S1
2. Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development)		F10/S2
3. Demands in urban areas should be met by well designed high density development		F10/S3
4. Encourage research to develop techniques to develop wasteland (e.g. former tin mines) and other land currently unsuitable or very expensive for development (e.g. swampland)		F10/S4
5. Reclaim land in suitable coastal areas		F10/S5
6. Revive derelict land in urban areas		F10/S6

Appendix D – Questionnaire coding system for Survey 2 and the Interviews

Constraint and proposed strategy	Code for current strategy	Code for future strategy
7. Create new urban and industrial sites in suitable locations		F10/S7
8. Relocate large-scale labour intensive agricultural estates to suitable sites elsewhere.		F10/S8
9. Speed-up land acquisition and land conversion process		F10/S9
10. Review the National Land Code with the objective of achieving optimum land use policy		F10/S10
11. Others		F10/S11
Constraint 11. Constraints in availability of timber (future constraint only)		
1. Government policies on sustainable forest management should be implemented strictly and urgently		F11/S1
2. Ban or discourage the export of timber		F11/S2
3. Use alternatives materials to replace or to minimise the use of timber in temporary works (e.g. in formwork and scaffolding)		F11/S3
4. Encourage the use of secondary timber (e.g. rubber wood) in construction (where appropriate)		F11/S4
5. Encourage research to identify alternative materials to replace or to minimise using primary timber in construction		F11/S5
6. Others		F11/S6
General strategies		
1. Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry	CG/S1	FG/S1
2. Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry	CG/S2	FG/S2
3. Construction demands that have potential for mass production (e.g. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised	CG/S3	FG/S3
4. Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry	CG/S4	FG/S4
5. Local Authorities should discourage alteration and renovation of newly completed projects to save resources	CG/S5	FG/S5
6. Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources	CG/S6	FG/S6
7. Others	CG/S7	FG/S7

Appendix E

Results of survey of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 1 - Respondent organisations (by category and type)

Category and type	No		%	
Client				
Government ministry and department	1		1.85	
Developer	1		1.85	
Total client		2		3.70
Designer				
(JKR) Public Works Department	12		22.22	
Architect	8		14.81	
Engineer	2		5.56	
Quantity Surveyor	12		22.22	
Total designer		35		64.81
Total contractor*		17		31.48
Total respondent organisations		54		100.00

* Tables 3 and 4 provide the breakdown of respondent contractors according to registration, classification and category of work, respectively.

Table 2 - Respondent organisations (by sector and type)

Sector and type	No		%	
Public sector				
Government ministry and department	1		1.85	
(JKR) Public Works Department	12		22.22	
Total public sector		13		24.07
Private sector				
Developer	1		1.85	
Architect	8		14.81	
Engineer	3		5.56	
Quantity Surveyor	12		22.22	
Contractor	17		31.48	
Total private sector		41		75.93
Total respondent organisations		54		100.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 3 - Respondent contractors (by registration with CIDB and PKK)

CIDB			PKK		
Grade	**No**	**%**	**Class**	**No**	**%**
3	6	35.29	D	5	29.41
4	3	17.65	C	2	11.76
5	1	5.88	BX	0	0.00
6	1	5.88	B	1	5.88
7	6	35.29	A	16	35.29
No reply	0	0.00	No reply	3	17.65
Total	17	100.00	Total	17	100.00

Table 4 - Respondent contractors (by work category)

Work category	No	%*
Building works	13	76.47
Civil engineering works	16	94.12
Mechanical and electrical works	2	11.76
Others	1	5.88

Where number of respondent contractor organisations = 17.
* Contractors were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent contractors and therefore add up to more than 100.

Table 5 - Size of respondent organisations (by number of employee)

Number of employee	No	%
Under 5	2	3.70
5 to 9	13	24.07
10 to 19	9	16.67
20 to 29	4	7.41
30 to 49	5	9.26
50 to 99	5	9.26
100 to 199	6	11.11
200 to 499	6	11.11
500 to 999	1	1.85
1000 and above	3	5.56
No reply	0	0.00
Total	54	100.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 6 - Size of respondent organisations (by number of employee and according to sector)

Number of employee	Public sector		Private sector	
	No	%	No	%
Under 5	0	0.00	2	4.88
5 to 9	0	0.00	13	31.71
10 to 19	0	0.00	9	21.95
20 to 29	0	0.00	4	9.76
30 to 49	0	0.00	5	12.19
50 to 99	0	0.00	5	12.19
100 to 199	5	38.46	1	2.44
200 to 499	5	38.46	1	2.44
500 to 999	0	0.00	1	2.44
1000 and above	3	23.08	0	0.00
No reply	0	0.00	0	0.00
Total	13	100.00	41	100.00

Table 7 - Location of head office of respondent organisations (by state)

State	No. of organisation	%
Perlis	2	3.70
Kedah	3	5.56
Pulau Pinang	4	7.41
Perak	1	1.85
Selangor	5	9.26
Kuala Lumpur	14	25.93
Negeri Sembilan	3	5.56
Melaka	0	0.00
Johor	7	12.96
Pahang	1	1.85
Terengganu	1	1.85
Kelantan	1	1.85
Sarawak	5	9.26
Sabah & Labuan	7	12.96
Total	54	100.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 8 - Locations of current projects of respondent organisations (by state)

State	No. of organisations	%*
Perlis	6	11.11
Kedah	14	25.93
Pulau Pinang	13	24.07
Perak	10	18.52
Selangor	20	37.04
Kuala Lumpur	17	31.48
Negeri Sembilan	8	14.81
Melaka	11	20.37
Johor	15	27.78
Pahang	13	24.07
Terengganu	5	9.26
Kelantan	5	9.26
Sarawak	8	14.81
Sabah & Labuan	17	31.48
No reply	0	0.00

Where number of respondent organisations = 54.
* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

Table 9 - Types of current projects undertaken by respondent organisations

Type of project	No	%*
Housing	30	55.56
Other buildings**	43	79.63
Civil engineering	29	53.70
Specialist project	6	11.11
Others	4	7.41
No reply	0	

Where number of respondent organisations = 54.
* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.
** Other buildings refer to all types of building works excluding housing.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 10 - Types of current projects undertaken by respondent organisations (by sector)

Type of project	Public sector		Private sector	
	No	%*	No	%*
Housing	0	0.00	30	73.17
Other buildings**	10	76.92	33	80.49
Civil engineering	12	92.31	17	41.46
Specialist project	2	15.38	4	9.76
Others	1	7.96	3	7.32
No reply	0	0.00	0	
Total organisation	13		41	

Where number of respondent organisations = 54.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

** Other buildings refer to all types of building works excluding housing.

Table 11 - Value of current projects undertaken by respondent organisations

Total value (in RM)	No	%
Under 500,000	0	0.00
500,000 to 999,999	5	9.26
1,000,000 to 4,999,999	6	11.11
5,000,000 to 9,999,999	4	7.41
10,000,000 to 14,999,999	2	3.70
15,000,000 to 19,999,999	0	0.00
20,000,000 to 29,999,000	4	7.41
30,000,000 to 39,999,999	2	3.70
40,000,000 and above	31	57.41
No reply	0	0.00
Total	54	100.00

Table 12 - Value of current projects undertaken by respondent organisations (by sector)

Total value (in RM)	Public sector		Private sector	
	No	%	No	%
Under 500,000	0	0.00	0	0.00
500,000 to 999,999	0	0.00	5	12.20
1,000,000 to 4,999,999	0	0.00	6	14.63
5,000,000 to 9,999,999	1	7.69	3	7.32
10,000,000 to 14,999,999	0	0.00	2	4.88
15,000,000 to 19,999,999	0	0.00	0	0.00
20,000,000 to 29,999,000	2	15.38	2	4.88
30,000,000 to 39,999,999	1	7.69	1	2.44
40,000,000 and above	29	69.23	22	53.66
No reply	0	0.00	0	0.00
Total	13	100.00	41	100.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 13 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
C1										
C1/S1	0	54	2	6	7	17	22	14.81	12.96	72.22
C1/S2	0	54	0	3	3	17	31	5.55	5.55	88.89
C1/S3	2	52	1	2	5	17	27	5.77	9.61	84.61
C1/S4	0	54	1	1	6	9	37	3.70	11.11	85.18
C1/S5	0	54	4	1	9	18	22	9.26	16.67	74.07
C1/S6	0	54	2	1	12	21	18	5.55	22.22	72.22
C1/S7	0	54	7	21	6	14	6	51.85	11.11	37.03
C1/S8	0	54	1	6	9	16	22	12.96	16.67	70.37
C1/S9	1	53	0	3	6	20	24	5.66	11.32	83.02
C1/S10	1	53	3	6	10	12	22	16.98	18.87	64.15
C1/S11	54	0	0	0	0	0	0	0.00	0.00	0.00
C2										
C2/S1	2	52	1	1	2	22	26	3.85	3.85	92.31
C2/S2	5	49	0	6	9	19	15	12.24	18.37	69.39
C2/S3	2	52	1	4	10	13	24	9.61	19.23	71.15
C2/S4	2	52	0	2	1	16	33	3.85	1.92	94.23
C2/S5	2	52	4	12	14	15	7	30.77	26.92	42.31
C2/S6	2	52	1	1	10	25	15	3.85	19.23	76.92
C2/S7	2	52	0	5	10	26	11	9.61	19.23	71.15
C2/S8	2	52	1	4	18	12	17	9.61	34.61	55.77
C2/S9	2	52	0	5	14	18	15	9.61	26.92	63.46
C2/S10	2	52	1	11	18	11	11	23.08	34.61	42.31
C2/S11	2	52	3	12	19	12	6	28.85	36.54	34.61
C2/S12	1	53	0	0	8	29	16	0.00	15.09	84.90
C2/S13	52	2	0	0	0	1	1	0.00	0.00	100
C3										
C3/S1	1	53	1	10	13	24	5	20.75	24.53	54.72
C3/S2	2	52	1	1	2	25	23	3.85	3.85	92.31
C3/S3	1	53	3	6	17	17	10	16.98	32.07	50.94
C3/S4	1	53	2	5	7	26	13	13.21	13.21	73.58
C3/S5	1	53	3	15	16	15	4	33.96	30.19	35.85
C3/S6	2	52	2	3	15	17	15	9.61	28.85	61.54
C3/S7	1	53	1	1	1	27	23	3.77	1.89	94.34
C3/S8	1	53	1	3	4	26	19	7.55	7.55	84.90
C3/S9	1	53	0	0	4	28	21	0.00	7.55	92.45
C3/S10	2	52	0	1	10	25	16	1.92	19.23	78.85
C3/S11	1	53	0	2	11	23	17	3.77	20.75	75.47
C3/S12	3	51	4	11	9	18	9	29.41	17.65	52.94
C3/S13	3	51	0	1	7	23	20	1.96	13.75	84.31
C3/S14	3	51	0	1	5	23	22	1.96	9.80	88.23
C3/S15	3	51	0	2	7	21	21	3.92	13.72	82.35
C3/S16	54	0	0	0	0	0	0	0.00	0.00	0.00
C4										
C4/S1	2	52	0	2	0	31	19	3.85	0.00	96.15
C4/S2	2	52	0	1	4	23	24	1.92	7.69	90.38
C4/S3	2	52	0	2	4	25	21	3.85	7.69	88.46

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 13 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall) (Continued)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
C4/S4	2	52	2	2	3	25	20	7.69	5.77	86.54
C4/S5	2	52	1	1	7	23	20	3.85	13.46	82.69
C4/S6	2	52	1	0	7	20	24	1.92	13.46	84.61
C4/S7	1	53	6	10	16	10	11	30.19	30.19	39.62
C4/S8	1	53	1	2	9	31	10	5.66	16.98	77.36
C4/S9	2	52	0	7	18	18	9	13.46	34.61	51.92
C4/S10	1	53	0	4	11	26	12	7.55	20.75	71.70
C4/S11	1	53	5	12	10	17	9	32.07	18.87	49.05
C4/S12	54	0	0	0	0	0	0	0.00	0.00	0.00
C5										
C5/S1	1	53	0	7	17	22	7	13.21	32.07	54.72
C5/S2	1	53	0	2	4	29	18	3.77	7.54	88.68
C5/S3	1	53	2	7	9	20	15	16.98	16.98	66.04
C5/S4	1	53	0	2	3	23	25	3.77	5.66	90.57
C5/S5	1	53	2	6	7	26	12	15.09	13.21	71.70
C5/S6	2	52	1	4	9	21	17	9.61	17.31	73.08
C5/S7	1	53	5	20	12	14	2	47.17	22.64	30.19
C5/S8	1	53	2	3	10	28	10	9.43	18.87	71.70
C5/S9	2	52	1	1	8	29	13	3.85	15.38	80.77
C5/S10	1	53	2	5	11	27	8	13.21	20.75	66.04
C5/S11	1	53	5	11	16	16	5	30.19	30.19	39.62
C5/S12	1	53	11	19	12	10	1	56.60	22.64	20.75
C5/S13	2	52	2	0	15	26	9	3.85	28.85	67.31
C5/S14	1	53	1	4	10	28	10	9.43	18.87	71.70
C5/S15	1	53	3	4	15	17	14	13.21	28.30	58.49
C5/S16	2	52	0	1	1	32	18	1.92	1.92	96.15
C5/S17	1	53	0	1	0	32	20	1.89	0.00	98.11
C5/S18	1	53	0	1	3	31	18	1.89	5.66	92.45
C5/S19	2	52	1	3	1	28	19	7.69	1.92	90.38
C5/S20	2	52	0	7	9	23	13	13.46	17.31	69.23
C5/S21	2	52	0	2	3	33	14	3.85	5.77	90.38
C5/S22	2	52	4	3	8	25	12	13.46	15.38	71.15
C5/S23	2	52	1	9	9	24	9	19.23	17.30	63.46
C5/S24	2	52	1	4	7	30	10	9.61	13.46	76.92
C5/S25	2	52	1	4	5	31	11	9.61	9.61	80.77
C5/S26	2	52	0	8	15	21	8	15.38	28.85	55.77
C5/S27	3	51	0	2	9	21	19	3.92	17.65	78.43
C5/S28	2	52	6	4	6	25	11	19.23	11.54	69.23
C5/S29	53	1	0	0	0	1	0	0.00	0.00	100
C6										
C6/S1	1	53	4	7	13	26	3	20.75	24.53	54.72
C6/S2	1	53	3	9	13	22	6	22.64	24.53	52.83
C6/S3	1	53	1	1	5	29	17	3.77	9.43	86.79
C6/S4	1	53	7	13	10	15	8	37.73	18.87	43.40
C6/S5	1	53	0	2	8	28	15	3.77	15.09	81.13
C6/S6	1	53	1	1	6	31	14	3.77	11.32	84.90
C6/S7	1	53	0	1	8	28	16	1.89	15.09	83.02
C6/S8	1	53	0	4	8	26	15	7.55	15.09	77.36

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 13 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall) (Continued)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
C6/S9	2	52	0	0	6	28	18	0.00	11.54	88.46
C6/S10	1	53	1	2	5	24	21	5.66	9.43	84.90
C6/S11	53	1	0	0	0	1	0	0.00	0.00	100
C7										
C7/S1	2	52	1	6	4	21	20	13.46	7.69	78.85
C7/S2	2	52	0	2	2	22	26	3.85	3.85	92.31
C7/S3	3	51	0	0	5	20	26	0.00	9.80	90.20
C7/S4	2	52	0	0	6	16	30	0.00	11.54	88.46
C7/S5	4	50	0	0	3	20	27	0.00	6.00	94.00
C7/S6	2	52	1	1	4	23	23	3.85	7.69	88.46
C7/S7	2	52	14	14	7	10	7	53.85	13.46	32.69
C7/S8	2	52	6	3	8	24	11	17.31	15.38	67.31
C7/S9	2	52	1	3	2	21	25	7.69	3.85	88.46
C7/S10	2	52	0	0	7	24	21	0.00	13.46	86.54
C7/S11	53	1	0	0	0	0	1	0.00	0.00	100
C8										
C8/S1	2	52	0	5	5	24	18	9.61	9.61	80.77
C8/S2	2	52	0	4	2	22	24	7.69	3.85	88.46
C8/S3	2	52	0	0	1	14	37	0.00	1.92	98.08
C8/S4	2	52	0	0	4	22	26	0.00	7.69	92.31
C8/S5	2	52	1	3	11	21	16	7.69	21.15	71.15
C8/S6	54	0	0	0	0	0	0	0.00	0.00	0.00
C9										
C9/S1	1	53	0	0	3	22	28	0.00	5.66	94.34
C9/S2	1	53	0	1	2	15	35	1.89	3.77	94.34
C9/S3	2	52	0	1	1	26	24	1.92	1.92	96.15
C9/S4	2	52	0	0	7	24	21	0.00	13.46	86.54
C9/S5	1	53	0	1	5	23	24	1.89	9.43	88.68
C9/S6	2	52	0	0	4	23	25	0.00	7.69	92.31
C9/S7	2	52	0	1	1	21	29	1.92	1.92	96.15
C9/S8	2	52	0	1	1	25	25	1.92	1.92	96.15
C9/S9	53	1	0	0	0	0	1	0.00	0.00	100
CG										
CG/S1	2	52	0	1	5	30	16	1.92	9.61	88.46
CG/S2	2	52	0	0	5	28	19	0.00	9.61	90.38
CG/S3	2	52	0	2	8	22	20	3.85	15.38	80.77
CG/S4	2	52	1	1	6	28	16	3.85	11.54	84.61
CG/S5	2	52	2	6	15	18	11	15.38	28.85	55.77
CG/S6	2	52	1	0	7	20	24	1.92	13.46	84.61
CG/S7	54	0	0	0	0	0	0	0.00	0.00	0.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 13 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall) (Continued)

(Where total number of respondent organisations = 54. The percentages for (6), (7) and (8) are calculated as a proportion of the number of organisations responding to each strategy (n), respectively.

Nr	Number of organisations not responding.
n	Number of organisations responding.
1	Number of organisations indicating strongly disagrees with the proposed strategy.
2	Number of organisations indicating disagrees with the proposed strategy.
3	Number of organisations indicating neither agrees nor disagrees with the proposed strategy.
4	Number of organisations indicating agrees with the proposed strategy.
5	Number of organisations indicating strongly agrees with the proposed strategy.
6	Percentage of respondent organisations scoring less than or equal to 2.
7	Percentage of respondent organisation scoring 3.
8	Percentage of respondent organisations scoring more than or equal to 4.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 14 - Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
F1										
F1/S1	1	53	2	5	5	17	24	13.21	9.43	77.36
F1/S2	2	52	0	2	2	11	37	3.85	3.85	92.31
F1/S3	5	49	1	0	1	19	28	2.04	2.04	95.91
F1/S4	3	51	1	0	5	4	41	1.96	9.80	88.23
F1/S5	2	52	2	1	9	14	26	5.77	17.31	76.92
F1/S6	2	52	2	2	8	18	22	7.69	15.38	76.92
F1/S7	2	52	7	11	8	18	8	34.61	15.38	50.00
F1/S8	2	52	0	5	9	14	24	9.61	17.31	73.08
F1/S9	4	50	0	1	7	13	29	2.00	14.00	84.00
F1/S10	4	50	2	4	8	13	23	12.00	16.00	72.00
F1/S11	54	0	0	0	0	0	0	0.00	0.00	0.00
F3										
F3/S1	4	50	1	16	10	17	6	34.00	20.00	46.00
F3/S2	4	50	1	1	3	15	30	4.00	6.00	90.00
F3/S3	4	50	3	3	17	17	10	12.00	34.00	54.00
F3/S4	4	50	2	3	8	20	17	10.00	16.00	74.00
F3/S5	3	51	2	14	14	16	5	31.37	27.45	41.18
F3/S6	4	50	2	4	14	10	20	12.00	28.00	60.00
F3/S7	3	51	1	0	3	20	27	1.96	5.88	92.16
F3/S8	4	50	2	2	3	24	19	8.00	6.00	86.00
F3/S9	4	50	0	0	1	24	25	0.00	2.00	98.00
F3/S10	5	49	0	1	7	20	21	2.04	14.28	83.67
F3/S11	4	50	0	2	10	17	21	4.00	20.00	76.00
F3/S12	6	48	8	17	8	11	4	82.08	16.67	31.25
F3/S13	6	48	0	0	6	21	21	0.00	12.50	87.50
F3/S14	6	48	0	0	3	21	24	0.00	6.25	93.75
F3/S15	6	48	0	0	5	20	23	0.00	10.42	89.58
F3/S16	54	0	0	0	0	0	0	0.00	0.00	0.00
F4										
F4/S1	5	49	0	1	2	20	26	2.04	4.08	93.88
F4/S2	5	49	0	0	4	19	26	0.00	8.16	91.84
F4/S3	5	49	0	1	3	20	25	2.04	6.12	91.84
F4/S4	5	49	1	1	4	21	22	4.08	8.16	87.75
F4/S5	5	49	1	0	3	23	22	2.04	6.12	91.84
F4/S6	5	49	1	0	4	19	25	2.04	8.16	89.79
F4/S7	4	50	6	6	17	10	11	24.00	34.00	42.00
F4/S8	3	51	1	2	12	23	13	5.88	23.53	70.59
F4/S9	4	50	1	7	17	15	10	16.00	34.00	50.00
F4/S10	4	50	1	2	11	24	12	6.00	22.00	72.00
F4/S11	3	51	5	13	11	10	12	35.29	21.57	43.14
F4/S12	54	0	0	0	0	0	0	0.00	0.00	0.00
F5										
F5/S1	4	50	0	10	15	17	8	20.00	30.00	50.00
F5/S2	4	50	0	1	3	25	21	2.00	6.00	92.00
F5/S3	4	50	3	7	7	16	17	20.00	14.00	66.00
F5/S4	4	50	0	2	2	15	31	4.00	4.00	92.00
F5/S5	4	50	2	4	8	18	18	12.00	16.00	72.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 14 - Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall) (Continued)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
F5/S6	5	49	1	3	10	15	20	8.16	20.41	71.43
F5/S7	4	50	3	15	15	13	4	36.00	30.00	34.00
F5/S8	4	50	1	2	9	23	15	6.00	18.00	76.00
F5/S9	5	49	1	1	6	28	13	4.08	12.24	83.67
F5/S10	4	50	4	3	10	20	13	14.00	20.00	66.00
F5/S11	4	50	7	11	14	15	3	36.00	28.00	36.00
F5/S12	4	50	12	13	14	7	4	50.00	28.00	22.00
F5/S13	5	49	1	2	16	17	13	6.12	32.65	61.22
F5/S14	4	50	1	8	12	21	8	18.00	24.00	58.00
F5/S15	4	50	3	3	12	12	20	12.00	24.00	64.00
F5/S16	5	49	0	0	1	28	20	0.00	2.04	97.96
F5/S17	4	50	0	0	1	24	25	0.00	2.00	98.00
F5/S18	4	50	0	0	5	24	21	0.00	10.00	90.00
F5/S19	4	50	1	2	4	25	18	6.00	8.00	86.00
F5/S20	5	49	0	4	8	22	15	8.16	16.33	75.51
F5/S21	4	50	0	1	3	29	17	2.00	6.00	92.00
F5/S22	5	49	3	3	8	18	17	12.24	16.33	71.43
F5/S23	5	49	1	12	8	17	11	26.53	16.33	57.14
F5/S24	4	50	2	4	9	22	13	12.00	18.00	70.00
F5/S25	5	49	1	4	6	27	11	10.20	12.24	77.55
F5/S26	5	49	2	8	8	19	12	20.41	16.33	63.26
F5/S27	6	48	0	2	6	18	22	4.17	12.50	83.33
F5/S28	5	49	7	3	7	22	10	20.41	14.28	65.31
F5/S29	53	1	0	0	0	1	0	0.00	0.00	100
F6										
F6/S1	4	50	7	10	14	15	4	34.00	28.00	38.00
F6/S2	4	50	5	14	17	6	8	38.00	34.00	28.00
F6/S3	4	50	2	0	8	24	16	4.00	16.00	80.00
F6/S4	4	50	9	10	11	10	10	38.00	22.00	40.00
F6/S5	4	50	0	1	10	23	16	2.00	20.00	78.00
F6/S6	4	50	2	0	8	23	17	4.00	16.00	80.00
F6/S7	4	50	1	2	11	22	14	6.00	22.00	72.00
F6/S8	4	50	1	3	10	16	20	8.00	20.00	72.00
F6/S9	5	49	0	0	6	27	16	0.00	12.24	87.75
F6/S10	3	51	1	3	5	22	20	7.84	9.80	82.35
F6/S11	51	3	0	0	0	0	3	0.00	0.00	100
F7										
F7/S1	4	50	1	5	6	16	22	12.00	12.00	76.00
F7/S2	5	49	0	1	0	22	26	2.04	0.00	97.96
F7/S3	6	48	0	0	3	17	28	0.00	6.25	93.75
F7/S4	5	49	0	0	4	17	28	0.00	8.16	91.84
F7/S5	7	47	0	0	3	16	28	0.00	6.38	93.62
F7/S6	4	50	1	0	5	19	25	2.00	10.00	88.00
F7/S7	4	50	15	11	7	5	12	52.00	14.00	34.00
F7/S8	4	50	6	3	7	21	13	18.00	14.00	68.00
F7/S9	6	48	1	1	4	16	26	4.17	8.33	87.50
F7/S10	5	49	0	0	5	22	22	0.00	10.20	89.79
F7/S11	53	1	0	0	0	0	1	0.00	0.00	100

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 14 - Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia as appraised by respondent organisations (overall) (Continued)

Constraint and strategy	nr	n	1	2	3	4	5	6 (%)	7 (%)	8 (%)
F8										
F8/S1	5	49	0	2	6	20	21	4.08	12.24	83.67
F8/S2	5	49	0	3	2	16	28	6.12	4.08	89.79
F8/S3	5	49	0	0	0	11	38	0.00	0.00	100.00
F8/S4	5	49	0	0	3	17	29	0.00	6.12	93.88
F8/S5	5	49	1	3	7	20	18	8.16	14.28	77.55
F8/S6	54	0	0	0	0	0	0	0.00	0.00	00.00
F10										
F10/S1	2	52	0	1	7	20	24	1.92	13.46	84.61
F10/S2	1	53	0	0	3	13	37	0.00	5.66	94.34
F10/S3	1	53	5	1	8	19	20	11.32	15.09	73.58
F10/S4	1	53	1	4	6	22	20	9.43	11.32	79.24
F10/S5	1	53	5	7	9	19	13	22.64	16.98	60.38
F10/S6	2	52	0	2	3	25	22	3.85	5.77	90.38
F10/S7	2	52	1	0	1	31	19	1.92	1.92	96.15
F10/S8	2	52	0	3	11	23	15	5.77	21.15	73.08
F10/S9	2	52	0	0	4	20	28	0.00	7.69	92.31
F10/S10	1	53	1	0	14	20	18	1.89	26.41	71.70
F10/S11	54	0	0	0	0	0	0	0.00	0.00	0.00
F11										
F11/S1	1	53	0	1	2	20	30	1.89	3.77	94.34
F11/S2	1	53	0	10	11	16	16	18.86	20.75	60.38
F11/S3	0	54	1	3	6	23	21	7.41	11.11	81.48
F11/S4	3	51	0	3	6	24	18	5.88	11.76	82.35
F11/S5	1	53	1	0	5	25	22	1.89	9.43	88.68
F11/S6	54	0	0	0	0	0	0	0.00	0.00	00.00
FG										
FG/S1	5	49	0	0	4	25	20	0.00	8.16	91.84
FG/S2	5	49	0	0	3	26	20	0.00	6.12	93.88
FG/S3	5	49	1	1	7	14	26	4.08	14.28	81.63
FG/S4	5	49	2	0	7	18	22	4.08	14.28	81.63
FG/S5	5	49	3	3	14	11	18	12.24	28.57	59.18
FG/S6	5	49	1	0	7	13	28	2.04	14.28	83.67
FG/S7	54	0	0	0	0	0	0	0.00	0.00	0.00

(Where total number of respondent organisations = 54. The percentages for (6), (7) and (8) are calculated as a proportion of the number of organisations responding to each strategy (n), respectively.

- Nr Number of organisations not responding.
- n Number of organisations responding.
- 1 Number of organisations indicating strongly disagrees with the proposed strategy.
- 2 Number of organisations indicating disagrees with the proposed strategy.
- 3 Number of organisations indicating neither agrees nor disagrees with the proposed strategy.
- 4 Number of organisations indicating agrees with the proposed strategy.
- 5 Number of organisations indicating strongly agrees with the proposed strategy.
- 6 Percentage of respondent organisations scoring less than or equal to 2.
- 7 Percentage of respondent organisation scoring 3.
- 8 Percentage of respondent organisations scoring more than or equal to 4.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 15 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors

Constraint and strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
C1									
C1/S1	0.00	0.00	100	8.57	14.28	77.14	29.41	11.76	58.82
C1/S2	0.00	0.00	100	0.00	5.71	94.28	17.65	5.88	76.47
C1/S3	0.00	0.00	100	0.00	8.82	91.18	18.75	12.50	68.75
C1/S4	0.00	0.00	100	0.00	8.57	91.43	11.76	17.65	70.59
C1/S5	0.00	0.00	100	8.57	17.14	74.28	11.76	17.64	70.59
C1/S6	0.00	0.00	100	5.71	22.85	71.43	5.88	23.53	70.59
C1/S7	50.00	0.00	50.00	65.71	8.57	25.71	23.53	17.65	58.82
C1/S8	0.00	0.00	100	11.43	22.86	65.71	17.65	5.88	76.47
C1/S9	0.00	0.00	100	2.94	14.70	82.35	11.76	5.88	82.35
C1/S10	50.00	0.00	50.00	17.65	11.76	70.59	11.76	35.29	52.94
C1/S11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C2									
C2/S1	0.00	0.00	100	3.03	6.06	90.91	5.88	0.00	94.12
C2/S2	0.00	50.00	50.00	9.68	25.81	64.52	18.75	0.00	81.25
C2/S3	0.00	0.00	100	12.12	18.18	69.70	5.88	23.53	70.59
C2/S4	0.00	0.00	100	6.06	0.00	93.94	0.00	5.88	94.12
C2/S5	100	0.00	0.00	33.33	30.30	36.36	17.65	23.53	58.82
C2/S6	0.00	0.00	100	6.06	27.27	66.67	0.00	5.88	94.12
C2/S7	50.00	0.00	50.00	12.12	21.21	66.67	0.00	17.65	82.35
C2/S8	50.00	0.00	50.00	9.09	45.45	45.45	5.88	17.65	76.47
C2/S9	50.00	0.00	50.00	12.12	21.21	66.67	0.00	41.18	58.82
C2/S10	50.00	0.00	50.00	21.21	36.36	42.42	23.53	35.29	41.18
C2/S11	50.00	0.00	50.00	21.21	45.45	33.33	41.18	23.53	35.29
C2/S12	0.00	0.00	100	0.00	20.59	79.41	0.00	5.88	94.12
C2/S13	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
C3									
C3/S1	0.00	0.00	100	23.53	29.41	47.06	17.65	17.65	64.70
C3/S2	0.00	0.00	100	0.00	5.88	94.12	12.50	0.00	87.50
C3/S3	50.00	50.00	0.00	20.59	38.23	41.18	5.88	17.65	76.47
C3/S4	0.00	0.00	100	11.76	11.76	76.47	17.65	17.65	64.70
C3/S5	100	0.00	0.00	23.53	32.35	44.12	47.06	29.41	23.53
C3/S6	50.00	0.00	50.00	6.06	33.33	60.61	11.76	23.53	64.70
C3/S7	0.00	0.00	100	0.00	2.94	97.06	11.76	0.00	88.23
C3/S8	0.00	0.00	100	8.82	8.82	82.35	5.88	5.88	88.23
C3/S9	0.00	0.00	100	0.00	5.88	94.12	0.00	11.76	88.23
C3/S10	0.00	0.00	100	3.03	21.21	75.76	0.00	17.65	82.35
C3/S11	0.00	0.00	100	5.88	23.53	70.59	0.00	17.65	82.35
C3/S12	50.00	0.00	50.00	33.33	12.12	54.54	18.75	31.25	50.00
C3/S13	0.00	0.00	100	0.00	21.21	78.79	6.25	0.00	93.75
C3/S14	0.00	0.00	100	0.00	15.15	84.85	6.25	0.00	93.75
C3/S15	0.00	0.00	100	0.00	18.18	81.82	12.50	6.25	81.25
C3/S16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C4									
C4/S1	0.00	0.00	100	0.00	0.00	100	11.76	0.00	88.23
C4/S2	0.00	0.00	100	0.00	12.12	87.88	5.88	0.00	94.12
C4/S3	0.00	0.00	100	3.03	9.09	87.88	5.88	5.88	88.23

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 15 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors (Continued)

Constraint and strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
C4/S4	0.00	0.00	100	9.09	9.09	81.82	5.88	0.00	94.12
C4/S5	0.00	0.00	100	3.03	9.09	87.88	5.88	23.53	70.59
C4/S6	0.00	0.00	100	3.03	6.06	90.91	0.00	29.41	70.59
C4/S7	50.00	0.00	50.00	14.71	38.23	47.06	58.82	17.65	23.53
C4/S8	0.00	0.00	100	5.88	11.76	82.35	5.88	29.41	64.70
C4/S9	0.00	0.00	100	8.88	38.23	52.94	25.00	31.25	43.75
C4/S10	0.00	0.00	100	5.88	23.53	70.59	11.76	17.65	70.59
C4/S11	50.00	0.00	50.00	41.18	17.65	41.18	11.76	23.53	64.70
C4/S12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C5									
C5/S1	0.00	0.00	100	8.82	38.23	52.94	23.53	23.53	52.94
C5/S2	0.00	0.00	100	0.00	8.82	91.18	11.76	5.88	82.35
C5/S3	50.00	0.00	50.00	17.65	14.70	67.65	11.76	23.53	64.70
C5/S4	0.00	0.00	100	2.94	2.94	94.12	5.88	11.76	82.35
C5/S5	50.00	0.00	50.00	11.76	17.65	70.59	17.64	5.88	76.47
C5/S6	50.00	0.00	50.00	12.12	18.18	69.70	0.00	17.65	82.35
C5/S7	50.00	0.00	50.00	47.06	26.47	26.47	47.06	17.65	35.29
C5/S8	50.00	0.00	50.00	8.82	26.47	64.70	5.88	5.88	88.23
C5/S9	0.00	0.00	100	6.06	18.18	75.76	0.00	11.76	88.23
C5/S10	50.00	0.00	50.00	14.70	17.65	67.64	5.88	29.41	64.70
C5/S11	0.00	50.00	50.00	23.53	32.35	44.12	47.06	23.53	29.41
C5/S12	100	0.00	0.00	67.65	20.59	11.76	29.41	29.41	41.18
C5/S13	0.00	0.00	100	5.88	29.41	61.70	0.00	31.25	68.75
C5/S14	0.00	50.00	50.00	2.94	17.65	79.41	23.53	17.65	58.82
C5/S15	0.00	50.00	50.00	17.65	29.41	52.94	5.88	23.53	70.59
C5/S16	0.00	0.00	100	0.00	2.94	97.06	6.25	0.00	93.75
C5/S17	0.00	0.00	100	0.00	0.00	100	5.88	0.00	94.12
C5/S18	0.00	0.00	100	0.00	5.88	94.12	5.88	5.88	88.23
C5/S19	0.00	0.00	100	2.94	0.00	97.05	17.65	5.88	76.47
C5/S20	0.00	0.00	100	5.88	14.70	79.41	29.41	23.53	47.06
C5/S21	0.00	0.00	100	2.94	8.82	88.23	5.88	0.00	94.12
C5/S22	100	0.00	0.00	11.76	17.65	70.59	11.76	11.76	76.47
C5/S23	0.00	0.00	100	17.65	20.59	61.76	23.53	11.76	64.70
C5/S24	0.00	0.00	100	8.82	11.76	79.41	11.76	17.65	70.59
C5/S25	0.00	0.00	100	8.82	8.82	82.35	11.76	11.76	76.47
C5/S26	100	0.00	0.00	11.76	29.41	58.82	17.64	29.41	52.94
C5/S27	0.00	0.00	100	2.94	14.70	82.35	6.25	25.00	68.75
C5/S28	100	0.00	0.00	23.53	11.76	64.70	5.88	11.76	82.35
C5/S29	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
C6									
C6/S1	100	0.00	0.00	20.59	23.53	55.88	11.76	29.41	58.82
C6/S2	100	0.00	0.00	20.59	20.59	58.82	17.65	35.29	47.06
C6/S3	0.00	0.00	100	2.94	11.76	85.29	5.88	5.88	88.23
C6/S4	50.00	50.00	0.00	47.06	14.70	38.23	17.65	23.53	58.82
C6/S5	0.00	0.00	100	2.94	23.53	73.53	5.88	0.00	94.12
C6/S6	0.00	0.00	100	5.88	8.82	85.29	0.00	17.65	82.35
C6/S7	0.00	0.00	100	2.94	14.70	82.35	0.00	17.65	82.35

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 15 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors (Continued)

Constraint and strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
C6/S8	0.00	0.00	100	8.82	20.59	70.59	5.88	5.88	88.23
C6/S9	0.00	0.00	100	0.00	6.06	93.94	0.00	23.53	76.47
C6/S10	0.00	0.00	100	8.82	11.76	79.41	0.00	5.88	94.12
C6/S11	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
C7									
C7/S1	0.00	0.00	100	8.82	8.82	82.35	23.53	5.88	70.59
C7/S2	0.00	0.00	100	2.94	2.94	94.12	5.88	5.88	88.23
C7/S3	0.00	0.00	100	0.00	8.82	91.18	0.00	12.50	87.50
C7/S4	0.00	0.00	100	0.00	2.94	97.06	0.00	29.41	70.59
C7/S5	0.00	0.00	100	0.00	2.94	97.06	0.00	13.33	86.67
C7/S6	0.00	0.00	100	2.94	8.82	88.23	5.88	5.88	88.23
C7/S7	100	0.00	0.00	58.82	14.70	26.47	41.18	11.76	47.06
C7/S8	0.00	0.00	100	20.59	17.65	61.76	11.76	11.76	76.47
C7/S9	100	0.00	0.00	5.88	5.88	88.23	5.88	0.00	94.12
C7/S10	0.00	0.00	100	0.00	14.70	85.29	0.00	11.76	88.23
C7/S11	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
C8									
C8/S1	0.00	0.00	100	9.09	12.12	78.79	11.76	5.88	82.35
C8/S2	50.00	0.00	50.00	3.03	3.03	93.94	11.76	5.88	82.35
C8/S3	0.00	0.00	100	0.00	0.00	100	0.00	5.88	94.12
C8/S4	0.00	0.00	100	0.00	9.09	90.91	0.00	5.88	94.12
C8/S5	0.00	0.00	100	9.09	24.24	66.67	5.88	17.65	76.47
C8/S6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C9									
C9/S1	0.00	0.00	100	0.00	0.00	100	0.00	17.65	82.35
C9/S2	0.00	0.00	100	0.00	2.94	97.06	5.88	5.88	88.23
C9/S3	0.00	0.00	100	0.00	3.03	96.97	5.88	0.00	94.12
C9/S4	0.00	0.00	100	0.00	15.15	84.85	0.00	11.76	88.23
C9/S5	0.00	0.00	100	0.00	14.70	85.29	5.88	0.00	94.12
C9/S6	0.00	0.00	100	0.00	6.06	93.94	0.00	11.76	88.23
C9/S7	0.00	0.00	100	0.00	0.00	100	5.88	5.88	88.23
C9/S8	0.00	0.00	100	0.00	0.00	100	5.88	5.88	88.23
C9/S9	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
CG									
CG/S1	0.00	0.00	100	0.00	11.76	88.23	5.88	5.88	88.23
CG/S2	0.00	0.00	100	0.00	11.76	88.23	0.00	5.88	94.12
CG/S3	0.00	0.00	100	2.94	20.59	76.47	5.88	5.88	88.23
CG/S4	0.00	0.00	100	5.88	14.70	79.41	0.00	5.88	94.12
CG/S5	0.00	0.00	100	23.53	29.41	47.06	0.00	29.41	70.59
CG/S6	0.00	0.00	100	2.94	17.65	79.41	0.00	5.88	94.12
CG/S7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 15 - Strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors (Continued)

(Where total number of respondent organisations = 54, comprising: 2 clients, 35 designers and 17 contractors. The percentages are calculated as a proportion of the number of organisations in each category responding to each strategy).

1 Percentage of respondent organisations indicating strongly disagrees and disagrees with the proposed strategy (i.e. scoring less than or equal to 2).

2 Percentage of respondent organisations indicating neither agrees nor disagrees with the proposed strategy (i.e. scoring equal to 3).

3 Percentage of respondent organisations indicating agrees and strongly agrees with the proposed strategy (i.e. scoring more than or equal to 4).

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 16 - Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors

Constraint and strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
F1									
F1/S1	0.00	0.00	100	8.82	11.76	79.41	23.53	5.88	70.59
F1/S2	0.00	0.00	100	0.00	3.03	96.97	11.76	5.88	82.35
F1/S3	0.00	0.00	100	0.00	3.12	96.87	6.67	0.00	93.33
F1/S4	0.00	0.00	100	0.00	12.12	87.88	6.25	6.25	87.50
F1/S5	0.00	0.00	100	8.82	17.65	73.53	0.00	18.75	81.25
F1/S6	0.00	0.00	100	8.82	20.59	70.59	6.25	6.25	87.50
F1/S7	50.00	0.00	50.00	44.12	14.70	41.18	12.50	18.75	68.75
F1/S8	0.00	0.00	100	11.76	17.65	70.59	6.25	18.75	75.00
F1/S9	0.00	0.00	100	3.12	15.62	81.25	0.00	12.50	87.50
F1/S10	50.00	0.00	50.00	15.62	9.37	75.00	0.00	31.25	68.75
F1/S11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F3									
F3/S1	0.00	0.00	100	46.87	21.87	31.25	12.50	18.75	68.75
F3/S2	0.00	0.00	100	3.12	6.25	90.62	6.25	6.25	87.50
F3/S3	50.00	50.00	0.00	15.62	40.62	43.75	0.00	18.75	81.25
F3/S4	0.00	0.00	100	12.50	12.50	75.00	6.25	25.00	68.75
F3/S5	100	0.00	0.00	24.24	30.30	45.45	37.50	25.00	37.50
F3/S6	50.00	0.00	50.00	12.50	31.25	56.25	6.25	25.00	68.75
F3/S7	0.00	0.00	100	0.00	9.09	90.90	6.25	0.00	93.75
F3/S8	0.00	0.00	100	9.37	9.37	81.25	6.25	0.00	93.75
F3/S9	0.00	0.00	100	0.00	0.00	100	0.00	6.25	93.75
F3/S10	0.00	0.00	100	3.22	16.13	80.64	0.00	12.50	87.50
F3/S11	0.00	0.00	100	6.25	25.00	68.75	0.00	12.50	87.50
F3/S12	50.00	0.00	50.00	45.16	19.35	35.48	66.67	13.33	20.00
F3/S13	0.00	0.00	100	0.00	19.35	80.64	0.00	0.00	100
F3/S14	0.00	0.00	100	0.00	9.678	90.32	0.00	0.00	100
F3/S15	0.00	0.00	100	0.00	12.90	87.10	0.00	6.67	93.33
F3/S16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F4									
F4/S1	0.00	0.00	100	0.00	6.45	93.55	6.25	0.00	93.75
F4/S2	0.00	0.00	100	0.00	12.90	87.10	0.00	0.00	100
F4/S3	0.00	0.00	100	3.22	6.45	90.32	0.00	6.25	93.75
F4/S4	0.00	0.00	100	6.45	9.68	83.87	0.00	6.25	93.75
F4/S5	0.00	0.00	100	3.22	3.22	93.55	0.00	12.50	87.50
F4/S6	0.00	0.00	100	3.22	3.22	93.55	0.00	18.75	81.25
F4/S7	0.00	0.00	100	12.50	40.62	46.88	50.00	25.00	25.00
F4/S8	0.00	0.00	100	3.03	24.24	72.72	12.50	25.00	62.50
F4/S9	0.00	0.00	100	12.12	36.36	51.51	26.67	33.33	40.00
F4/S10	0.00	0.00	100	6.25	18.75	75.00	6.25	31.25	62.50
F4/S11	50.00	0.00	50.00	42.42	24.24	33.33	18.75	18.75	62.50
F4/S12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F5									
F5/S1	0.00	0.00	100	18.75	34.37	46.87	25.00	25.00	50.00
F5/S2	0.00	0.00	100	0.00	9.37	90.62	6.25	0.00	93.75
F5/S3	50.00	0.00	50.00	21.87	15.62	62.50	12.50	12.50	75.00
F5/S4	0.00	0.00	100	3.12	3.12	93.75	6.25	6.25	87.50

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 16 - Strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia as appraised by clients, designers and contractors (Continued)

Constraint and strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
F5/S5	50.00	0.00	50.00	9.37	25.00	65.62	12.50	0.00	87.50
F5/S6	50.00	0.00	50.00	9.68	25.81	64.51	0.00	12.50	87.50
F5/S7	50.00	0.00	50.00	34.37	37.50	28.12	37.50	18.75	43.75
F5/S8	50.00	0.00	50.00	6.25	28.12	65.62	0.00	0.00	100
F5/S9	0.00	0.00	100	6.45	12.90	80.64	0.00	12.50	87.50
F5/S10	50.00	0.00	50.00	15.62	18.75	65.62	6.25	25.00	68.75
F5/S11	0.00	50.00	50.00	28.12	31.25	40.62	56.25	18.75	25.00
F5/S12	100	0.00	0.00	56.25	31.25	12.50	31.25	25.00	43.75
F5/S13	0.00	0.00	100	9.37	37.50	53.12	0.00	26.67	73.33
F5/S14	0.00	50.00	50.00	12.50	25.00	62.50	31.25	18.75	50.00
F5/S15	0.00	50.00	50.00	18.75	21.87	59.37	0.00	25.00	75.00
F5/S16	0.00	0.00	100	0.00	3.12	96.87	0.00	0.00	100
F5/S17	0.00	0.00	100	0.00	3.12	96.87	0.00	0.00	100
F5/S18	0.00	0.00	100	0.00	12.50	87.50	0.00	6.25	93.75
F5/S19	0.00	0.00	100	9.09	9.09	81.82	0.00	6.25	93.75
F5/S20	0.00	0.00	100	3.12	18.75	78.12	18.75	12.50	68.75
F5/S21	0.00	0.00	100	3.03	9.09	87.88	0.00	0.00	100
F5/S22	100	0.00	0.00	9.37	21.87	68.75	12.50	6.25	81.25
F5/S23	0.00	0.00	100	28.12	15.62	56.25	25.00	18.75	56.25
F5/S24	0.00	0.00	100	12.12	15.15	72.73	12.50	25.00	62.50
F5/S25	0.00	0.00	100	15.62	12.50	71.87	0.00	12.50	87.50
F5/S26	100	0.00	0.00	18.75	18.75	62.50	18.75	12.50	68.75
F5/S27	0.00	0.00	100	6.25	9.37	84.37	0.00	20.00	80.00
F5/S28	100	0.00	0.00	25.00	15.62	59.37	6.25	12.50	81.25
F5/S29	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
F6									
F6/S1	100	0.00	0.00	34.37	28.12	37.50	25.00	31.25	43.75
F6/S2	100	0.00	0.00	37.50	31.25	31.25	31.25	43.75	25.00
F6/S3	0.00	0.00	100	3.12	18.75	78.12	6.25	12.50	81.25
F6/S4	50.00	50.00	0.00	50.00	21.88	28.12	12.50	18.75	68.75
F6/S5	0.00	0.00	100	3.12	31.25	65.62	0.00	0.00	100
F6/S6	0.00	0.00	100	6.25	18.75	75.00	0.00	12.50	87.50
F6/S7	0.00	0.00	100	9.37	18.75	71.87	0.00	31.25	68.75
F6/S8	0.00	0.00	100	12.50	21.87	65.62	0.00	18.75	81.25
F6/S9	0.00	0.00	100	0.00	16.13	83.87	0.00	6.25	93.75
F6/S10	0.00	0.00	100	12.12	15.15	72.73	0.00	0.00	100
F6/S11	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	100
F7									
F7/S1	0.00	0.00	100	9.09	15.15	75.76	18.75	6.25	75.00
F7/S2	0.00	0.00	100	0.00	0.00	100	6.25	000	93.75
F7/S3	0.00	0.00	100	0.00	6.25	93.75	0.00	6.67	93.33
F7/S4	0.00	0.00	100	0.00	3.12	96.88	0.00	18.75	81.25
F7/S5	0.00	0.00	100	0.00	6.25	93.75	0.00	7.14	92.86
F7/S6	0.00	0.00	100	3.03	12.12	84.85	0.00	6.25	93.75
F7/S7	100	0.00	0.00	57.57	15.15	27.27	37.50	12.50	50.00
F7/S8	0.00	0.00	100	21.21	15.15	63.64	12.50	12.50	75.00
F7/S9	100	0.00	0.00	3.22	12.90	83.87	0.00	0.00	100

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 16 - Strategies to remove or alleviate future constraints within the processes of construction procurement processes in Malaysia as appraised by clients, designers and contractors (Continued)

Constraint and Strategy	Client (%)			Designer (%)			Contractor (%)		
	1	2	3	1	2	3	1	2	3
F7/S10	0.00	0.00	100	0.00	15.62	84.37	0.00	0.00	100
F7/S11	0.00	0.00	0.00	0.00	0.00	100	0.00	0.00	0.00
F8									
F8/S1	0.00	0.00	100	6.45	12.90	80.64	0.00	12.50	87.50
F8/S2	50.00	0.00	50.00	3.22	3.22	93.55	6.25	6.25	87.50
F8/S3	0.00	0.00	100	0.00	0.00	100	0.00	0.00	100
F8/S4	0.00	0.00	100	0.00	6.45	93.55	0.00	6.25	93.75
F8/S5	0.00	0.00	100	9.68	16.13	74.19	6.25	12.50	81.25
F8/S6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F10									
F10/S1	0.00	0.00	100	3.03	15.15	81.82	0.00	11.76	88.23
F10/S2	0.00	0.00	100	0.00	5.88	94.12	0.00	5.88	94.12
F10/S3	0.00	0.00	100	17.65	20.59	61.76	0.00	5.88	94.12
F10/S4	0.00	0.00	100	14.70	14.70	70.59	0.00	5.88	94.12
F10/S5	50.00	0.00	50.00	26.47	17.64	55.88	11.76	17.65	70.59
F10/S6	0.00	0.00	100	5.88	5.88	88.23	0.00	6.25	93.75
F10/S7	0.00	0.00	100	3.03	3.03	93.94	0.00	0.00	100
F10/S8	0.00	0.00	100	9.09	27.27	63.64	0.00	11.76	88.23
F10/S9	0.00	0.00	100	0.00	9.09	90.91	0.00	5.88	94.12
F10/S10	0.00	0.00	100	2.94	29.41	67.65	0.00	23.53	76.47
F10/S11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
F11									
F11/S1	0.00	0.00	100	0.00	5.88	94.12	5.88	0.00	94.12
F11/S2	50.00	0.00	50.00	20.59	26.47	52.94	11.76	11.76	100
F11/S3	0.00	0.00	100	11.43	8.57	80.00	0.00	17.65	82.35
F11/S4	0.00	0.00	100	5.88	14.70	79.41	6.67	6.67	86.67
F11/S5	0.00	0.00	100	2.94	8.82	88.23	0.00	11.76	88.23
F11/S6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FG									
FG/S1	0.00	0.00	100	0.00	9.37	90.62	0.00	6.25	93.75
FG/S2	0.00	0.00	100	0.00	9.37	90.62	0.00	0.00	100
FG/S3	0.00	0.00	100	3.12	21.87	75.00	6.25	0.00	93.75
FG/S4	0.00	0.00	100	6.25	18.75	75.00	0.00	6.25	93.75
FG/S5	0.00	0.00	100	18.75	28.12	53.12	0.00	31.25	68.75
FG/S6	0.00	0.00	100	3.12	18.75	78.12	0.00	6.25	93.75
FG/S7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

(Where total number of respondent organisations = 54, comprising: 2 clients, 35 designers and 17 contractors. The percentages are calculated as a proportion of the number of organisations in each category responding to each strategy).

1 Percentage of respondent organisations indicating strongly disagrees and disagrees with the proposed strategy (i.e. scoring less than or equal to 2).

2 Percentage of respondent organisations indicating neither agrees nor disagrees with the proposed strategy (i.e. scoring equal to 3).

3 Percentage of respondent organisations indicating agrees and strongly agrees with the proposed strategy (i.e. scoring more than or equal to 4).

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 17 - Summary and ranking of suitable[1] strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia

Constraint and strategy	p (%)	r	c
C1			
C1/S2	88.89	1	1/2
C1/S3	84.61	3	1/2
C1/S4	85.18	2	1/2
C1/S9	83.02	4	1/2/3
C2			
C2/S1	92.31	2	1/2/3
C2/S4	94.23	1	1/2/3
C2/S12	84.90	3	1/3
C3			
C3/S2	92.31	3	1/2/3
C3/S7	94.31	1	1/2/3
C3/S8	84.91	5	1/2/3
C3/S9	92.45	2	1/2/3
C3/S13	84.31	6	1/3
C3/S14	88.23	4	1/2/3
C3/S15	82.35	7	1/2/3
C4			
C4/S1	96.15	1	1/2/3
C4/S2	90.38	2	1/2/3
C4/S3	88.46	3	1/2/3
C4/S4	86.54	4	1/2/3
C4/S5	82.69	6	1/2
C4/S6	84.60	5	1/2
C5			
C5/S2	88.68	7	1/2/3
C5/S4	90.56	4	1/2/3
C5/S9	80.77[+]	8	1/3
C5/S16	96.15	2	1/2/3
C5/S17	98.11	1	1/2/3
C5/S18	92.45	3	1/2/3
C5/S19	90.38[+]	5	1/2
C5/S21	90.38[+]	6	1/2/3
C5/S25	80.77[+]	9	1/2
C6			
C6/S3	86.79	2	1/2/3
C6/S5	81.13	6	1/3
C6/S6	84.90[+]	4	1/2/3
C6/S7	83.02	5	1/2/3
C6/S9	88.46	1	1/2
C6/S10	84.90[+]	3	1/3
C7			
C7/S2	92.31	2	1/2/3
C7/S3	90.20	3	1/2/3
C7/S4	88.46[+]	4	1/2
C7/S5	94.00	1	1/2/3
C7/S6	88.46[+]	6	1/2/3
C7/S9	88.46[+]	5	2/3
C7/S10	86.54	7	1/2/3

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 17 - Summary and ranking of suitable[1] strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia (Continued)

Constraint and strategy	p(%)	r	c
C8			
C8/S1	80.76	4	1/3
C8/S2	88.46	3	2/3
C8/S3	98.08	1	1/2/3
C8/S4	92.31	2	1/2/3
C9			
C9/S1	94.34⁺	5	1/2/3
C9/S2	94.34⁺	4	1/2/3
C9/S3	96.15⁺	3	1/2/3
C9/S4	86.54	7	1/2/3
C9/S5	88.68	8	1/2/3
C9/S6	92.31	6	1/2/3
C9/S7	96.15⁺	1	1/2/3
C9/S8	96.15⁺	2	1/2/3
CG			
CG/S1	88.46	2	1/2/3
CG/S2	90.38	1	1/2/3
CG/S3	80.77	5	1/3
CG/S4	84.61⁺	4	1/3
CG/S6	84.61⁺	3	1/3

[1] In the present research, suitable strategies are the ones that:
1. Have been agreed by 80 percent or more of the respondent organisations (overall), and
2. Have been agreed by 80 per cent or more of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

p Percentage of respondent organisations (overall) indicating agree and strongly agree with the proposed strategy (i.e. scoring more than or equal to 4).

r Relative ranking in accordance with percentage of respondent organisations (overall) indicating agree and strongly agree with the proposed strategy.

⁺ Equal percentages; ranked in accordance with the number of respondent organisations indicating strongly agree with the proposed strategy.

c Eighty per cent of respondent organisations indicating agree and strongly agree with the proposed strategy (i.e. scoring more than or equal to 4) where,
1 = Client organisations
2 = Designer organisations
3 = Contractor organisations.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 18 - Summary and ranking of suitable[1] strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia

Constraint and strategy	p(%)	r	c
F1			
F1/S2	92.31	2	1/2/3
F1/S3	95.92	1	1/2/3
F1/S4	88.23	3	1/2/3
F1/S9	84.00	4	1/2/3
F3			
F3/S2	90.00	4	1/2/3
F3/S7	92.16	3	1/2/3
F3/S8	86.00	7	1/2/3
F3/S9	98.00	1	1/2/3
F3/S10	83.67	9	1/2/3
F3/S13	87.50	6	1/2/3
F3/S14	93.75	2	1/2/3
F3/S15	89.58	5	1/2/3
F4			
F4/S1	93.88	1	1/2/3
F4/S2	91.84+	2	1/2/3
F4/S3	91.84+	3	1/2/3
F4/S4	87.75	6	1/2/3
F4/S5	91.84+	4	1/2/3
F4/S6	89.79	5	1/2/3
F5			
F5/S2	92.00+	4	1/2/3
F5/S4	92.00+	3	1/2/3
F5/S9	83.67	8	1/2/3
F5/S16	97.96	2	1/2/3
F5/S17	98.00	1	1/2/3
F5/S18	90.00	6	1/2/3
F5/S19	86.00	7	1/2/3
F5/S21	92.00+	5	1/2/3
F5/S27	83.33	9	1/2/3
F6			
F6/S3	80.00+	4	1/3
F6/S6	80.00+	3	1/3
F6/S9	87.75	1	1/2/3
F6/S10	82.35	2	1/3
F7			
F7/S2	97.96	1	1/2/3
F7/S3	93.75	2	1/2/3
F7/S4	91.84	4	1/2/3
F7/S5	93.62	3	1/2/3
F7/S6	88.00	6	1/2/3
F7/S9	87.50	7	2/3
F7/S10	89.79	5	1/2/3
F8			
F8/S1	83.67	4	1/2/3
F8/S2	89.79	3	2/3
F8/S3	100.00	1	1/2/3
F8/S4	93.88	2	1/2/3

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 18 - Summary and ranking of suitable[1] strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia (Continued)

Constraint and strategy	p(%)	r	c
F10			
F10/S1	84.61	5	1/2/3
F10/S2	94.34	2	1/2/3
F10/S6	90.38	4	1/2/3
F10/S7	96.15	1	1/2/3
F10/S9	92.31	3	1/2/3
F11			
F11/S1	94.34	1	1/2/3
F11/S3	81.48	4	1/2/3
F11/S4	82.35	3	1/3
F11/S5	88.68	2	1/2/3
FG			
FG/S1	91.84	2	1/2/3
FG/S2	93.88	1	1/2/3
FG/S3	81.63+	4	1/3
FG/S4	81.63+	5	1/3
FG/S6	83.67	3	1/3

1 In the present research, suitable strategies are the ones that:
1. Have been agreed by 80 percent or more of the respondent organisations (overall), and
2. Have been agreed by 80 per cent or more of at least two out of the three categories of respondent organisations (i.e., clients, designers or contractors).

p Percentage of respondent organisations (overall) indicating agree and strongly agree with the proposed strategy (i.e. scoring more than or equal to 4).

r Relative ranking in accordance with percentage of respondent organisations (overall) indicating agree and strongly agree with the proposed strategy.

\+ Equal percentages; ranked in accordance with the number of respondent organisations indicating strongly agree with the proposed strategy.

c Eighty per cent of respondent organisations indicating agree and strongly agree with the proposed strategy (i.e. scoring more than or equal to 4) where,
1 = Client organisations
2 = Designer organisations
3 = Contractor organisations.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 19 - Results of Chi-square Test of Independence between suitable strategies to remove or alleviate current constraints and organisation roles in the processes of construction procurement in Malaysia[1]

Constraint and strategy	X^2	r[1]	p
C1			
C1/S2	6.59*	Related	0.05
C1/S3	7.12*	Related	0.05
C1/S4	4.77*	Related	0.05
C1/S9	1.36*	Independent	0.05
C2			
C2/S1	0.19*	Independent	0.05
C2/S4	1.01*	Independent	0.05
C2/S12**	-	-	-
C3			
C3/S2	4.17*	Related	0.05
C3/S7	4.04*	Related	0.05
C3/S8	0.16*	Independent	0.05
C3/S9**	-	-	-
C3/S13	1.66*	Independent	0.05
C3/S14	1.79*	Independent	0.05
C3/S15	3.78*	Independent	0.05
C4			
C4/S1	4.04*	Related	0.05
C4/S2	1.74	Independent	0.05
C4/S3	0.21*	Independent	0.05
C4/S4	0.24*	Independent	0.05
C4/S5	0.39*	Independent	0.05
C4/S6	0.40*	Independent	0.05
C5			
C5/S2	4.05*	Related	0.05
C5/S4	0.34*	Independent	0.05
C5/S9	1.17*	Independent	0.05
C5/S16	2.10*	Independent	0.05
C5/S17	2.04*	Independent	0.05
C5/S18	2.04*	Independent	0.05
C5/S19	3.69*	Independent	0.05
C5/S21	0.19*	Independent	0.05
C5/S25	0.14*	Independent	0.05
C6			
C6/S3	0.21*	Independent	0.05
C6/S5	0.10*	Independent	0.05
C6/S6	0.94*	Independent	0.05
C6/S7	0.49*	Independent	0.05
C6/S9**	-	-	-
C6/S10	1.71*	Independent	0.05
C7			
C7/S2	0.28*	Independent	0.05
C7/S3**	-	-	-
C7/S4**	-	-	-
C7/S5**	-	-	-
C7/S6	0.24*	Independent	0.05
C7/S9	0.003*	Independent	0.05
C7/S10**	-	-	-

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 19 - Results of Chi-square Test of Independence between suitable strategies to remove or alleviate current constraints and organisation roles in the processes of construction procurement in Malaysia[1] (Continued)

Constraint and strategy	X^2	r^1	p
C8			
C8/S1	0.05*	Independent	0.05
C8/S2	1.60*	Independent	0.05
C8/S3**	-	-	-
C8/S4**	-	-	-
C9			
C9/S1**	-	-	-
C9/S2	2.10*	Independent	0.05
C9/S3	1.92*	Independent	0.05
C9/S4**	-	-	-
C9/S5	1.74*	Independent	0.05
C9/S6**	-	-	-
C9/S7	2.10*	Independent	0.05
C9/S8	2.10*	Independent	0.05
CG			
CG/S1	1.92*	Independent	0.05
CG/S2**	-	-	-
CG/S3	0.15*	Independent	0.05
CG/S4	1.15*	Independent	0.05
CG/S6	0.58*	Independent	0.05

(Where degree of freedom = 1; table chi-square value: at 0.05 = 3.84)

[1] Results of the chi-square test were for two categories of organisations, i.e., designer and contractor. Client organisations were excluded in an attempt to reduce the number of cells with expected frequency of less than 5. This is because initial test results indicate that when responses from client organisations were included more than 20% of cells have an expected frequency of less than 5. According to Bryman and Cramer (1997, pp124, 168-172) chi-square can be unreliable if 20% or more of the cells have an expected frequency of less than 5. In addition, to further reduce the number of cells with expected frequency of less than 5 the response category of "neither agree nor disagree" was excluded. Further, in an attempt to increase expected frequencies adjacent response categories were combined (see Siegel and Castellan, 1988, pp49-50), i.e., "strongly disagree" and "disagree" were combined as "disagree"; "agree" and "strongly agree" were combined as "agree".

X^2 Obtained chi-square value.

r^1 Relationship.

p Probability.

* 20% or more of cells have an expected value of less than 5.

** Organisations that responded indicated full agreement to the proposed strategy, i.e. all designer and contractor organisations responded either "agree" or "strongly agree" to the proposed strategy.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 20 - Results of Chi-square Test of Independence between suitable strategies to remove or alleviate future constraints and organisation roles in the processes of construction procurement in Malaysia[1]

Constraint and strategy	X^2	r[1]	p
F1			
F1/S2	4.17*	Related	0.05
F1/S3	2.11*	Independent	0.05
F1/S4	1.98*	Independent	0.05
F1/S9	0.53*	Independent	0.05
F3			
F3/S2	0.26*	Independent	0.05
F3/S7	1.92*	Independent	0.05
F3/S8	0.21*	Independent	0.05
F3/S9**	-	-	-
F3/S10	0.55*	Independent	0.05
F3/S13**	-	-	-
F3/S14**	-	-	-
F3/S15**	-	-	-
F4			
F4/S1	1.85*	Independent	0.05
F4/S2**	-	-	-
F4/S3	0.53*	Independent	0.05
F4/S4	1.12*	Independent	0.05
F4/S5	0.48*	Independent	0.05
F4/S6	0.44*	Independent	0.05
F5			
F5/S2	1.85*	Independent	0.05
F5/S4	0.29*	Independent	0.05
F5/S9	1.09*	Independent	0.05
F5/S16**	-	-	-
F5/S17**	-	-	-
F5/S18**	-	-	-
F5/S19	1.61*	Independent	0.05
F5/S21	0.54*	Independent	0.05
F5/S27	0.87*	Independent	0.05
F6			
F6/S3	0.21*	Independent	0.05
F6/S6	1.13*	Independent	0.05
F6/S9**	-	-	-
F6/S10	2.51*	Independent	0.05
F7			
F7/S2	2.04*	Independent	0.05
F7/S3**	-	-	-
F7/S4**	-	-	-
F7/S5**	-	-	-
F7/S6	0.53*	Independent	0.05
F7/S9	0.61*	Independent	0.05
F7/S10**	-	-	-
F8			
F8/S1	1.09*	Independent	0.05
F8/S2	0.26*	Independent	0.05
F8/S3**	-	-	-
F8/S4**	-	-	-

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 20 - Results of Chi-square Test of Independence between suitable strategies to remove or alleviate future constraints and organisation roles in the processes of construction procurement in Malaysia[1] (Continued)

Constraint and strategy	X^2	r^1	p
F10			
F10/S1	0.56*	Independent	0.05
F10/S2**	-	-	-
F10/S6	0.98*	Independent	0.05
F10/S7	0.54*	Independent	0.05
F10/S9**	-	-	-
F11			
F11/S1	1.92*	Independent	0.05
F11/S3	1.92*	Independent	0.05
F11/S4	0.0009*	Independent	0.05
F11/S5	0.49*	Independent	0.05
FG			
FG/S1**	-	-	-
FG/S2**	-	-	-
FG/S3	0.11*	Independent	0.05
FG/S4	1.21*	Independent	0.05
FG/S6	0.59*	Independent	0.05

(Where degree of freedom = 1; table chi-square value: at 0.05 = 3.84)

1 Results of the chi-square test were for two categories of organisations, i.e., designer and contractor. Client organisations were excluded in an attempt to reduce the number of cells with expected frequency of less than 5. This is because initial test results indicate that when responses from client organisations were included more than 20% of cells have an expected frequency of less than 5. According to Bryman and Cramer (1997, pp124, 168-172) chi-square can be unreliable if 20% or more of the cells have an expected frequency of less than 5. In addition, to further reduce the number of cells with expected frequency of less than 5 the response category of "neither agree nor disagree" was excluded. Further, in an attempt to increase expected frequencies adjacent response categories were combined (see Siegel and Castellan, 1988, pp49-50), i.e., "strongly disagree" and "disagree" were combined as "disagree"; "agree" and "strongly agree" were combined as "agree".

X^2 Obtained chi-square value.

r^1 Relationship.

p Probability.

* 20% or more of cells have an expected value of less than 5.

** Organisations that responded indicated full agreement to the proposed strategy, i.e. all designer and contractor organisations responded either "agree" or "strongly agree" to the proposed strategy.

Appendix E - Results of appraisal of strategies to remove or alleviate constraints in the processes of construction procurement in Malaysia

Table 21 - Most suitable locations of new cement plants as perceived by respondent organisations (by state)

State	No	%*
Perlis	1	4.35
Kedah	1	4.35
Pulau Pinang	2	8.69
Perak	3	13.04
Selangor	1	4.35
Kuala Lumpur	3	13.04
Negeri Sembilan	1	4.35
Melaka	2	8.69
Johor	5	21.74
Pahang	4	17.39
Terengganu	4	17.39
Kelantan	7	30.43
Sarawak	4	17.39
Sabah & Labuan	7	30.43
Total organisation	23	

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100

Table 22 - Breakdown of respondent organisations willing to participate in the third part of the research (the interviews) (by category and type)

Category and type	No	%
Client		
Government ministry and department	1	4.17
Developer	0	0.00
Total client	1	4.17
Designer		
(JKR) Public Works Department	5	20.83
Architect	3	12.50
Engineer	1	4.17
Quantity Surveyor	7	29.17
Total designer	16	66.67
Contractor		
CIDB Grade 3	2	8.33
CIDB Grade 4	0	0.00
CIDB Grade 5	0	0.00
CIDB Grade 6	0	0.00
CIDB Grade 7	5	20.83
Total contractor	7	29.16
Total organisations	24	100.00

Appendix F

Interview recording sheet

The Nottingham Trent University

Faculty of Environmental Studies

Department of Surveying
Acting Head – Paul Collins MSc (Urb Plan) ARICS

Construction Procurement Research Unit

Our Ref: ( ) in survey 3/data/97 16 July 1997

Dear Sir,

Research on "Construction Procurement Process in Malaysia : Developing Strategies to Support the Economic Target of Vision 2020"

I am a Malaysian researcher undertaking research on the topic mentioned above. My study is sponsored by the Malaysian Government. The findings will be forwarded to the relevant authorities for use in developing the Malaysian Construction Industry. The work is carried out in partial fulfilment for the degree of PhD at The Nottingham Trent University, England.

The research is in three parts, i.e. Part 1 on the identification of constraints within the process of construction procurement in Malaysia, Part 2 on the evaluation of proposed strategies to remove or alleviate the constraints identified, and Part 3 is on validating the constraints identified in Part 1 and validating the evaluated strategies identified in Part 2.

Both Part 1 and 2 were executed through postal surveys during November 1996 to February 1997 and April to June 1997 respectively. The surveys were conducted on Malaysian organisations including yours. I wish to record my appreciation to those organisations that have responded to the surveys.

I am now starting on Part 3 of the research. For this part, informal structured interviews either personal or through telephone will be conducted by myself in Malaysia from 18 August 1997 to 18 September 1997. Your organisation had indicated willingness to participate/has been selected to participate in the interview. Each interview is expected to last for 45 minutes. In order to minimise inconvenience to you, I suggest the interview to be held at your office.

I reassure you that all information obtained from the interview is confidential and will be used only for statistical analysis,

The accuracy of the work will depend on the numbers of useful interviews conducted. I hope you would be able to meet me and discuss issues relating to the above topic. Please indicate your availability for an interview by returning the attached sheet. You could either use the self addressed internationally prepaid envelope provided, e-mail me on <Abdul Rashid, Khairuddin@ntu.ac.uk> or fax your reply on UK 0115 9486507 (no later than Monday 4 August 1997).

I thank you in advance for your cooperation and look forward to meet you.

Yours sincerely,

Khairuddin Bin Abdul Rashid
Construction Procurement Research Unit
Department of Surveying

Copy.Professor Roy Morledge
Construction Procurement Research Unit

Burton Street
Nottingham NG1 4BU
Tel: (0115) 941 8418
Telex: 377534 Polnot G
Fax: (0115) 948 6507

The proposed dates for the interviews are as follows* :

Dates		**Location**
18 - 20 August 1997	(3 days)	Selangor
21 - 22 & 25 - 28 August 1997	(6 days)	Kuala Lumpur
29 August 1997	(1 day)	Perak
2 September 1997	(1 day)	Kedah
3 - 4 September 1997	(2 days)	Penang
5 September 1997	(1 day)	Pahang (by telephone)
6 September 1997	(1 day)	Kelantan (by telephone)
8 - 9 September 1997	(2 days)	Sabah
10 - 11 September 1997	(2 days)	Sarawak
15 September 1997	(1 day)	Negeri Sembilan
16 September 1994	(1 day)	Melaka
17 -18 September 1997	(2 days)	Johor

* Exact time of interview will be confirmed by telephone prior to 18 August 1997

-- **cut here** --

Date:_______

To :
Khairuddin Bin Abdul Rashid
Construction Procurement Research Unit
Department of Surveying
The Nottingham Trent University
Burton Street, Nottingham NG1 4BU
United Kingdom
Fax No : UK 0115 9486507

Research on "Construction Procurement Process in Malaysia : Developing strategies to support the economic target of Vision 2020"

☐ I would like to participate in the interview on the date mentioned above*

☐ I would like to participate in the interview but will only be available on __________ (please indicate date)*

☐ I would not be able to participate in the interview*

Name : ______________________________

Position : ______________________________

Organisation's name and address : ______________________________

____

____

Telephone/facsimile : ______________/______________

Email address : ______________________________

*Please tick appropriate box

a:\survey3.wri (16/7/97)

VALIDATING PROPOSED STRATEGIES TO REMOVE/ALLEVIATE CONSTRAINTS IN CONSTRUCTION PROCUREMENT PROCESSES IN MALAYSIA

Interview no:
Date:
Time start/finish: /
Method: Personal/Telephone

INTERVIEW QUESTIONNAIRE

The objective of this interview is to validate proposed strategies to remove/alleviate constraints within the construction procurement processes in Malaysia. Specifically, this interview aims to validate the proposed strategies in terms of firstly, their viability and feasibility and secondly, the order of priority in implementation.

Constraints in construction procurement processes in Malaysia have been identified in a survey which was conducted in November/December 1996. The proposed strategies to remove/ alleviate the constraints identified are strategies that have been selected by not less than eighty percent of the respondents in a survey which was conducted in May/June 1997. Respondents to both surveys were Malaysian representing organisations involved in construction procurement processes in Malaysia.

Guidance on conducting the interview

The interview questionnaire is in three parts:

Part 1: Respondent's personal data
Part 2: Organisation's characteristics
Part 3: Validating proposed strategies to remove/alleviate constraints within construction procurement processes in Malaysia

Ask all questions and record all answers. Reassure respondents that their answers are confidential and will be used only for statistical analysis.

All questions will only require either a tick (/) or a cross (x) in the appropriate box or numbers written in the spaces provided. Verbal comments (if any) will be recorded by the interviewer.

Explain to respondents that in this research the following definitions apply:

The term **'constraints in construction procurement processes'** is defined as limitations or restrictions imposed on the process of acquiring construction projects.

'Current constraints' are defined as constraints that are currently experienced.

'Future constraints' are defined as constraints that will exist for up to five years from now.

At the end of the interview a letter of appreciation will be presented to the respondent.

Part 1. Respondent's personal data

1. Name:
2. Position:
3. Name of organisation:
4. Address:
5. Telephone:
6. Facsimile:
7. Sex:
8. Age:
9. Professional background/qualification:
10. Working experience (in years):

Part 2. Organization's characteristics

1. Your organization (please tick (/) one box only)
   (a) Jabatan Kerja Raya Malaysia ☐ (e) Private Quantity Surveying firm ☐
   (b) Other Government Ministry/Department ☐ (f) Property Developer ☐
   (c) Private Architectural firm ☐ (g) Contractor ☐
   (d) Private Engineering firm ☐ (h) Others, please specify ☐ ________

   (i) If your organization is a contractor, please state:
   (1) PKK Class of registration _____ and/or (2) CIDB Grade of registration _____
   (3) Category: (i) Building ☐ (ii) Civil Engineering ☐
   (iii) M & E ☐ (iv) Others, please specify ☐ ______________

2. Total number of employees in your organization (please tick (/) one box only)
   (a) Under 5 ☐ (e) 30 to 49 ☐ (i) 500 to 999 ☐
   (b) 5 to 9 ☐ (f) 50 to 99 ☐ (j) 1000 and above ☐
   (c) 10 to 19 ☐ (g) 100 to 199 ☐
   (d) 20 to 29 ☐ (h) 200 to 499 ☐

3. Your head office is located in (please tick (/) one box only)
   (a) Perlis ☐ (f) Kuala Lumpur ☐ (k) Terengganu ☐
   (b) Kedah ☐ (g) Negeri Sembilan ☐ (l) Kelantan ☐
   (c) Penang ☐ (h) Melaka ☐ (m) Sarawak ☐
   (d) Perak ☐ (i) Johor ☐ (n) Sabah ☐
   (e) Selangor ☐ (j) Pahang ☐ (o) Labuan ☐

4. Your current projects are located in (you can tick (/) more than one box)
   (a) Perlis ☐ (f) Kuala Lumpur ☐ (k) Terengganu ☐
   (b) Kedah ☐ (g) Negeri Sembilan ☐ (l) Kelantan ☐
   (c) Penang ☐ (h) Melaka ☐ (m) Sarawak ☐
   (d) Perak ☐ (i) Johor ☐ (n) Sabah ☐
   (e) Selangor ☐ (j) Pahang ☐ (o) Labuan ☐

5. Types of current projects (you can tick (/) more than one box)
   (a) Housing ☐ (d) Specialist projects ☐
   (b) Other buildings ☐ (e.g. mechanical, electrical, etc)
   (c) Civil engineering ☐ (e) Others, please specify ☐ ____________

6. Total value of current projects (please tick (/) one box only)
   (a) Under RM 500,000 ☐ (f) RM 15,000,000 to RM 19,999,999 ☐
   (b) RM 500,000 to RM 999,999 ☐ (g) RM 20,000,000 to RM 29,999,999 ☐
   (c) RM 1,000,000 to RM 4,999,999 ☐ (h) RM 30,000,000 to RM 39,999,999 ☐
   (d) RM 5,000,000 to RM 9,999,999 ☐ (i) RM 40,000,000 and above ☐
   (e) RM 10,000,000 to RM 14,999,999 ☐

For office use only: *(1) Type of organization: (i) Public sector ☐ (ii) Private sector ☐*
(2) Organization's role: (i) Designer ☐ (ii) Client ☐ (iii) Contractor ☐

Part 3. Validating proposed strategies to remove/alleviate constraints within construction procurement processes in Malaysia

For each of the constraints identified, a list of strategies (in order of importance) is presented. Please indicate your agreement or disagreement to the viability and feasibility of each strategy by putting a tick (/) or a cross (x) respectively in the boxes provided. In addition, if you feel that the order of importance of the strategies is not appropriate, please indicate your order of priority by rank in the spaces provided.

Constraint 1: Constraints at project planning stage caused by procedures in obtaining statutory approvals, i.e. land acquisition, planning permission and building regulations

Strategies for current constraint

☐ 1. Streamline and standardise administrative procedures in Local Authorities

☐ 2. Simplify and standardise approval procedures nationwide

☐ 3. Improve organisational and functional coordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers

☐ 4. Revise planning legislation with the objective of achieving faster planning approval

Your order of priority (if different from above): __/__/__/__

Strategies for future constraint

☐ 1. Improve organisational and functional coordination within Local Authorities, i.e. between the three levels of governments - federal, state and district - and between governments departments and the private utility providers

☐ 2. Streamline and standardise administrative procedures in Local Authorities

☐ 3. Simplify and standardise approval procedures nationwide

☐ 4. Revise planning legislation with the objective of achieving faster planning approval

Your order of priority (if different from above): __/__/__/__

Constraint 2: Constraints in availability of Malaysian produced cement

Strategies for current constraint only

☐ 1. Improve enforcement to curb hoarding and black marketeering of cement

☐ 2. Existing cement plants should increase production to relieve shortages

☐ 3. Initiate research into alternative materials to cement in construction

Your order of priority (if different from above): __/__/__

Constraint 3: Constraints in availability of unskilled, semi-skilled and skilled Malaysian labour

Strategies for current constraints

☐ 1. Increase intake of new trainees

☐ 2. Contractors should move towards greater use of plant to reduce the use of labour

☐ 3. Increase the productivity of labour

☐ 4. CIDB should speed-up its efforts on the accreditation and certification of skilled worker

☐ 5. Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers

☐ 6. CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers

☐ 7. CIDB should produce a policy on construction workers (i.e. number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc)

Your order of priority (if different from above): ___/___/___/___/___/___/___

Strategies for future constraint

☐ 1. Contractors should move towards greater use of plant to reduce the use of labour

☐ 2. CIDB should speed-up its efforts on the accreditation and certification of skilled worker

☐ 3. Increase intake of new trainees

☐ 4. Increase the productivity of labour

☐ 5. CIDB should produce a policy on construction workers (i.e. number of workers required currently and in future, the breakdown of workers required according to trades, recruitment, intakes of new trainees, foreign workers, retention, wages and other incentives, health and safety, etc)

☐ 6. CIDB should speed-up its efforts in compiling and maintaining a register of skilled workers

☐ 7. Revise training syllabuses with the objective of achieving quicker delivery of semi-skilled and skilled workers

☐ 8. Design should promote rationalisation of components; industrialisation of components production; and capital intensive site operations to reduce the use of labour

Your order of priority (if different from above): ___/___/___/___/___/___/___/___

Constraint 4: Constraint in availability of facilities for training skilled labour

Strategies for current constraint

☐ 1. Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth

☐ 2. CIDB and other bodies should set up new training centres specializing in the training of skills required by the construction industry

☐ 3. The Human Resources Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry

☐ 4. The On Site Training Scheme administered by the Human Resources Ministry on government projects should be extended to include projects in the private sector

☐ 5. Contractors should provide adequate training facilities for their workers

☐ 6. Private sector should be more active in providing training facilities

Your order of priority (if different from above): ___/___/___/___/___/___

Strategies for future constraint

☐ 1. Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth

☐ 2. CIDB and other bodies should set up new training centres specializing in the training of skills required by the construction industry

☐ 3. The Human Resources Development Fund (HRDF) Scheme for training and retraining of workers should be extended to include the construction industry

☐ 4. Private sector should be more active in providing training facilities

☐ 5. Contractors should provide adequate training facilities for their workers

☐ 6. The On Site Training Scheme administered by the Human Resources Ministry on government projects should be extended to include projects in the private sector

Your order of priority (if different from above): ___/___/___/___/___/___

Constraint 5: Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (Malaysian citizens)

Strategies for current constraint

☐ 1. Expand the capacity of existing university/colleges to train more students in key construction courses

☐ 2. Promote the construction industry and its key professions (architecture, engineering and quantity surveying) to schools

☐ 3. Increase the number of entrants into key construction courses

☐ 4. Increase use of technology (eg. computers) in design process to reduce manpower requirements

☐ 5. Set up new educational institutions to train more students in key construction courses

☐ 6. Professional institutions should oversee training of key professionals and semi-professionals

☐ 7. Increase the productivity of professionals and semi- professionals

☐ 8. Local professional firms to form alliances to increase key manpower capacity

☐ 9. Conduct postgraduate conversion courses to provide a route to professional and semi-professional qualifications for graduates of other disciplines who want to work in the construction industry

Your order of priority (if different from above): ___/___/___/___/___/___/___/___/___

Strategies for future constraint

☐ 1. Expand the capacity of existing university/colleges to train more students in key construction courses

☐ 2. Promote the construction industry and its key professions (architecture, engineering and quantity surveying) to schools

☐ 3. Increase use of technology (eg. computers) in design process to reduce manpower requirements

☐ 4. Increase the productivity of professionals and semi- professionals

☐ 5. Professional institutions should oversee training of key professionals and semi-professionals

☐ 6. Increase the number of entrants into key construction courses

continue next page.../

Constraint 5: Constraints in availability of key design team members (professionals - architects, engineers and quantity surveyors) and key assistant design team members (semi-professionals - technical assistants and technicians - in architectural, engineering and quantity surveying) (Malaysian citizens) (continued)

Strategies for future constraint (continued)

☐ 7. Set up new educational institutions to train more students in key construction courses

☐ 8. Local professional firms to form alliances to increase key manpower capacity

☐ 9. Encourage greater use of information technology to provide opportunities for qualified women to work from home

Your order of priority (if different from above): ___/___/___/___/___/___/___/___/___

Constraint 6: Constraints in availability of technically competent, experienced and financially capable Malaysian specialist contractors

Strategies for current constraint

☐ 1. Develop mechanisms to allow local specialist contractors to gain experience.

☐ 2. Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer

☐ 3. The 'umbrella' and 'dedicated contractors' scheme for training Bumiputra contractors by the government to be extended to include training for specialist contractors

☐ 4. Local specialist contractors to form alliances to increase their level of expertise and financial capability

☐ 5. Local specialist contractors to form alliances with foreign specialist contractors to increase their level of expertise and financial capability

☐ 6. Provide facilities for training specialist contractors

Your order of priority (if different from above): ___/___/___/___/___/___

Strategies for future constraint

☐ 1. Develop mechanisms to allow local specialist contractors to gain experience

☐ 2. The 'umbrella' and 'dedicated contractors' scheme for training Bumiputra contractors by the government to be extended to include training for specialist contractors

☐ 3. Local specialist contractors to form alliances to increase their level of expertise and financial capability

☐ 4. Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer

Your order of priority (if different from above): ___/___/___/___

Constraint 7: Constraints caused by procedures in obtaining Certificate Of Fitness For Occupation (CF)

Strategies for current constraint

☐ 1. Disseminate information on approval procedures

☐ 2. Streamline and standardise administrative procedures in Local Authorities

☐ 3. Improve organisational and functional coordination within Local Authorities, i.e.between the three levels of governments - federal, state and district - and between governments departments and the private utility providers

☐ 4. Simplify and standardise approval procedures nationwide

☐ 5. Inspection for CF approval should be done progressively and to be based on standard inspection schedule

☐ 6. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to coordinate CF approval among the various departments

☐ 7. Local Authorities should confine criterias for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements

Your order of priority (if different from above): ___/___/___/___/___/___/___

Strategies for future constraint

☐ 1. Streamline and standardise administrative procedures in Local Authorities

☐ 2. Improve organisational and functional coordination within Local Authorities, i.e.between the three levels of governments - federal, state and district - and between governments departments and the private utility providers

☐ 3. Disseminate information on approval procedures

☐ 4. Simplify and standardise approval procedures nationwide

☐ 5. Local Authorities should confine criterias for CF approval on conditions stipulated in the Development Order, factors concerning safety and legal requirements

☐ 6. Set up a one stop, full service agency within the Local Authorities to which the client can turn for advice, technical assistance, and to coordinate CF approval among the various departments

☐ 7. Inspection for CF approval should be done progressively and to be based on standard inspection schedule

Your order of priority (if different from above): ___/___/___/___/___/___/___

Constraint 8: Constraints in contract administration due to political and/or bureaucratic interference

Strategies for current constraint

☐ 1. Superintending Officer should be fully qualified and experienced professional

☐ 2. Improve organizational and functional co-ordination between clients and other bodies (eg. banks, Federal Treasury, Local Authority, private utility providers, etc.) to avoid administrative bottlenecks

☐ 3. Superintending Officer should be given full powers to supervise projects in accordance with the conditions of contract

☐ 4. Client to appoint full time Superintending Officer - SO - to supervise each project

Your order of priority (if different from above): ___/___/___/___

Strategies for future constraint

☐ 1. Superintending Officer should be fully qualified and experienced professional

☐ 2. Improve organizational and functional co-ordination between clients and other bodies (eg. banks, Federal Treasury, Local Authority, private utility providers, etc.) to avoid administrative bottlenecks

☐ 3. Superintending Officer should be given full powers to supervise projects in accordance with the conditions of contract

☐ 4. Client to appoint full time Superintending Officer - SO - to supervise each project

Your order of priority (if different from above): ___/___/___/___

Constraint 9: Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities)

Strategies for current constraint only

☐ 1. Encourage local universities/colleges to conduct relevant research and development and in publishing the findings

☐ 2. Encourage professional institutions to conduct relevant research and development and in publishing the findings

☐ 3. CIDB should speed up its efforts to collect, analyse, interpret and publish data on a regular basis on the construction industry

☐ 4. Local Authorities should make transparent all matters pertaining to approval process

☐ 5. Local Authorities should disseminate information on statutory requirements, procedures for their applications and approvals

Continue next page.../

Constraint 9: Constraints in availability of reliable sources of information (on statutory requirements, cost data, project opportunities) (continued)

Strategies for current constraint only (continued)

☐ 6. Encourage greater participation of private sector in relevant research and development and in publishing the findings

☐ 7. Disseminate information on project opportunities through major newspapers, technical and professional journals

☐ 8. CIDB should take the lead in research and development and publications and coordinate research and development and publication of works of others

Your order of priority (if different from above): ___/___/___/___/___/___/___/___

Constraint 10: Constraints in availability of suitable sites

Strategies for future constraint only

☐ 1. Create new urban and industrial sites in suitable locations

☐ 2. Local Authorities should speed-up preparing and gazetting the latest structure plan. (Structure plan provides clients with information on Local Authorities' land use planning. This would assist clients in identifying areas suitable for development)

☐ 3. Speed-up land acquisition and land conversion process

☐ 4. Revive derelict land in urban areas

☐ 5. Strictly enforce the Real Property Gains Tax Act to curb land speculation

Your order of priority (if different from above): ___/___/___/___/___

Constraint 11: Constraints in availability of (Malaysian) timber

Strategies for future constraints only

☐ 1. Government policies on sustainable forest management should be implemented strictly and urgently

☐ 2. Encourage research to identify alternative materials to replace or to minimise using primary timber in construction

☐ 3. Encourage the use of secondary timber (eg. rubber wood) in construction (where appropriate)

☐ 4. Use alternatives materials to replace or to minimise the use of timber in temporary works (eg. in formwork and scaffolding)

Your order of priority (if different from above): ___/___/___/___

General strategies

The following strategies are construction industry level strategies that have been designed within the context of the constraints identified.

Strategies for current constraint

☐ 1. Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry

☐ 2. Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry

☐ 3. Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources

☐ 4. Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry

☐ 5. Construction demands that have potential for mass production (eg. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised

Your order of priority (if different from above): ___/___/___/___/___

Strategies for future constraint

☐ 1. Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry

☐ 2. Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry

☐ 3. Projects should be designed to meet clients' needs (in terms of space, aesthetics and functions) in order to minimise widespread alteration and renovation upon handing over to save resources

☐ 4. Construction demands that have potential for mass production (eg. low cost housing and public buildings like schools) should be rationalised, industrialised and mechanised

☐ 5. Government should take the lead towards rationalisation, industrialisation and mechanisation in the Malaysian construction industry

Your order of priority (if different from above): ___/___/___/___/___

This is the third and final part of the research work.

Thank you very much for your cooperation

Terima kasih diatas kerjasama yang telah anda berikan

VALIDATING PROPOSED STRATEGIES TO REMOVE/ALLEVIATE CONSTRAINTS IN CONSTRUCTION PROCUREMENT PROCESSES IN MALAYSIA

Interview no: Sheet no:

Comments

Constraint 1:

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Constraint 2:

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Constraint 3:

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Constraint 4:

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Constraint 5:

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Constraint 6:

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Constraint 7:

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Constraint 8:

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Constraint 9:

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Constraint 10:

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Constraint 11:

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General strategies:

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Other comments:

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A:\Intervie\interv2.wri. (27/7/97; 28/7/97; 30/7/97; 31/7/97). Revision 4/5 after series of piloting with Prof. R. Morledge, Prof. J.A.J Moohan and Mr Kevin Owen on 30/7/97

Appendix G

Results of interviews to validate proposed strategies

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 1 - Respondent organisations contacted for the interview (by category and type of organisation)

Category and type	Agreed to the inteview[1]	From random sampling[2]	Total	
			No	%
Client	(1)	(3)	(4)	(6.25)
Government ministry and department	1	1	2	3.12
Developer	0	2	2	3.12
Designer	(16)	(28)	(44)	(68.75)
(JKR) Public Works Department	5	2	7	10.94
Architect	3	18	21	32.81
Engineer	1	8	9	14.06
Quantity Surveyor	7	0	7	10.94
Contractor	(7)	(9)	(16)	(25.00)
CIDB Grade 3	2	3	5	7.81
CIDB Grade 4	0	0	0	0.00
CIDB Grade 5	0	2	2	3.12
CIDB Grade 6	0	2	2	3.12
CIDB Grade 7	5	2	7	10.94
Total	24	40	64	100.00

Numbers in brackets denote group total.

1 Respondent organisations of Survey 2 that indicated willingness to participate in the interview.

2 Organisations selected through stratified random sampling from the main database used for Survey 1.

Table 2 - Institutions contacted for the interview

Institutions	No
Housing Developers Association of Malaysia (HDA)	1
Architects Association of Malaysia (PAM)	1
Institution of Engineers Malaysia (IEM)	1
Institution of Surveyors Malaysia (ISM)	1
Malay Contractors Association of Malaysia (PKMM)	1
Master Builders Association of Malaysia (MBA)	1
Construction Industry Development Board Malaysia (CIDB)	1
Total	7

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 3 - Respondents to the interview (by category and type of organisation)

Category and type	No	%
Client	(5)	(10.64)
Government ministry and department	1	2.13
Developer	4	8.51
Designer	(26)	(55.32)
(JKR) Public Works Department	9	19.15
Architect	6	12.77
Engineer	3	6.38
Quantity Surveyor	8	17.02
Contractor*	11	23.40
Institution	(5)	(10.64)
Architects Association of Malaysia (PAM)	1	2.13
Institution of Engineers Malaysia (IEM)	1	2.13
Malay Contractors Association of Malaysia (PKMM)	1	2.13
Master Builders Association of Malaysia (MBA)	1	2.13
Construction Industry Development Board Malaysia (CIDB)	1	2.13
Total	47	100.00

Numbers in brackets denote group total.

* See Tables 4 and 5 for the breakdown of respondent contractors according to registration classification and category of work respectively.

Table 4 - Respondents' personal characteristic: position in organisation

Position	No	%
Senior manager	22	46.81
General manager/Director	4	8.51
Managing director/Chief executive	4	8.51
Sole proprietor	6	12.77
Partner	4	8.51
Senior technical assistant and others	7	14.89
Total	47	100.00

Table 5 - Respondents' personal characteristic: sex

Sex	No	%
Male	40	85.11
Female	7	14.89
Total	47	100.00

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 6 - Respondents' personal characteristic: age

Age (years)	No	%
Under 25	0	0.00
25 to 34	12	25.53
35 to 44	26	55.32
45 to 54	8	17.02
55 and above	1	2.13
Total	47	100.00

Average age = 39.55 years.
s.d. = 7.01.

Table 7 - Respondents' personal characteristic: professional background

Profession	No	%
Architect	7	14.89
Engineer	17	36.17
Quantity Surveyor	14	29.79
Administrator	7	14.89
Lawyer and other	2	4.26
Total	47	100.00

Table 8 - Respondents' personal characteristic: experience

Experience (years)	No	%
Under 5	3	6.38
5 to 9	12	25.53
10 to 14	8	17.02
15 to 19	16	34.04
20 to 24	5	10.64
25 to 29	1	2.13
30 and above	2	4.26
Total	47	100.00

Average experience = 14.15years.
s.d. = 6.93.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 9 - Respondent contractors (by registration with the CIDB and PKK)

CIDB			PKK		
Grade	**No**	**%**	**Class**	**No**	**%**
3	3	27.27	D	3	27.27
4	0	0.00	C	0	0.00
5	0	0.00	BX	1	9.09
6	1	9.09	B	0	0.00
7	7	63.64	A	7	63.64
Total	11	100.00	Total	11	100.00

Table 10 - Respondent contractors (by work category)

Work category	No	%*
Building works	10	90.91
Civil engineering works	10	90.91
Mechanical and electrical works	3	27.27

Where number of respondent contractor organisations = 11.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent contractor organisations and therefore add up to more than 100.

Table 11 - Size of respondent organisations (by number of employee)

Number of employee	No	%
Under 5	6	12.77
5 to 9	5	10.64
10 to 19	7	14.89
20 to 29	5	10.64
30 to 49	7	14.89
50 to 99	3	6.38
100 to 199	6	12.77
200 to 499	1	2.13
500 to 999	1	2.13
1000 and above	6	12.77
Total	47	100.00

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 12 - Size of respondent organisations (by number of employee and according to sector)

Number of employee	Public sector		Private sector	
	No	%	No	%
Under 5	1	10.00	5	13.51
5 to 9	0	0.00	5	13.51
10 to 19	0	0.00	7	18.92
20 to 29	1	10.00	4	10.81
30 to 49	0	0.00	7	18.92
50 to 99	0	0.00	3	8.11
100 to 199	4	40.00	2	5.41
200 to 499	1	10.00	0	0.00
500 to 999	0	0.00	1	2.70
1000 and above	3	30.00	3	8.11
Total	10	100.00	37	100.00

Table 13 - Location of head office of respondent organisations (by state)

State	No	%
Perlis	0	0.00
Kedah	2	4.26
Pulau Pinang	3	6.38
Perak	1	2.13
Selangor	8	17.02
Kuala Lumpur	13	27.66
Negeri Sembilan	2	4.26
Melaka	1	2.13
Johor	6	12.77
Pahang	1	2.13
Terengganu	0	0.00
Kelantan	1	2.13
Sarawak	5	10.64
Sabah & Labuan	4	8.51
Total	47	100.00

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 14 - Locations of current projects of respondent organisations (by state)

State	No	%*
Perlis	2	4.26
Kedah	10	21.28
Pulau Pinang	11	23.40
Perak	7	14.89
Selangor	13	27.66
Kuala Lumpur	12	25.53
Negeri Sembilan	7	14.89
Melaka	6	12.77
Johor	13	27.66
Pahang	6	12.77
Terengganu	3	6.38
Kelantan	3	6.38
Sarawak	9	19.15
Sabah & Labuan	15	31.91
No reply**	5	-

Where number of respondent organisations = 47.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

** Organisations that do not reply are the professional institutions; they do not undertake construction projects.

Table 15 - Types of current projects undertaken by respondent organisations

Type of project	No	%*
Housing	27	57.45
Other buildings**	37	78.72
Civil engineering	18	38.30
Specialist project	15	31.91
No reply***	5	10.64

Where number of respondent organisations = 47.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

** Other buildings refer to all types of building works excluding housing.

*** Organisations that do not reply are the professional institutions; they do not undertake construction projects.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 16 - Types of current projects undertaken by respondent organisations (by sector)

Type of project	Public sector		Private sector	
	No	%*	No	%*
Housing	0	0.00	27	72.97
Other buildings**	9	90.00	28	75.68
Civil engineering	8	80.00	10	27.03
Specialist project	2	20.00	13	35.14
No reply***	1	10.00	4	10.81
Total organisation	10		37	

Where number of respondent organisations = 47.

* Organisations were allowed to give more than one response to this question: percentages are calculated as a proportion of the number of respondent organisations and therefore add up to more than 100.

** Other buildings refer to all types of building works excluding housing.

*** Organisations that do not reply are the professional institutions; they do not undertake construction projects.

Table 17 - Value of current projects undertaken by respondent organisations

Total value (in RM)	No	%
Under 500,000	1	2.13
500,000 to 999,999	0	0.00
1,000,000 to 4,999,999	1	2.13
5,000,000 to 9,999,999	1	2.13
10,000,000 to 14,999,999	2	4.26
15,000,000 to 19,999,999	1	2.13
20,000,000 to 29,999,000	1	2.13
30,000,000 to 39,999,999	2	4.26
40,000,000 and above	33	70.21
No reply*	5	10.64
Total	47	100.00

* Organisations that do not reply are the professional institutions; they do not undertake construction projects.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 18 - Value of current projects undertaken by respondent organisations (by sector)

Total value (in RM)	Public sector		Private sector	
	No	%	No	%
Under 500,000	0	0.00	1	2.70
500,000 to 999,999	0	0.00	0	0.00
1,000,000 to 4,999,999	0	0.00	1	2.70
5,000,000 to 9,999,999	0	0.00	1	2.70
10,000,000 to 14,999,999	0	0.00	2	5.41
15,000,000 to 19,999,999	0	0.00	1	2.70
20,000,000 to 29,999,000	0	0.00	1	2.70
30,000,000 to 39,999,999	1	10.00	1	2.70
40,000,000 and above	8	80.00	25	67.57
No reply*	1	10.00	4	10.81
Total	10	100.00	37	100.00

* Organisations that do not reply are the professional institutions; they do not undertake construction projects.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 19 - Validation of strategies to remove or alleviate current constraints within the processes of construction procurement processes in Malaysia by respondent organisations (overall)

Constraint and strategy	a	a (%)	s	m^1	s.e.	p	p^1
C1							
C1/S2	38	90.48	√	1.74	0.16	2	1
C1/S4	38	90.48	√	1.66	0.08	1	2
C1/S3	38	90.48	√	2.63	0.09	3	3
C1/S9	35	83.33	√	3.97	0.03	4	4
C2							
C2/S4	38	90.48	√	1.39	0.08	1	1
C2/S1	42	100.00	√	1.62	0.09	2	2
C2/S12	39	92.86	√	2.82	0.07	3	3
C3							
C3/S7	42	100.00	√	1.12	0.08	1	1
C3/S9	42	100.00	√	2.12	0.10	2	2
C3/S2	41	97.62	√	3.15	0.10	3	3
C3/S14	42	100.00	√	3.98	0.09	4	4
C3/S8	37	88.10	√	4.97	0.10	5	5
C3/S13	42	100.00	√	5.78	0.09	6	6
C3/S15	42	100.00	√	6.55	0.19	7	7
C4							
C4/S1	40	95.24	√	1.10	0.10	1	1
C4/S2	42	100.00	√	1.95	0.05	2	2
C4/S3	37	88.10	√	2.94	0.04	3	3
C4/S4	40	95.24	√	3.92	0.10	4	4
C4/S6	41	97.62	√	4.80	0.09	5	5
C4/S5	41	97.62	√	5.76	0.10	6	6
C5							
C5/S17	40	95.24	√	1.17	0.17	1	1
C5/S16	41	97.62	√	1.95	0.03	2	2
C5/S18	41	97.62	√	2.95	0.03	3	3
C5/S4	41	97.62	√	3.95	0.03	4	4
C5/S19	36	85.71	√	4.97	0.03	5	5
C5/S21	40	95.24	√	5.87	0.05	6	6
C5/S2	41	97.62	√	6.80	0.09	7	7
C5/S9	41	97.62	√	7.80	0.08	8	8
C5/S25	37	88.10	√	8.86	0.09	9	9
C6							
C6/S9	39	92.86	√	1.05	0.03	1	1
C6/S3	39	92.86	√	2.02	0.06	2	2
C6/S10	38	90.48	√	3.05	0.05	3	3
C6/S6	39	92.86	√	3.95	0.03	4	4
C6/S7	39	92.86	√	4.87	0.10	5	5
C6/S5	39	92.86	√	5.97	0.02	6	6
C7							
C7/S5	36	85.71	√	1.19	0.15	1	1
C7/S2	37	88.10	√	1.92	0.04	2	2
C7/S3	37	88.10	√	2.94	0.05	3	3
C7/S4	37	88.10	√	4.02	0.09	4	4
C7/S9	33	78.57	√	4.94	0.04	5	5
C7/S6	35	83.33	√	5.86	0.06	6	6
C7/S10	37	88.10	√	6.70	0.12	7	7

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 19 - Validation of strategies to remove or alleviate current constraints within the processes of construction procurement processes in Malaysia by respondent organisations (overall) (Continued)

Constraint and strategy	a	a (%)	s	m[1]	s.e.	p	p[1]
C8							
C8/S3	33	78.57	√	1.12	0.06	1	1
C8/S4	33	78.57	√	1.91	0.06	2	2
C8/S2	33	78.57	√	3.03	0.03	3	3
C8/S1	33	78.57	√	3.94	0.06	4	4
C9							
C9/S7	42	100.00	√	1.19	0.13	1	1
C9/S8	42	100.00	√	2.05	0.07	2	2
C9/S3	42	100.00	√	2.95	0.03	3	3
C9/S2	42	100.00	√	3.90	0.07	4	4
C9/S1	42	100.00	√	4.93	0.05	5	5
C9/S6	42	100.00	√	5.98	0.02	6	6
C9/S5	42	100.00	√	7.00	0.00	7	7
C9/S4	42	100.00	√	8.00	0.00	8	8
CG							
CG/S2	42	100.00	√	1.00	0.00	1	1
CG/S1	41	97.62	√	2.00	0.00	2	2
CG/S6	41	97.62	√	3.00	0.03	3	3
CG/S4	42	100.00	√	4.00	0.04	4	4
CG/S3	42	100.00	√	5.00	0.06	5	5

Where number of respondents organisatios = 42.

a Number of respondent organisations agreeing with the strategy.

s Status of strategy, where:
√ = strategy is viable and feasible (majority of respondents agree with the strategy).
× = strategy is not viable and not feasible (majority of respondents disagree with the strategy).

m[1] Mean score.

s.e. Standard error of the mean.

p Priority after validation (ranked in accordance with the mean scores).

p[1] Priority prior to validation.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 20 - Validation of strategies to remove or alleviate future constraints within the processes of construction procurement processes in Malaysia by respondent organisations (overall)

Constraint and strategy	a	a (%)	s	m[1]	s.e.	p	p[1]
F1							
F1/S3	38	90.48	√	1.13	0.08	1	1
F1/S2	38	90.48	√	2.08	0.04	2	2
F1/S4	38	90.48	√	2.87	0.08	3	3
F1/S9	35	83.33	√	3.91	0.08	4	4
F3							
F3/S9	41	97.62	√	1.22	0.17	1	1
F3/S14	41	97.62	√	2.24	0.17	2	2
F3/S7	41	97.62	√	3.14	0.09	3	3
F3/S2	41	97.62	√	3.93	0.09	4	4
F3/S15	41	97.62	√	4.95	0.12	5	5
F3/S13	41	97.62	√	5.85	0.09	6	6
F3/S8	38	90.48	√	6.97	0.04	7	7
F3/S10	42	100.00	√	7.45	0.24	8	8
F4							
F4/S1	40	95.24	√	1.10	0.10	1	1
F4/S2	42	100.00	√	1.93	0.04	2	2
F4/S3	37	88.10	√	2.97	0.03	3	3
F4/S5	41	97.62	√	3.85	0.06	4	4
F4/S6	41	97.62	√	4.85	0.06	5	5
F4/S4	40	95.24	√	5.80	0.11	6	6
F5							
F5/S17	40	95.24	√	1.00	0.00	1	1
F5/S16	41	97.62	√	1.97	0.02	2	2
F5/S4	41	97.62	√	2.97	0.02	3	3
F5/S2	41	97.62	√	3.97	0.02	4	4
F5/S21	40	95.24	√	5.00	0.00	5	5
F5/S18	41	97.62	√	5.95	0.05	6	6
F5/S19	37	88.10	√	7.00	0.00	7	7
F5/S9	41	97.62	√	7.85	0.08	8	8
F5/S27	40	95.24	√	8.85	0.08	9	9
F6							
F6/S9	39	92.86	√	1.00	0.00	1	1
F6/S10	38	90.48	√	2.00	0.00	2	2
F6/S6	39	92.86	√	2.97	0.02	3	3
F6/S3	39	92.86	√	3.97	0.02	4	4
F7							
F7/S2	37	88.10	√	1.16	0.13	1	1
F7/S3	37	88.10	√	2.11	0.14	2	2
F7/S5	37	88.10	√	2.97	0.06	3	3
F7/S4	37	88.10	√	4.02	0.10	4	4
F7/S10	37	88.10	√	4.94	0.05	5	5
F7/S6	35	83.33	√	5.94	0.05	6	6
F7/S9	33	78.57	√	6.79	0.13	7	7
F8							
F8/S3	33	78.57	√	1.09	0.05	1	1
F8/S4	33	78.57	√	1.94	0.06	2	2
F8/S2	33	78.57	√	3.03	0.03	3	3
F8/S1	33	78.57	√	3.94	0.06	4	4

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 20 - Validation of strategies to remove or alleviate future constraints within the processes of construction procurement processes in Malaysia by respondent organisations (overall) (Continued)

Constraint and strategy	a	a (%)	s	m^1	s.e.	p	p^1
F10							
F10/S7	33	78.57	√	1.06	0.04	1	1
F10/S2	33	78.57	√	2.00	0.04	2	2
F10/S9	33	78.57	√	3.03	0.03	3	3
F10/S6	33	78.57	√	4.06	0.04	4	4
F10/S1	33	78.57	√	4.85	0.12	5	5
F11							
F11/S1	40	95.24	√	1.00	0.00	1	1
F11/S5	40	95.24	√	2.05	0.03	2	2
F11/S4	40	95.24	√	3.00	0.03	3	3
F11/S3	40	95.24	√	3.95	0.05	4	4
FG							
FG/S2	42	100.00	√	1.00	0.00	1	1
FG/S1	41	97.62	√	2.00	0.00	2	2
FG/S6	41	97.62	√	3.00	0.03	3	3
FG/S3	42	100.00	√	3.98	0.04	4	4
FG/S4	42	100.00	√	4.90	0.06	5	5

Where number of respondents = 42.

a Number of respondents agreeing with the strategy.

s Status of strategy, where:

√ = strategy is viable and feasible (majority of respondents agree with the strategy).

× = strategy is not viable and not feasible (majority of respondents disagree with the strategy).

m^1 Mean score.

s.e. Standard error of the mean.

p Priority after validation (ranked in accordance with the mean scores).

p^1 Priority prior to validation.

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 21 - Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia by clients, designers and contractors

Constraint and strategy	Client				Designer				Contractor			
	a(%)	s	m[1]	p	a(%)	s	m[1]	p	a(%)	s	m[1]	p
C1												
C1/S2	100.00	√	1.00	1	88.46	√	2.00	2	90.91	√	1.50	1
C1/S4	100.00	√	2.00	2	88.46	√	1.52	1	90.91	√	1.80	2
C1/S3	100.00	√	3.00	3	88.46	√	2.52	3	90.91	√	2.70	3
C1/S9	80.00	√	4.00	4	84.62	√	3.95	4	81.82	√	4.00	4
C2												
C2/S4	100.00	√	1.20	1	96.15	√	1.48	1	72.73	√	1.25	1
C2/S1	100.00	√	1.80	2	100.00	√	1.61	2	100.00	√	1.54	2
C2/S12	100.00	√	3.00	3	88.46	√	2.83	3	100.00	√	2.73	3
C3												
C3/S7	100.00	√	1.00	1	100.00	√	1.15	1	100.00	√	1.09	1
C3/S9	100.00	√	2.00	2	100.00	√	2.23	2	100.00	√	1.91	2
C3/S2	100.00	√	3.00	3	96.15	√	3.24	3	100.00	√	3.00	3
C3/S14	100.00	√	4.00	4	100.00	√	3.96	4	100.00	√	4.00	4
C3/S8	60.00	√	5.00	5	92.31	√	4.96	5	90.91	√	5.00	5
C3/S13	100.00	√	5.60	6	100.00	√	5.77	6	100.00	√	5.91	6
C3/S15	100.00	√	6.60	7	100.00	√	6.38	7	100.00	√	6.91	7
C4												
C4/S1	100.00	√	1.00	1	96.15	√	1.00	1	90.91	√	1.40	1
C4/S2	100.00	√	2.00	2	100.00	√	2.00	2	100.00	√	1.82	2
C4/S3	60.00	√	3.00	3	96.15	√	2.96	3	81.82	√	2.89	3
C4/S4	80.00	√	3.75	4	100.00	√	4.04	4	90.91	√	3.70	4
C4/S6	100.00	√	4.40	5	100.00	√	4.92	5	90.91	√	4.70	5
C4/S5	100.00	√	5.40	6	100.00	√	5.81	6	90.91	√	5.80	6
C5												
C5/S17	100.00	√	1.00	1	96.15	√	1.28	1	90.91	√	1.00	1
C5/S16	100.00	√	2.00	2	96.15	√	1.96	2	100.00	√	1.91	2
C5/S18	100.00	√	3.00	3	96.15	√	2.96	3	100.00	√	2.91	3
C5/S4	100.00	√	4.00	4	96.15	√	3.96	4	100.00	√	3.91	4
C5/S19	60.00	√	5.00	5	92.31	√	4.95	5	81.82	√	5.00	5
C5/S21	100.00	√	5.60	6	96.15	√	5.92	6	90.91	√	5.90	6
C5/S2	100.00	√	6.60	7	96.15	√	6.92	7	100.00	√	6.64	7
C5/S9	100.00	√	7.60	8	96.15	√	7.92	8	100.00	√	7.64	8
C5/S25	60.00	√	9.00	9	96.15	√	8.96	9	81.82	√	8.55	9
C6												
C6/S9	60.00	√	1.00	1	100.00	√	1.04	1	90.91	√	1.10	1
C6/S3	60.00	√	2.00	2	100.00	√	2.08	2	90.91	√	1.90	2
C6/S10	60.00	√	3.00	3	96.15	√	3.08	3	90.91	√	3.00	3
C6/S6	60.00	√	4.00	4	100.00	√	3.92	4	90.91	√	4.00	4
C6/S7	60.00	√	5.00	5	100.00	√	4.81	5	90.91	√	5.00	5
C6/S5	60.00	√	6.00	6	100.00	√	5.96	6	90.91	√	6.00	6
C7												
C7/S5	100.00	√	1.00	1	80.77	√	1.33	1	90.91	√	1.00	1
C7/S2	100.00	√	2.00	2	84.62	√	1.86	2	90.91	√	2.00	2
C7/S3	100.00	√	3.00	3	84.62	√	2.91	3	90.91	√	3.00	3
C7/S4	100.00	√	4.00	4	84.62	√	4.04	4	90.91	√	4.00	4
C7/S9	60.00	√	5.00	5	80.77	√	4.90	5	81.82	√	5.00	5
C7/S6	100.00	√	5.60	6	80.77	√	5.86	6	81.82	√	6.00	6

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 21 - Validation of strategies to remove or alleviate current constraints within the processes of construction procurement in Malaysia by clients, designers and contractors (Continued)

Constraint and strategy	Client				Designer				Contractor			
	a(%)	s	m[1]	p	a(%)	s	m[1]	p	a(%)	s	m[1]	p
C7/S10	100.00	√	6.60	7	84.62	√	6.68	7	90.91	√	6.80	7
C8												
C8/S3	40.00	×	1.00	1	88.46	√	1.13	1	72.73	√	1.12	1
C8/S4	40.00	×	2.00	2	88.46	√	1.91	2	72.73	√	1.88	2
C8/S2	40.00	×	3.00	3	88.46	√	3.04	3	72.73	√	3.00	3
C8/S1	40.00	×	4.00	4	88.46	√	3.91	4	72.73	√	4.00	4
C9												
C9/S7	100.00	√	1.00	1	100.00	√	1.31	1	100.00	√	1.00	1
C9/S8	100.00	√	2.00	2	100.00	√	2.08	2	100.00	√	2.00	2
C9/S3	100.00	√	3.00	3	100.00	√	2.93	3	100.00	√	3.00	3
C9/S2	100.00	√	4.00	4	100.00	√	3.85	4	100.00	√	4.00	4
C9/S1	100.00	√	5.00	5	100.00	√	4.88	5	100.00	√	5.00	5
C9/S6	100.00	√	6.00	6	100.00	√	5.96	6	100.00	√	6.00	6
C9/S5	100.00	√	7.00	7	100.00	√	7.00	7	100.00	√	7.00	7
C9/S4	100.00	√	8.00	8	100.00	√	8.00	8	100.00	√	8.00	8
CG												
CG/S2	100.00	√	1.00	1	100.00	√	1.00	1	100.00	√	1.00	1
CG/S1	100.00	√	2.00	2	100.00	√	2.00	2	90.91	√	2.00	2
CG/S6	100.00	√	3.00	3	96.15	√	3.04	3	100.00	√	2.91	3
CG/S4	100.00	√	4.00	4	100.00	√	4.00	4	100.00	√	3.91	4
CG/S3	100.00	√	5.00	5	100.00	√	4.88	5	100.00	√	4.91	5

Where number of clients = 5, designers = 26, and contractors = 11.

a Percentage of respondents agreeing with the strategy.

s Status of strategy, where:

√ = strategy is viable and feasible (majority of respondents agree with the strategy).

× = strategy is not viable and not feasible (majority of respondents disagree with the strategy).

m[1] Mean score.

p Priority (ranked in accordance with the mean scores).

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 22 – Validation of strategies to remove or alleviate future constraints within the processes of construction procurement in Malaysia by clients, designers and contractors

Constraint and strategy	Client				Designer				Contractor			
	a(%)	s	m[1]	p	a(%)	s	m[1]	p	a(%)	s	m[1]	p
F1												
F1/S3	100.00	√	1.00	1	88.46	√	1.17	1	90.91	√	1.10	1
F1/S2	100.00	√	2.00	2	88.46	√	2.04	2	90.91	√	2.20	2
F1/S4	100.00	√	3.00	3	88.46	√	2.91	3	90.91	√	2.70	3
F1/S9	80.00	√	4.00	4	84.62	√	3.86	4	81.82	√	4.00	4
F3												
F3/S9	100.00	√	1.00	1	96.15	√	1.08	1	100.00	√	1.64	1
F3/S14	100.00	√	2.00	2	96.15	√	2.44	2	100.00	√	1.91	2
F3/S7	100.00	√	3.00	3	96.15	√	3.28	3	100.00	√	2.91	3
F3/S2	100.00	√	4.00	4	96.15	√	3.92	4	100.00	√	3.91	4
F3/S15	100.00	√	5.00	5	96.15	√	4.96	5	100.00	√	4.91	5
F3/S13	100.00	√	6.00	6	96.15	√	5.80	6	100.00	√	5.91	6
F3/S8	60.00	√	7.00	7	92.31	√	7.00	7	100.00	√	6.91	7
F3/S10	100.00	√	7.60	8	100.00	√	7.23	8	100.00	√	7.91	8
F4												
F4/S1	100.00	√	1.00	1	96.15	√	1.00	1	90.91	√	1.40	1
F4/S2	100.00	√	2.00	2	100.00	√	1.96	2	100.00	√	1.82	2
F4/S3	60.00	√	3.00	3	96.15	√	3.00	3	81.82	√	2.89	3
F4/S5	100.00	√	3.60	4	100.00	√	3.92	4	90.91	√	3.80	4
F4/S6	100.00	√	4.60	5	100.00	√	4.92	5	90.91	√	4.80	5
F4/S4	80.00	√	5.75	6	100.00	√	5.92	6	90.91	√	5.50	6
F5												
F5/S17	100.00	√	1.00	1	96.15	√	1.00	1	90.91	√	1.00	1
F5/S16	100.00	√	2.00	2	96.15	√	2.00	2	100.00	√	1.91	2
F5/S4	100.00	√	3.00	3	96.15	√	3.00	3	100.00	√	2.91	3
F5/S2	100.00	√	4.00	4	96.15	√	4.00	4	100.00	√	3.91	4
F5/S21	100.00	√	5.00	5	96.15	√	5.00	5	90.91	√	5.00	5
F5/S18	100.00	√	6.00	6	96.15	√	6.00	6	100.00	√	5.82	6
F5/S19	60.00	√	7.00	7	96.15	√	7.00	7	81.82	√	7.00	7
F5/S9	100.00	√	7.60	8	96.15	√	8.00	8	100.00	√	7.64	8
F5/S27	100.00	√	8.60	9	96.15	√	9.00	9	90.91	√	8.60	9
F6												
F6/S9	60.00	√	1.00	1	100.00	√	1.00	1	90.91	√	1.00	1
F6/S10	60.00	√	2.00	2	96.15	√	2.00	2	90.91	√	2.00	2
F6/S6	60.00	√	3.00	3	100.00	√	2.96	3	90.91	√	3.00	3
F6/S3	60.00	√	4.00	4	100.00	√	3.96	4	90.91	√	4.00	4
F7												
F7/S2	100.00	√	1.00	1	84.62	√	1.27	1	90.91	√	1.00	1
F7/S3	100.00	√	2.00	2	84.62	√	2.18	2	90.91	√	2.00	2
F7/S5	100.00	√	3.00	3	84.62	√	2.95	3	90.91	√	3.00	3
F7/S4	100.00	√	4.00	4	84.62	√	4.04	4	90.91	√	4.00	4
F7/S10	100.00	√	5.00	5	84.62	√	4.91	5	90.91	√	5.00	5
F7/S6	100.00	√	6.00	6	80.77	√	5.90	6	81.82	√	6.00	6
F7/S9	60.00	√	7.00	7	80.77	√	6.67	7	81.82	√	7.00	7
F8												
F8/S3	40.00	×	1.00	1	88.46	√	1.13	1	72.73	√	1.00	1
F8/S4	40.00	×	2.00	2	88.46	√	1.91	2	72.73	√	2.00	2
F8/S2	40.00	×	3.00	3	88.46	√	3.04	3	72.73	√	3.00	3

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 22 – Validation of strategies to rémove or alleviate future constraints within the processes of construction procurement in Malaysia by clients, designers and contractors (Continued)

Constraint and strategy	Client				Designer				Contractor			
	a(%)	s	m[1]	p	a(%)	s	m[1]	p	a(%)	s	m[1]	p
F8/S1	40.00	×	4.00	4	88.46	√	3.91	4	72.73	√	4.00	4
F10												
F10/S7	100.00	√	1.00	1	69.23	√	1.10	1	90.91	√	1.00	1
F10/S2	100.00	√	2.00	2	69.23	√	2.10	2	90.91	√	2.00	2
F10/S9	100.00	√	3.00	3	69.23	√	3.10	3	90.91	√	3.00	3
F10/S6	100.00	√	4.00	4	69.23	√	4.10	4	90.91	√	4.00	4
F10/S1	100.00	√	5.00	5	69.23	√	4.60	5	90.91	√	5.00	5
F11												
F11/S1	100.00	√	1.00	1	96.15	√	1.00	1	90.91	√	1.00	1
F11/S5	100.00	√	2.00	2	96.15	√	2.00	2	90.91	√	2.00	2
F11/S4	100.00	√	3.00	3	96.15	√	3.00	3	90.91	√	3.00	3
F11/S3	100.00	√	4.00	4	96.15	√	4.00	4	90.91	√	4.00	4
FG												
FG/S2	100.00	√	1.00	1	100.00	√	1.00	1	100.00	√	1.00	1
FG/S1	100.00	√	2.00	2	100.00	√	2.00	2	90.91	√	2.00	2
FG/S6	100.00	√	3.00	3	96.15	√	2.91	3	100.00	√	3.00	3
FG/S3	100.00	√	4.00	4	100.00	√	3.91	4	100.00	√	4.00	4
FG/S4	100.00	√	5.00	5	100.00	√	4.91	5	100.00	√	5.00	5

Where number of clients = 5, designers = 26, and contractors = 11.

a Percentage of respondents agreeing with the strategy.

s Status of strategy, where:
√ = strategy is viable and feasible (majority of respondents agree with the strategy).
× = strategy is not viable and not feasible (majority of respondents disagree with the strategy).

m[1] Mean score.

p Priority (ranked in accordance with the mean scores).

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 23 - Analysis of verbal comments on the constraints identified

No	C	F	C1	F1	C2	C3	F3	C4	F4	C5	F5	C6	F6	C7	F7	C8	F8	C9	F10	F11
1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
2	A	A	A	A	N	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
3	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***N***	***N***	***A***	***A***	***A***	***A***	***A***	***N***	***N***
4	A	A	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
5	A	A	A	A	A	A	A	N	N	A	A	A	A	A	A	A	A	A	N	N
6	A	A	A	A	D	A	A	A	A	A	A	N	N	A	A	N	N	A	A	N
7	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***N***	***N***	***N***	***N***	***N***
8	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A
9	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***D***	***D***	***A***	***A***	***A***	***A***	***A***	***A***	***A***
10	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***
11	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	D	D	D	A	N
12	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
13	A	A	D	D	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A
14	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
15	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
16	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
17	A	A	N	N	A	A	A	A	A	A	A	A	A	A	A	D	D	N	A	A
18	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A	A
19	A	A	A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A
20	A	A	A	A	A	A	A	N	N	A	A	A	A	A	A	A	A	A	A	A
21	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
22	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***	***A***
23	A	A	A	A	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
24	A	A	A	A	A	A	A	A	A	A	A	D	D	A	A	D	D	A	A	A
25	A	A	N	N	A	A	A	A	A	A	A	D	D	A	A	D	D	A	A	A
26	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	N
27	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N
28	A	A	A	A	D	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
29	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
30	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
31	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N
32	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	D	N	N
33	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A	A
34	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	N	A
35	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A
36	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A
37	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A
38	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	N	A	A	D
39	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	D	D	A	D	D
40	A	A	D	D	A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A
41	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
42	A	A	A	A	A	A	A	A	A	D	D	A	A	A	A	A	A	A	A	A
43	A	A	N	N	A	A	A	A	A	A	A	N	N	N	N	N	N	A	N	N
44	A	A	A	A	N	A	A	A	A	A	A	N	N	A	A	N	N	A	A	A
45	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	N	A	A

Appendix G - Results of interview to validate strategies to remove or to alleviate constraints in the processes of construction procurement in Malaysia

Table 23 - Analysis of verbal comments on the constraints identified (Continued)

No	C	F	C1	F1	C2	C3	F3	C4	F4	C5	F5	C6	F6	C7	F7	C8	F8	C9	F10	F11
46	A	A	D	D	A	D	D	A	A	D	D	A	A	D	D	D	D	A	D	A
47	A	A	D	D	A	A	A	A	A	D	D	A	A	D	D	A	A	A	D	A
T	47	47	39	39	41	45	45	44	44	43	43	37	37	39	39	35	35	38	33	34
T1	0	0	8	8	6	2	2	3	3	4	4	10	10	8	8	12	12	9	14	13
TT	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

Results in bold italic are those of professional institutions.

No	Interview serial number.
C	The presence of current constraints (overall).
F	Perceived future constraints (overall).
C1	Current constraints at project planning stage caused by procedures in obtaining statutory approvals.
F1	Perceived future constraints at project planning stage caused by procedures in obtaining statutory approvals.
C2	Current constraints in availability of Malaysian produced cement.
C3	Current constraints in availability of labour (Malaysian citizens).
F3	Perceived future constraints in availability of labour (Malaysian citizens).
C4	Current constraints in availability of facilities for training skilled labour.
F4	Perceived future constraints in availability of facilities for training skilled labour.
C5	Current constraints in availability of key design team members (Malaysian citizens).
F5	Future constraints in availability of key design team members (Malaysian citizens).
C6	Current constraints in availability of technically competent, experienced and Financially capable Malaysian contractors.
F6	Perceived future constraints in availability of technically competent, experienced and Financially capable Malaysian contractors.
C7	Current constraints caused by procedures in obtaining CF for completed facilities.
F7	Perceived future constraints caused by procedures in obtaining CF for completed facilities.
C8	Current constraints in contract administration due to political and or bureaucratic interference.
F8	Perceived future constraints in contract administration due to political and or bureaucratic interference.
C9	Current constraints in availability of reliable sources of information.
F10	Perceived future constraints in availability of suitable sites.
F11	Perceived future constraints in availability of timber.

Verbal comments relating to the constraints identified are coded as follows:

A	Respondent indicated agreeing with the constraint identified.
D	Respondent indicated disagreeing with the constraints identified.
N	Respondent did not offer any comment or doesn't know.

Results of the analysis of the verbal comments:

T	Total respondents agreeing with the constraints identified.
T1	Total respondents disagreeing with the constraints identified or don't know.
TT	Total number of respondents.
P	Predominant responses.

Appendix H

Transcription of verbal comments made by respondents during interviews

Appendix H - Transcription of verbal comments made by respondents during semi-structured interviews in Malaysia

Interview 1

1. The construction industry is very active. Local Authorities are unable to cope with the number of applications for statutory approvals. For example, it could take up to 3 years to obtain approval for land conversion.
2. Shortages of cement delayed the completion of projects. Contractors had to pay more to buy cement in the black market.
3. Shortages of Malaysian skilled labour resulted in poor workmanship because contractors employ semi-skilled and unskilled Malaysian and imported labour to perform skilled tasks.
4. My firm is experiencing staff shortage. It could take up to 3 months to recruit a professional or a semi-professional staff. The shortages of Malaysian professionals and semi-professionals have led to high turnover in these categories of staff.
5. The Government should set guidelines for the development of the Malaysian construction industry.

Interview 2

1. Professional firms are poorly paid. To cover for overheads, professional firms undertake more jobs than they could handle leading to poor quality in services.
2. High operating costs prevented professional firms from spending on training, etc.
3. The construction industry lacks professionalism. For example, about 70% of faults in projects were due to professionals' poor services. The remaining 30% were due to clients' changing their needs during the progress of the project.
4. The Government is the best party to implement the identified strategies. It has the legal framework to do so. The private sector would not participate unless there is enforcement and incentives.

Interview 3

1. The procedure for processing statutory approvals within Local Authorities is good but staff shortages and untrained personnel lead to inefficiencies in the processes of approving statutory applications.
2. Shortages of cement are seasonal. Contractors are not keen on using imported cement because their properties are different from Malaysian produced cement. The high demand for locally produced cement leads to shortages.
3. There is an urgent need for higher provision for education and training for the construction industry.
4. The Malaysian construction industry is private sector driven. However, the Government should set guidelines for the construction industry to follow.

Interview 4

1. Constraint in the resources and functions as identified exist currently and is perceived to continue in the future for up to 2001.

Interview 5

1. There is a real shortage of cement. The high number of on going projects leads to high demand in Malaysian produced cement. A delivery delay of 1 month is common for cement.
2. Shortages of Malaysian skilled labour affected workmanship and delayed the completion of projects. The delays were due to remedial works undertaken to rectify the poor workmanship.
3. Staff turnover among professionals and semi-professionals is high. They demand higher salary. It could take between 3 to 6 months to recruit a professional or a semi-professional staff.
4. There is no constraint in the availability of technically competent, experienced and financially capable Malaysian specialist contractors for projects such as housing and the like. The constraint exists for mega projects.
5. A delay of between 3 to 6 months in the process of obtaining Certificate Of Fitness For Occupation (CF) is common. There are many requirements set by various bodies within the Local Authorities.

6. The most constrained area is Kuala Lumpur where most development projects are taking place.

Interview 6

1. In the process of obtaining statutory approvals' constraints exist. Causes of constraints include overlapping of functions between different levels of governments; between different government's departments; and between government departments and the private utility providers.
2. There is a shortage of Malaysian labour. Employing foreign labour led to poor workmanship. In most cases, imported labour is unskilled but they claimed to be skilled.
3. It could take up to 3 months to recruit a professional or a semi-professional staff.
4. In extreme cases it could take between 2 to 3 years to obtain Certificate Of Fitness For Occupation (CF).
5. Constraints in availability of suitable sites in the future could happen in the urban areas but not in the eastern states of Peninsular Malaysia.
6. There should be greater emphasis on human resources development.
7. Local universities produced graduates that do not meet the needs of the Malaysian construction industry.
8. Research forms a very small area. There should be better integration between the universities and the private sector.
9. Consultants and contractors should be more professional and be more accountable for their services.

Interview 7

1. It could take between 3 to 6 months (from date of application) to obtain statutory approvals. The implications include increases on holding cost.
2. Malaysia produced cement is preferred by contractors. In addition, projects' specifications require the use of Malaysian produced cement or imported cement approved by the Standards and Industrial Research Institute of Malaysia.
3. Skills training in the construction industry are fragmented. Some public sector training centres produce trainees that do not possess skills required by the construction industry.
4. The high salary demanded by Malaysian professionals and semi-professionals lead contractors to employ expatriates such as from the Philippines.
5. The number of Malaysian specialist contractor is small. For example, only 5% of members of the Malay Contractors Association are specialist contractors.
6. Constraints caused by procedures in obtaining Certificates Of Fitness For Occupation (CF) are widespread. The causes of constraints include inefficiencies of the Local Authorities.
7. Government intervention is essential in order to promote growth in the Malaysian construction industry.

Interview 8

1. In one of our projects, delay in land acquisition delayed the commencement of the project by 4 months. The delay was due to the presence of illegal settlement on the site.
2. The planning legislation is clear. Delays in obtaining planning permission are due to inefficiencies in the processes of approving statutory applications.
3. Shortages of cement require contractors to allow a longer lead-time of up to 3 months to ensure uninterrupted supply. In addition, the shortages led to price increases by up to 100% more than price approved by the government.
4. Shortages of Malaysian labour are affecting productivity and workmanship. It could take up to 2 months to recruit labour and labour turnover is very high.
5. We could not recruit Malaysian professionals in specialised areas such as electrical and electric instrumentation. We imported professionals from Britain, Australia and India.

Appendix H - Transcription of verbal comments made by respondents during semi-structured interviews in Malaysia

6. Malaysian contractors do not have the expertise in some specialised areas like instrumentation for refinery. We imported specialist contractors from France and Japan.
7. On constraints in contract administration, we have had difficulties. The difficulties were due to conflict of interest between the different levels of governments.

Interview 9

1. It could take between 6 months to 2 years to obtain statutory approvals. The time taken depends on the efficiency of the Local Authorities concerned.
2. Shortages of cement are seasonal. In 1996 the shortage was 900,000 metric tonne. Currently there are 9 cement plants in Malaysia and 2 more plants are due to start operation soon. With the expansion in production capacity, availability of cement would not become a constraint in the future.
3. Shortages of Malaysian labour for the construction industry are serious. Malaysian skilled workers are demanding higher wages while some unskilled and semi-skilled workers are claiming as skilled workers. Up to December 1996 there are about 600,000 to 700,000 foreign workers working in the Malaysian construction industry on a 2 years work permit.
4. Current facilities for training skilled worker are not sufficient. There are 6 training centres in Malaysia but none specifically for the construction industry.
5. It is very difficult to recruit Malaysian professionals. For example, there were cases where there was no respond to job advertisements and less qualified people applying for higher posts. Contractors are importing professional staff from the Commonwealth countries, Iran and Turkey.
6. Constraints in obtaining Certificate of Fitness For Occupation (CF) are serious in housing projects. Housing development involve social responsibilities, hence non-technical aspects are among the criteria for approval used by Local Authorities.
7. There is no current and comprehensive data on the Malaysian construction industry. The Statistics Department published its data every 3 years.
8. Constraints in availability of suitable sites are more serious in the urban areas on the west coast of Peninsular Malaysia.
9. Future shortage in timber may be due to the reduction in logging.

Interview 10

1. The current planning legislation is not standardised nation-wide and therefore, its revision focusing on standardisation of the planning legislation for Malaysia as a whole might remove some of the inherent constraints. In addition, under a new procedure only the town planners are allowed to submit application for planning permissions whereas traditionally it was the architects. As a consequence, a conflict of interest prevails among the town planners and the architects. Hopefully, the revision would address this and other issues concerning land matters, planning permissions and building regulations.
2. The shortages of cement are seasonal, current shortage is due to high demand. Cement is cheaper in the northern states of Peninsular Malaysia because of the presence of many cement plants there.
3. The shortages of Malaysian labour are serious causing poor workmanship. Malaysian workers prefer to work in other industries while imported workers are unskilled. Complaints of defects due to poor workmanship in completed housing projects were genuine.
4. High demand for Malaysian professional and semi-professional staff has led to shortages high turnover and higher salary.
5. The number of Malaysian specialist contractors is small and is not sufficient to cater for the needs of the construction industry. Most are working in joint ventures with foreign specialist contractors.
6. Information on the Malaysian construction industry is fragmented and outdated.

Appendix H - Transcription of verbal comments made by respondents during semi-structured interviews in Malaysia

Interview 11

1. The process of land acquisition could take 6 months. In extreme cases the process could take 4 years.
2. The shortages of cement delayed the completion of projects, increased cost and black marketing of cement supply. Cement is a Government controlled price item. Cement manufacturers are not increasing cement production as a strategy to persuade the Government to raise the price. Contractors are not keen to use imported cement because of poor quality.
3. Shortages of Malaysian labour caused poor workmanship. There was a delay of 1 1/2 year in one of our project because we insisted on the contractor to rectify the poorly completed part of the work. Time constraint forced clients to accept projects at a lower level of quality.
4. Constraint in obtaining Certificate of Fitness For Occupation (CF) is not serious in government projects.

Interview 12

1. It could take between 6 months to 5 years to obtain statutory approvals. It is unfair to allow unqualified personnel within the Local Authorities to vet through applications submitted by professionally qualified designers. The personnel would rigidly apply outdated bylaws in processing applications.
2. Shortages of cement are due to high demand and the preference for locally produced cement amongst contractors. The import duty and tax on imported cement are high. This is because the Government wants the construction industry to use local cement to protect the Malaysian cement industry. Lack of competition from imported cement makes the Malaysian cement producers complacent.
3. High demand for labour has caused shortages, high labour turnover and high wages. Imported labours are mostly unskilled.
4. It could take up to 6 months to hire Malaysian professional or semi-professional staff.
5. It could take between 6 months to 4 years to obtain the Certificate of Fitness For Occupation (CF). Clients do contribute in prolonging the delays. Their actions in varying approved development plans further stretched staff resources of Local Authorities.
6. Local Authorities' complex bureaucratic procedures often led to abuse.
7. There are no reliable sources and up to date data on the construction industry.

Interview 13

1. No requirement for statutory approvals for public sector projects.
2. Reasons for delays in processing statutory approvals include the involvement of many bodies and departments in the approving process and Local Authorities' lack of qualified and experienced personnel to process applications.
3. Shortages of cement are seasonal. The commissioning of the new cement plant in Bahau in 1998 could reduce the shortages of cement in Tampin in the future.
4. Shortages of Malaysian skilled labour led to the dependency on unskilled foreign labour. The shortages led to unskilled labours being employed to execute skilled task leading to poor workmanship.
5. There is no facility for construction skills training in Tampin. In addition, it is difficult to get trainees under the Government's On Site Training Schemes. This is because of Malaysia's full employment situation and competition from other industries.
6. The Public Works Department is currently experiencing staff shortages in the professionals and semi-professional categories.
7. Constraints in availability of Malaysian specialist contractors are not serious and our projects are not highly specialised.
8. On constraints in contract administration, in public sector projects supervising officers are not given full power under the contract to supervise projects.

In addition, there are too many procedures: federal and state governments' rulings and departmental procedures to be followed.

9. There are too many policies affecting the construction industry but reliable information is lacking.
10. The current practice of buying technology is not a long-term policy. Research and development are the key to the future especially to "Malaysianised" the industry.

Interview 14

1. Decision on statutory approvals was slow.
2. There is a high demand for cement. Cement is a Government controlled price item therefore suppliers blamed high transport cost as the reason for raising cement price. Delivery delays of 2 weeks are possible.
3. Shortages of Malaysian labour resulted in high turnover of workers and high wages. Qualified trainees are not keen to work in the construction industry.
4. It could take up to between 5 to 6 months to recruit Malaysian professionals and semi-professionals. They demand high salary.
5. There is a need for further human resource development and research in the Malaysian construction industry.
6. The Government should intervene by designing and implementing development policies for the Malaysian construction industry.

Interview 15

1. It could take between 6 months to 1 year to obtaining statutory approvals. The cause for the delay is bureaucracy in Local Authorities.
2. Contractors need a lead-time of 3 months to ensure uninterrupted supply of cement.
3. Shortages of Malaysian skilled labour affect workmanship as unskilled labours were employed to execute skilled tasks.
4. No structured courses on skills training. Most training is site based and is on 'ad-hoc' basis.
5. Experienced Malaysian professional is difficult to recruit. For example there was no respond to our advertisement for a Resident Architect.
6. There is a need to change the way in which the Malaysian construction industry is being run. The industry players should be more accountable and professional and they should minimise resources and increase standards.
7. Strategy implementation should be the Government. They have the legal framework to do so.

Interview 16

1. It could take between 3 to 6 months to obtain statutory approvals. Bureaucratic procedures caused the delay. The planning legislation is clear but there are inefficiencies in processing the applications for planning permission.
2. The shortages of cement are seasonal.
3. Some 20% of delays in projects were due to the shortages of Malaysian labour. The shortages also result in poor workmanship.
4. There is a lack of serious effort to train construction workers.
5. It is difficult to recruit Malaysian professionals and semi-professionals, sometimes even not available. The immediate solution is to import professionals from abroad.
6. It could take up to 6 months to obtain the Certificate Of Fitness For Occupation (CF). Delays were due to complex procedures used by the Local Authorities and clients' attitude in trying to avoid following the procedures.
7. Suitable sites are expensive to develop.
8. The constraint in availability of timber is already happening. For example, prices of Malaysian timber are high.

Interview 17

1. The shortages in cement are seasonal. There is no cement shortage now.

2. Shortages in Malaysian labour prevent some contractors from expanding. Some contractors are facing difficulties in coping with current demand.
3. The quality of training centres needs to be looked into in order to produce quality trainees. The current training syllabuses require 6 months to 2 years to complete. More 'hands-on' approach is required.
4. Shortages of Malaysian professionals and semi-professionals have caused salary increase. The rate of salary increase demanded by them is about 10% per annum.
5. Malaysian contractors lack training to become specialist contractors.
6. It could take between 3 months to 2 years to obtain the Certificate Of Fitness For Occupation. There are too many departments involved and co-ordination is lacking.
7. For Vision 2020, there is a need for the construction industry to be more professional.
8. The Government and the private sector must co-operate in preparing a guideline to implement the identified strategies and to see through their implementation.

Interview 18

1. The delay in obtaining statutory approvals is bad. For example, it could take 2 years to obtain approval for a project's layout plan.
2. The construction booms caused cement shortages. The shortages resulted in delays to the completion of projects. In addition, quality of works suffered as contractors attempted to save on the use of cement. Cement manufacturers and suppliers take advantage of the shortages by raising the price of cement. Consequently, clients' suffer cost increases.
3. Shortages of Malaysian labour led to poor workmanship and delays in the completion of projects and push wages upwards.
4. Our firm is willing to provide facilities for training skilled workers as long as other parties are also involved. There should be a single body to control quality of the trainees produced.
5. Due to the shortages of Malaysian professionals and semi-professional, staff in these categories is demanding higher salary.
6. The delay in obtaining Certificate Of Fitness For Occupation (CF) could take up to 6 months. The main cause of the delay is government red tape.
7. Now we do not experience constraints in the availability of suitable sites. However constraints may exist in the future due to the country's rapid rate of development.
8. The government should take the lead in implementing the strategies.

Interview 19

1. Different Local Authorities adopt different procedures when processing applications for statutory approvals. There is no standardisation across the nation. Delays in obtaining statutory approvals are worse in Kuala Lumpur and Johor. The complex procedures often led to abuse.
2. Shortages of cement are seasonal. The results of cement shortages include delays in the completion of projects; black marketing of cement; and price increases of up to 50% from the government's listed price.
3. Skilled Malaysian labour is limited. The industry is dependent on foreign workers. However, work permits are expensive and government red tapes complicate the process of obtaining them.
4. Malaysian youths are not interested to work in the construction industry.
5. The Government should train skilled workers required by the construction industry. Contractors are reluctant to train workers because there is no guarantee the qualified trainees would want to work for them.
6. Shortages of Malaysian professionals and semi-professionals result in high staff turnover in these categories and higher salary demands.

7. The delay in obtaining Certificate Of Fitness For Occupation (CF) is because clients are not clear of the requirements of the authorities.
8. The process of obtaining approval for variation works in public sector projects is slow and is full of government red tape.
9. Reliable information in the construction industry is difficult to obtain.
10. The industry should be more professional. There should be more investment in manpower and in technological developments.
11. The government and the private sector should co-operate in implementing the strategies.

Interview 20

1. Delays in obtaining statutory approvals could be between 6 months to 2 years. The process involves several departments and the Local Authority.
2. Shortages of cement are seasonal. The reason was plants shut down during maintenance and festivities. Two new cement plants are due to begin production in 1998; therefore, shortages may not occur in the future.
3. Some contractors are not participating in new tender exercises due to shortage of workers. Many Malaysians with construction skills are not interested to work in the construction industry. It is expensive to obtain work permits for foreign workers. In addition, the workmanship of foreign workers is poor.
4. Shortages of Malaysian professionals and semi-professionals lead to firms employing expatriates.
5. Delays in obtaining Certificate Of Fitness For Occupation (CF) could be up to 1 year. Consultants not incorporating changes to the original drawings when submitting application for CF contributed to the delays. Complex procedures in obtaining CF lead to abuse.
6. Constraint in contract administration is not serious in projects in the private sectors.
7. Future constraints in availability of suitable sites are possible in urban areas.
8. For the construction industry, human resource development and quality of works are the key issues in the quest toward Vision 2020.
9. The Government should take the lead in strategy implementation.

Interview 21

1. Shortages of cement have pushed price by up to 40%.
2. There is a shortage of Malaysian specialist contractors in the field of mechanical engineering and in fire fighting installations.
3. One of the reasons for delays in obtaining Certificate Of Fitness For Occupation (CF) is when completed projects were not in accordance with the requirements of the Local Authority. However, Local Authority requirements were not clear at the planning stage. The complex procedures often led to abuse.
4. The government should develop strategies to assist contractors to become more professional, more capable and more experienced. The current entry requirement for contractors needs upgrading.
5. The construction industry must be more professional and accountable.
6. Human resource development is the key for the industry to grow.

Interview 22

1. Unqualified staff in Local Authorities processes applications for statutory approvals. The procedures are full of government red tape. Consequently, the process of obtaining statutory approvals takes time. For example, it could take up to 1 year to obtain land acquisition approval and another 1 year to obtain building plans' approval.
2. Shortages of cement are due to high demand arising from many large projects in the country. The preference for Malaysian cement worsens the shortages. The Government has appointed the Construction Industry Development Board and the Standards and Industrial Research Institute Of Malaysia to conduct quality checks on imported cement.

3. The construction industry is not attractive to many Malaysians due to its poor working conditions and poor image. Malaysian workers prefer to work in other industries.
4. To address the issue on labour the Construction Industry Development Board is undertaking registration and accreditation processes to register and to accredit construction workers. Under the processes, the Board will test the skills of construction workers and categorised them into skilled, semi-skilled and unskilled. The system would create a career path for construction workers. The Government has decentralised the process of issuing work permits to foreign workers in efforts to reduce bottlenecks.
5. It appears that there are no demands for training places. Also it appears that awareness on the needs for training in the construction industry is lacking. The construction industry needs more skilled workers but current construction boom leads to employers ignoring the needs for training. The Construction Industry Development Board hopes that its accreditation scheme for workers in the construction industry would boost demands for training places. To cater for the potential demands, the Board is in the process of accrediting currently available training centres and setting up its own training centres.
6. Current boom in construction led to high demand for Malaysian professionals and semi-professionals. Current shortages are being met by importing professionals from abroad.
7. The Malaysian construction industry lacks human resource planning. Consequently, it appears that there is no relationship between training places and manpower needs in the construction industry.
8. Shortages of technically competent, experienced and financially capable Malaysian specialist contractors are serious in specialised areas such as pipe jacking, tunnelling, instrumentation. Part of the reasons is because in the past Malaysian consultants, main contractors and clients preferred to employ foreign specialist contractors. Consequently, Malaysian specialist contractors were not able to acquire sufficient expertise and experience.
9. Constraint in contract administration is more apparent in public sector projects.
10. The Malaysian construction industry is fragmented. There is no common policy for the construction industry as a whole.
11. Malaysian professionals' lack work etiquette and professionalism. Risks were passed down to contractors.
12. It is very unlikely that the Malaysian private sector would want to take the lead in implementing the strategies (since their existence is profit oriented). The Construction Industry Development Board's main task is to develop and to expand the Malaysian construction industry. Therefore, implementation of the strategies should become the Board's task and the Board would call for full co-operation from all parties; the public and private sectors alike.

Interview 23

1. Local Authorities do include non-technical elements as among the criteria in granting statutory approvals.
2. Shortages of cement are seasonal.
3. Shortages of Malaysian labour caused delays in completion of projects and poor workmanship. It is difficult to obtain work permits for foreign workers.
4. Contractors could not recruit trainees under the On Site Training Programmes.
5. The Public Works Department is experiencing staff shortages in the professional and semi-professional categories. Many professionals and semi-professional staff had left to join the private sector for better salary.
6. Shortages of specialist contractors are apparent in mechanical engineering works.
7. Poor decision making and political interest are among the factors causing constraints in contract administration in public sector projects.

8. Constraint in the future is possible in the availability of suitable sites. Squatter problems could be an issue.
9. There is already a constraint in the availability of timber such as hardwood.
10. There is a need to improve professionalism and accountability in the Malaysian construction industry.
11. The Government should come up with a guideline on implementing the strategies.

Interview 24

1. The process of obtaining statutory approvals is slow; it involves many stages. It could take between 2 to 3 years to obtain planning permission and another 1 year to obtain building regulation's approvals. Local Authorities are facing shortages of qualified staff. Consequently, clients may have to bear up to 3 years in holding costs.
2. Shortages of cement are seasonal. Require lead-time of one month to minimise interruptions in the supply of cement.
3. Shortage of Malaysian labours caused poor workmanship and delays to the completion of projects. The delays are because contractors have to rectify poor workmanship.
4. It could take up to 6 months to recruit a Malaysian professional or semi-professional.
5. Published guideline on the requirements for statutory approvals is not available.
6. Price of land is over speculated. The price of land is most expensive in Kuala Lumpur and in Johor Bharu.
7. There is a general lack of professionalism and poor accountability by all players in the Malaysian construction industry.
8. The Construction Industry Development Board should monitor the development of the Malaysian construction industry. Our firm would participate in implementing suitable strategies.

Interview 25

1. Shortages of cement are seasonal.
2. Some 80% of our workers are foreigners. It is difficult to recruit Malaysian workers due to shortages and high demand.
3. High demand for Malaysian professionals and semi-professionals resulted in high turnover and high salary demands.
4. Lengthy procedures caused delays in obtaining Certificate Of Fitness For Occupation (CF).
5. Less involvement of politicians and no government red tape in projects in the private sector. Consequently, there is no problem in contract administration for projects in the private sector.
6. Published information on the requirements of Local Authorities is not available.
7. A future constraint in availability of suitable sites in urban areas such as the Klang Valley is possible. The reasons include over development and high land price due to speculation.

Interview 26

1. Local Authorities in Penang are very strict in implementing the planning legislation.
2. Shortages of cement are seasonal. The presence of mega sized projects in the country caused acute shortages of cement over the last 3 years. The shortages delayed the completion of many projects. Most affected are medium and small sized contractors.
3. Shortages of Malaysian labour caused poor workmanship.
4. During the last economic recession many Malaysians skilled workers moved to other industries. They do not want to come back due to the construction industry's lack of incentives and poor image. To relieve the shortage contractors employ foreign workers. However, most foreign workers are

unskilled and do not possess valid work permits. Contractors risked paying heavy fines if caught employing illegal foreign workers. Further actions include stop work order that would result in delays.

5. Contractors should be more sensitive and should not employ foreign workers without valid work permits. Productivity should be the main concern of contractors, not lower unit cost of labour.
6. Shortages of Malaysian professionals and semi-professionals are due to the high demand from all sectors of the construction industry: public sector, consultants, contractors, developers, etc. Consequently, salary goes up and staff turnover increases. In addition, quality of services suffers as firms take in more jobs than their staff can handle. To relieve the shortages some firms employed foreign professionals but they lack experience in terms of local requirements.
7. Constraints in contract administration are due to lack of understanding of the procedures, poor attitude and personality and lack of trust.
8. The Government must conduct a review on the Malaysian construction industry. More importantly, there must be a real effort to revive and improve the construction industry. I see the role of the Malaysian Construction Industry Development Board as paramount in developing the Malaysian construction industry.

Interview 27

1. Delays in obtaining statutory approvals could be up to 1 year. There is a serious human resources problem within the Local Authorities.
2. Shortages of cement have caused delays to the completion of projects. Contractors faced most of the constraints in availability of cement.
3. Shortages of labour are serious. It caused delays and poor workmanship. Since the last recession many Malaysians skilled workers prefer to work abroad in Japan, Hong Kong, Taiwan and Singapore for better wages and working conditions.
4. The high activity in the Malaysian construction industry leads to high demand for Malaysian professionals and semi-professionals. This in turn leads to high staff high turnover and higher salary demand. It could take up to 6 months to recruit a Malaysian professional or a semi-professional.
5. The lack of Malaysian specialist contractor is pushing tender prices upwards. This is because they could collude in tenders to increase prices.
6. Complex procedures are causing delays in obtaining Certificate of Fitness For Occupation (CF).
7. Future constraints in availability of suitable sites in the future are possible in urban areas such as Kuala Lumpur, Penang and Johor Bharu.
8. Professionalism is lacking in the Malaysian construction industry.
9. The Government should work together with the private sector to set up an overall framework to implement the strategies. The implementation of the strategies requires strict enforcement.

Interview 28

1. Complex procedures involved in obtaining statutory approvals often lead to delays in project implementation.
2. Seasonal supply interruptions lead to minor problems in availability of cement. There are 4 cement plants in the northern states of peninsular Malaysia.
3. Shortages of Malaysian skilled labour are affecting progress and quality of projects such as high rise buildings requiring highly skilled labour. Most workers are foreigners and they lack skills resulting in poor workmanship. The poor image of the Malaysian construction industry leads Malaysians to work in other industries
4. The construction industry is moving towards higher level of technology and requires more training centres to train more Malaysians.
5. To recruit a professional civil engineer may take up to 3 months.

Appendix H - Transcription of verbal comments made by respondents during semi-structured interviews in Malaysia

6. There is a shortage of Malaysian specialist contractors in mechanical engineering works.
7. Complex procedures are causing delays in obtaining Certificate of Fitness For Occupation (CF).
8. Complex procedures such as in obtaining clearance from the authorities and in releasing progress payment are causing constraints in contract administration.
9. Future constraint in availability of suitable sites is possible in urban areas.
10. Shortages of Malaysian timber are already happening. The shortages, such as Class A timber, could be due to reasons such as poor forest management in the past; strict forest management now; and high demand for timber due to rapid development.
11. Human resource development is the key issue to achieve Vision 2020.
12. All parties must give full co-operation in implementing the strategies.

Interview 29

1. The complex procedures and negative attitudes of staff in Local Authorities are causing the delays in obtaining statutory approvals.
2. Shortages of cement are seasonal.
3. The presence of several mega projects caused labour shortages.
4. The Malaysian construction industry requires new training schemes to produce better quality workforce in sufficient number to meet current and future demands.
5. High demand for Malaysian professionals and semi-professionals lead to high staff turnover and higher salary demand. Our firm has to provide attractive salary packages and other incentives to try to retain staff.
6. The number of specialist contractors in Kedah is not sufficient. We have to depend on specialist contractors from other states like Kuala Lumpur.
7. Complex procedures are causing delays in obtaining Certificate of Fitness For Occupation (CF).
8. Constraints in contract administration are more obvious in public projects.
9. There is a lack of published information on the construction industry.
10. Future constraint in availability of suitable sites is possible in urban areas.
11. The need to preserve the forest leads to reduction in logging and in timber production.
12. Human resources development and positive attitudes in delivering quality services are lacking.
13. The development of the Malaysian construction industry should be through self- regulation, as it would not increase government red tape.

Interview 30

1. The procedures in obtaining statutory approvals related to private utility are complex.
2. The cement shortages have been on since 1994. Shortages are affecting the medium to small contractors because cement suppliers prefer to service large contractors with more stable orders especially those involved in mega projects.
3. About 90% of workers in the construction industry are foreigners. Their workmanship is a problem.
4. The public sector is experiencing high level of resignations from its professional and semi-professional staff. They prefer the private sector due to better salary and other incentives.
5. The number of Malaysian specialist contractors is not sufficient to meet demands due to the rapid increase in the number of highly specialised projects.
6. Complex procedures of involving private utility providers lead to constraints in obtaining Certificate of Fitness For Occupation (CF).
7. Most constraints in contract administration in the public sector are due to human problems. They arise due to the complex levels of governments and procedures.
8. Published information on the construction industry is not readily available.

9. Future constraint in availability of suitable sites is possible in the urban areas.
10. Higher needs to protect the environment could lead to future constraints in availability of timber.
11. Human resource development is the key issue in meeting the future needs of the Malaysian construction industry.
12. The Government (through the Construction Industry Development Board) should initiate the expansion of the Malaysian construction industry.

Interview 31

1. Constraints in obtaining statutory approvals include difficulties in estimating, cost uncertainties and potential cost increase. The reasons for the constraints include that the process is not transparent, there is a potential that delays may happen and that clients are not always aware of the changes.
2. Shortages of cement in Sabah are due to insufficient production. Sabah has one cement plant. The quality of imported cement is poor.
3. The shortages of Malaysian skilled labour are serious. Already some contractors are not tendering for new projects for fear that they could not hire workers if their bids were successful. Employing foreign workers with work permits is expensive: contractors have to pay levies and fee for work permits.
4. There is one training centre each for the states of Sabah and Labuan. These are not sufficient to cater for the needs of the local construction industry. More Malaysians should be trained to become skilled workers. On the On Site Training Scheme, there were no trainees interested to receive training. They prefer to work in other industries. Reasons for lack of interest in the construction industry include its poor image and its association with foreign workers.
5. Sabah has never received wide exposure to bigger numbers of professionals and semi-professionals. The high and sudden demand for professionals and semi-professionals over the last few years has created shortages.
6. The number of Malaysian specialist contractors in Sabah is small. This resulted in less competitive tender price for specialist works and delays in the completion of projects. Additional specialist contractors came from Singapore, the Philippines and Kuala Lumpur.
7. Constraints in obtaining Certificate of Fitness For Occupation (CF) include problems such as delays and abuse of power. The reasons for the constraints include staff shortages in Local Authorities and lack of professionalism among the staff of Local Authorities, clients and contractors.
8. Constraints in contract administration include procedural problems and delays. In projects handled by the Public Works Department, reason for the constraints includes the practise of delegation of Superintending Officer's power to the Resident Engineer. While in private projects, the delay may be due to interference by client's representatives such as demanding more from the Superintending Officer.
9. Published information on the Malaysian construction industry is lacking. Data on Building Cost published by the Malaysian Institution Of Surveyors is not up to date.
10. Future constraints in availability of suitable sites include high development cost in urban areas.
11. The Government through the Construction Industry Development Board should take the lead to develop the Malaysian construction industry.

Interview 32

1. The process of obtaining planning permission is full of government red tape and it could take up to 6 months or longer. Local Authorities are facing staff shortages.
2. Shortages of Malaysian professionals and semi-professionals in the past 3 years lead to high staff turnover and high salary demands.

3. About 90% of specialist contractors in Sabah are foreigners mostly from the Philippines.
4. Government red tape is constraining the process of obtaining the Certificate of Fitness For Occupation (CF).
5. The procedures in contract administration, e.g., in variations are complex. Delays in payments are possible. In private projects, clients' interference in contract administration is common.
6. There must be efforts to improve performance of the public sector especially in the Local Authorities.
7. The Government should set out policies to improve the Malaysian construction industry.

Interview 33

1. Sabah has only one cement plant. Shortages of cement could happen during periods of shut down due to either breakdown or maintenance.
2. Malaysians are not keen to work on construction sites. We have to rely on Filipinos and Indonesian workers.
3. Due to the shortages of Malaysian professionals and semi-professionals, it could be between 3 to 6 months to recruit an engineer or a quantity surveyor.
4. There is insufficient number of specialist contractors in Sabah. Tender prices for specialised works were not competitive and cost of specialised works was high.
5. The Local Authorities' complex procedures and staff shortages and too many applications caused delays in obtaining the Certificate of Fitness For Occupation (CF).
6. Government intervention is necessary to ensure effective strategy implementation.
7. Human resource development is the key issue in developing the Malaysian construction industry and for meeting human resources needs of Vision 2020.

Interview 34

1. Delays in land acquisition and other statutory approvals were largely due to squatter problems and staff shortages in Local Authorities.
2. In Sabah, the main problem with cement production is unavailability of clinker. The producer of cement imports clinker from the Philippines. To ensure fair distribution among contractors, the cement manufacturer implemented a quota system.
3. Shortage of Malaysian workers in Sabah is serious. The shortages have caused wages to increase. To reduce labour cost, contractors turn to foreign workers. About 90% of workers in the local construction industry are from Indonesia and the Philippines. Further, Malaysians are not keen to work on construction sites.
4. Shortage of professionals and semi-professionals (especially semi-professionals) in Sabah is serious. The effects include delays in the completion of projects, poor designs and poor supervision.
5. Sabah lacks specialist contractors.
6. There were procedural problems in obtaining Certificate of Fitness For Occupation (CF) for private sector projects. Local Authorities are facing staff shortages (especially professional staff) to process applications for CF.
7. Constraint in contract administration happen when parties in a contract by-pass the Superintending Officer.
8. The government must regulate the construction industry in order to cope with demands brought by Vision 2020.

Interview 35

1. Some procedures involved in obtaining statutory approvals are not applicable to government projects. Delays in obtaining statutory approvals were due to complex procedures; poor coordination among the departments involved in the process; and staff shortages in Local Authorities.

2. In Sarawak, the main problem with cement production is shortages of clinker. The cement producer imports clinker from the Philippines and Peninsular Malaysia.
3. There is a shortage of Malaysian skilled workers in Sarawak. The local construction industry is relying on foreign labours from Indonesia, Bangladesh and the Philippines. Malaysian skilled workers have immigrated to Singapore and Japan to earn higher wages.
4. The one and only training centre in Sarawak, that is, within the Public Works Department, is not strictly training skilled workers for work on construction sites.
5. The Public Works Department is experiencing staff shortages in the professionals and semi-professionals categories due to resignation to join the private sector.
6. Delays in obtaining Certificate of Fitness For Occupation (CF) were due to procedural problems and staff shortages in Local Authorities.
7. Development in human resources and technology; professionalism and work etiquette are key issues to sustain the Malaysian construction industry for Vision 2020.

Interview 36

1. A period of up to 2 years to obtain statutory approvals is common. There is lack of transparencies in the procedures and they are full of government red tape. The planning committee has too much discretionary powers.
2. The availability of clinker in recent months relieved the problems of cement production in Sarawak. Shortages of cement in Sarawak were due to inappropriate government policy on cement and manufacturer and suppliers' marketing strategy. The Government controls the price of cement.
3. The Public Works Department is experiencing serious staff shortages in the professionals and semi-professionals categories.
4. The number of specialist contractors in Sarawak is small. This is due to the lack of demand for their services in the past. Most specialist contractors are from Peninsular Malaysia.
5. Delays are common in obtaining Certificate of Fitness For Occupation (CF). However, the problem is not as bad as in Kuala Lumpur.
6. Many constraints in the process of construction procurement are due to unnecessary procedures.

Interview 37

1. The process of making decision for planning permission in Local Authorities is poor. Delays of up to 2 years are common.
2. There is one cement plant in Sarawak. Limited supply caused shortages.
3. Shortages of Malaysian workers, professionals and semi-professionals arise due to too many projects on-going at the present. The shortages of workers led to the employment of foreign workers from Indonesia and Bangladesh. However, they are usually unskilled.
4. Shortages of specialist contractors are apparent in areas such as gondola system and mechanical engineering works. Contractors from Kuala Lumpur undertake the execution of such works.
5. The process of obtaining Certificate of Fitness For Occupation (CF) could take between 3 to 6 months. Reasons for the delay include insufficient information submitted by clients when making the application.
6. Government's future development policy concerning land use is not clear.
7. Human resource and technology development and research and development are key issues in efforts to sustain the Malaysian construction industry for Vision 2020.

Interview 38

1. Complex procedures and staff shortages in Local Authorities caused delays in obtaining statutory approvals.

2. There is one cement plant in Sarawak.
3. The construction boom results in shortages of Malaysian workers. Consequently, wages of Malaysian workers increased and workmanship suffers. There are many foreign workers in Sarawak including those from Bangladesh, the Philippines and Indonesia but they are mostly unskilled. Some skilled workers were brought in from Hong Kong but this further increased projects' cost.
4. High demand for Malaysian professionals and semi-professionals results in increases in salary. Shortages of staff prevented some firms (especially quantity surveyors) from expanding.
5. Shortages of specialist contractors in Sarawak are more apparent in works like curtain walling, mechanical and electrical works, piling, etc.
6. It could take up to a year to obtain the Certificate of Fitness For Occupation (CF). Complex procedures and staff shortages in Local Authorities caused the delay.
7. High demand for suitable sites for development due to rapid rate of development. Government's future development policy concerning land use is lacking.

Interview 39

1. Delays in obtaining statutory approvals could be up to 3 years. The causes of delays include complex procedures; poor co-ordination among the departments involved in the approval process; poor decision-making; and staff shortages in Local Authorities.
2. There is one cement plant in Sarawak. The opening of a clinker plant recently relieved the shortages of cement in Sarawak.
3. High demand for Malaysian professionals and semi-professionals caused salary to increase and high turnover of staff in these categories. In addition, construction professionals are also working in other economic sectors such as banking, insurance, etc.
4. Shortages of Malaysian specialist contractors in Sarawak are apparent in air-conditioning, mechanical, electrical, fire fighting, and curtain walling installations. There are no facilities to train specialist contractors.
5. There is no reliable published information on the Malaysian construction industry.
6. Government bodies such as the Construction Industry Development Board should regulate the Malaysian construction industry.

Interview 40

1. The requirements for Local Authorities' statutory approvals and Certificate of Fitness For Occupation (CF) exclude Government projects.
2. Shortages of cement affected performance of small and medium sized contractors. These categories of contractors usually face credit and planning problems.
3. Shortages of Malaysian skilled workers are acute in Johor especially in Johor Bharu. The outcomes of the shortages include high wages and poor workmanship. Many prefer to work abroad such as in Singapore, Japan, Taiwan and Hong Kong. To overcome the shortages and to reduce cost, contractors employ foreign workers but they face language and culture problems.
4. Shortages of Malaysian professionals and semi-professionals (especially semi-professionals) are apparent in the public sector. Government staff resigned to join the private sector. Staff pinching by some newly privatised bodies exacerbated the situation.
5. Lack of technically competent and experienced specialist contractor results in delays and poor quality specialised works.
6. In public projects, the involvement of parties not forming part of the contract undermines the power of Superintending Officers and leads to constraints in

contract administration.
7. Human resource development, professionalism, positive ethics and further improvements in the Government's approving procedures are vital in sustaining the Malaysian construction industry.

Interview 41

1. The procedures and requirements for statutory approvals are not clear. There were delays in processing applications for statutory approvals.
2. Shortages of cement are not serious among contractors with good credit facilities.
3. Shortages of Malaysian skilled workers are acute. The outcomes of the shortages include high wages, high turnover and poor workmanship. Many prefer to work abroad such as in Singapore, Japan, Taiwan and Hong Kong.
4. Good systems for training skilled workers are lacking. Training syllabuses appear to prepare trainees for supervisory roles instead of skilled workers.
5. The Government departments concerned could not deliver the Certificate of Fitness For Occupation (CF) on time as promised in their Clients' Charter.
6. Manpower problem needs urgent measures in order to sustain the Malaysian construction industry. The Government should examine the construction industry's capability before introducing any new policy.

Interview 42

1. The process of land conversion could take between 1 to 3 years. This applies to projects in the private sector.
2. Constraints in cements include supply shortages and high price.
3. Shortages of Malaysian workers lead to reliance on workers from Indonesia. Problems include poor workmanship.
4. There are many departments involved in processing the Certificate of Fitness For Occupation (CF). This makes compliance with the various departments' requirements difficult and resulting in delays.
5. Constraints in contract administration include parties to the contract being unaware of new statutory requirements.
6. Information on the Local Authorities' requirements is not readily available.
7. The price of suitable sites in urban areas would be expensive in the future.
8. Supply shortages of good quality Malaysian timber may be a constraint in the future.
9. Use more technology to increase productivity of the Malaysian construction industry.

Interview 43

1. It is difficult and expensive to buy cement.
2. There is an acute shortage of skilled workers.
3. It is difficult to obtain statistics and price information from published sources.

Interview 44

1. There is no standardisation among the Local Authorities on requirements for statutory approvals. There were unnecessary delays and abuses in the process.
2. It is difficult to hire Malaysian skilled workers and they demanded high wages. It is difficult to employ foreign workers. This is because the Government's policy on foreign workers is unclear and not firmed.
3. Difficulties in employing Malaysian professional staff prevented this firm from expanding. They demand high salary.
4. The process of obtaining Certificate Of Fitness For Occupation involves complex procedures and many departments. Negative attitude of and abuse by the staff in Local Authorities exacerbated the problems.

Interview 45

1. The process of obtaining building plans approvals could take between 3 to 6 months depending on the status of drawings submitted. The process for land conversion is easier for commercial projects than for housing projects.

2. Shortages of cement caused delays to the completion of projects. Imported cement is poor in quality.
3. There is a shortage of Malaysian labour. The construction industry employs foreign workers from Indonesia, the Philippines, Bangladesh, India, Pakistan, etc.
4. Shortages of professional and semi-professional staff prevented firms from expanding. High demand leads to high salary increases and high turnover of staff in these categories.
5. Interference from the client's project management team leads to constraints in contract administration.
6. Price of land would be more expensive in the future.
7. Human resource and technology development, professionalism and positive work ethics are vital in order to increase productivity and efficiency in the Malaysian construction industry.

Interview 46

1. The requirements for Local Authorities' statutory approvals and Certificate of Fitness For Occupation (CF) exclude Government projects.
2. There is no cement plant in the state of Kelantan and elsewhere in the east coast states of peninsular Malaysia. Transport problem result in supply shortages of cement.
3. Shortages of skilled workers, professionals and semi-professionals are not serious. The situation has stabilised due to moderation in demand because of Government's initiative to control the number of projects implemented.
4. The shortage of specialist contractors is apparent in mechanical engineering works.
5. Prices of Malaysian timber are becoming expensive.
6. Development in human resource and technology is vital in order to achieve Vision 2020.

Interview 47

1. The requirements for Local Authorities' statutory approvals and Certificate of Fitness For Occupation (CF) exclude Government projects.
2. The shortage in cement is not acute. There is no cement plant in Pahang at the moment. However, the cement plant currently under construction may begin production in 2 to 3 years' time.
3. It is difficult to hire Malaysian skilled workers especially by small contractors. Most workers in Pahang come from the state of Kelantan and Terengganu as well as foreign workers.
4. Contractors have no interest to train workers. Training would incur cost to them.
5. There are a small number of contractors that are capable to execute mechanical engineering works.
6. The constraints in contract administration in public projects are common in progress payment. This is due to delays in receiving development allocation especially at the end of the financial year.
7. Constraints in timber such as hardwoods are already happening.
8. Efficiency in Government mechanism and level of technology in the Malaysian construction industry must match the industry's growth.

Appendix J

List of personnel and organisations interviewed

Appendix J - List of personnel and organisations interviewed

Date	Designation	Organisation	Category
18.8.1997	Director	Perunding Kontrak Bina 11 Jalan 8/1B 46050 Petaling Jaya Selangor	Designer
19.8.1997	Director / Principal Partner	Fawziah & Tan Associates 16A 1st Floor Jalan MJ 1 Medan Maju Jaya Batu 7 Jalan Klang Lama 46000 Petaling Jaya Selangor	Designer
20.8.1997	Honorary Secretary	The Institution of Engineers Bangunan Ingeniur Lot 60/62 Jalan 52/4 46720 Petaling Jaya Selangor	Institution
20.8.1997	Senior Project Executive	Budiman C.E. Sdn Bhd 75A Jalan SS 21/37 Damansara Utama 47400 Petaling Jaya Selangor	Designer
20.8.1997	Senior Project Coordinator	Akitek Urusrancang 88-2 Jalan SS 21/39 Damansara Utama 47400 Petaling Jaya Selangor	Designer
21.8.1997	Director	T.U.P. Construction Sdn Bhd 6 Jalan Waras Satu Taman Connaught 56000 Cheras Kuala Lumpur	Contractor
21.8.1997	Executive Secretary	Malay Contractors Association Tingkat 2 Bangunan No 316 Batu 2 1/2 Jalan Ipoh 51200 Kuala Lumpur	Institution
22.8.1997	Project Manager	MMC Engineering Services Sdn Bhd 32nd Floor Menara PNB 201A Jalan Tun Razak 50730 Kuala Lumpur	Contractor
22.8.1997	Executive Officer	Master Builders Association 2-1 1st Floor Jalan 2/109E Desa Business Park Taman Desa Off Jalan Klang Lama 58100 Kuala Lumpur	Institution
22.8.1997	Honorary Secretary	Malaysian Institute of Architect 4 & 6 Jalan Tangsi 50480 Kuala Lumpur	Institution

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Date	Designation	Organisation	Category
23.8.1997	Assistant Director	Jabatan Agama Islam Wilayah Persekutuan Bangunan Suleiman Jalan Damansara 50476 Kuala Lumpur	Client
23.8.1997	Senior Manager	CSLD Sdn Bhd 8 Jalan Scott 50470 Kuala Lumpur	Designer
25.8.1997	District Engineer	Public Works Department Tampin Negeri Sembilan	Designer
25.8.1997	Project Manager	Syarikat Pembinaan Ijay 563B Taman Aman Jalan Ujung Pasir 75050 Melaka	Contractor
25.8.1997	Project Architect	Ikatan Cipta Bina Akitek Unit 23-02 Tkt 2 Jalan 8/55A Taman Setiawangsa 54200 Kuala Lumpur	Designer
25.8.1997	Senior Manager	Wan Mohamad & Khoo Sdn Bhd 2B 2nd Floor Jalan Mesra 1 Taman Mesra Batu 3 40000 Shah Alam Selangor	Designer
25.8.1997	Senior Manager	Chungyu Construction Sdn Bhd Plot PT 2471 Nilai Industrial Estate 71800 Nilai Negeri Sembilan	Contractor
26.8.1997	Deputy General Manager	Country Heights Holdings Bhd 1 Jalan Sinar Pagi Country Heights 43000 Kajang Selangor	Client
26.8.1997	Senior Manager	Almatab Sdn Bhd 8A Jalan SS15/4 Subang Jaya 47500 Petaling Jaya Selangor	Contractor
26.8.1997	Director	Petareka Perunding Sdn Bhd 5 Jalan 11/62A Bandar Sri Manjalara 52000 Kuala Lumpur	Designer
26.8.1997	Director	Melur Enterprise 50A Jalan 2 Taman Setiawan Maju 32000 Setiawan Perak	Contractor

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Date	Designation	Organisation	Category
27.8.1997	Senior Manager	Construction Industry Development Board Level 19 Menara Dato' Onn PWTC 45 Jalan Tun Ismail 50480 Kuala Lumpur	Institution
27.8.1997	Senior Quantity Surveyor	Public Works Department Headquaters Jalan Sultan Salahuddin 50582 Kuala Lumpur	Designer
28.8.1997	Senior Project Manager	Island & Peninsular Bhd 24-31 Jalan 8/55A Taman Setiawangsa 54200 Kuala Lumpur	Client
28.8.1997	Project Manager	DiJaya Corporation Bhd Suite 17A, 17 Floor Office Tower Plaza Berjaya 12 Jalan Imbi 55100 Kuala Lumpur	Client
2.9.1997	Director	Kuantikos Perunding Sdn Bhd 5th Floor Wisma Lister Garden 123-P Jalan Macallister 10400 Pulau Pinang	Designer
2.9.1997	Director	Nathan-Jones Architect Unit 6A 2nd Floor Lot 10 Lebuh Bishop 10200 Pulau Pinang	Designer
3.9.1997	General Manager	B.S. Civil Engineering Sdn Bhd 65 Tingkat 2 Wisma Sentosa Jalan Kampong Perak 05100 Alor Setar Kedah	Contractor
3.9.1997	Director	Mazs Holdings Sdn Bhd No 9 Bangunan MDKM Jalan Kuala Ketil 08000 Sungei Petani Kedah	Contractor
3.9.1997	Assistant Director	Public Works Department Pulau Pinang Georgetown Pulau Pinang	Designer
5.9.1997	Director	JQK Quantity Surveyors 3rd Floor Lot 9 Block A Damai Plaza Luyang Commercial Centre 88770 Kota Kinabalu Sabah	Designer

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Date	Designation	Organisation	Category
5.9.1997	Director	Jurukos Bina 3rd Floor No 5 Lorong Margosa 2 Luyang Phase 8 Jalan Kolam 88832 Kota Kinabalu Sabah	Designer
5.9.1997	Senior Procurement Manager	Salaxy Corporation Sdn Bhd 1st Lot 7 & 8 Fortuna Commercial Centre Mile 2.5 Penampang Road 88200 Kota Kinabalu Sabah	Contractor
6.9.1997	Assistant Director	Public Works Department Sabah Kota Kinabalu Sabah	Designer
9.9.1997	Senior Quantity Surveyor	Public Works Department Sarawak Kuching Sarawak	Designer
9.9.1997	Assistant Director	Public Works Department Sarawak Kuching Sarawak	Designer
9.9.1997	Senior Architect	Aki Media 1st & 2nd Floor Lot 9034 Section 64 Lorong Sekama 3 Jalan Sekama 93300 Kuching Sarawak	Designer
9.9.1997	Principal	PT Ong Cost Consultant 2nd Floor Lot 513 Off Jalan Padungan 93100 Kuching Sarawak	Designer
10.9.97	Managing Director	JUBM (Sarawak) Sdn Bhd 2nd Floor Lot 142 Bangunan WSK Jalan Abell Kuching Sarawak	Designer
15.9.1997	District Engineer	Public Works Department Johor Bahru Johor	Designer
15.9.1997	General Manager (Johor Region)	Cygal Bhd Lot 4.21 4th Floor Plaza Prima 4 1/2 Mile Old Klang Road 58200 Kuala Lumpur	Client

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Date	Designation	Organisation	Category
15.9.1997	Senior Architect	Abdul Latif Muzammil Architect 38 Jalan Padi Riia 13 Bandar Baru UDA 81200 Johor Bahru Johor	Designer
15.9.1997	Managing Director	IMN Bina Sdn Bhd 48 Jalan Padi Mahsuri 6 Bandar Baru Uda 81200 Johor Bahru Johor	Contractor
15.9.1997	Executive Director	Systematic Plumbing Contractor Sdn Bhd 65 & 65A Jalan Bentara 20 Taman Ungku Tun Aminah 81300 Johor Bahru Johor	Contractor
15.9.1997	Senior Project Executive	KBC Quantity Surveyors Sdn Bhd 42-A Jalan Kuning Taman Pelangi 80400 Johor Bahru Johor	Designer
18.9.1997	Senior Technical Assistant	Public Works Department Pasir Mas Kelantan	Designer
18.9.1997	Senior Technical Assistant	Public Works Department Pekan Pahang	Designer

Appendix K

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Constraints in Resources and Functions Within the Process of Construction Procurement in Malaysia

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Abstract

Malaysia, through its Vision 2020, aims to become a fully developed and industrialised country by the year 2020. Among the key targets of Vision 2020 is that Malaysia's economy must achieve a rapid and sustainable rate of growth of 7% per annum in GDP for thirty years from 1991. However, due to the relatively small size of the Malaysian construction industry, inadequate construction output may be acting as a constraint on rapid and sustainable growth in the economy. To identify any constraints within the process of construction procurement, which might inhibit the level of construction output, a survey was conducted of Malaysian organisations involved in construction procurement in Malaysia. The findings of the survey indicate that within the process of construction procurement in Malaysia constraints in resources and functions are currently experienced and constraints in resources and functions are perceived to exist in the future for up to five years. The findings, reported in this paper, provide a useful basis to identify and develop strategies to boost and to sustain growth in construction output of the Malaysian construction industry.

Keywords: Vision 2020, Construction growth, Constraints, Construction Procurement.

Introduction

In November 1995, the authors began working on a study focusing on the identification of any constraints within the processes of construction procurement in Malaysia that may inhibit the level of construction output and on the development of appropriate strategies to remove or to alleviate the constraints identified. The context of the study is Malaysia's Vision 2020.

This paper reports on the first part of the study, i.e., on the identification of any constraints within the processes of construction procurement in Malaysia that may inhibit the level of construction output. The second part of the study, i.e., on the development of appropriate strategies to remove or to alleviate the constraints identified is currently in progress.

Specifically, the objective of this paper is to identify, on a construction industry-wide perspective, the types and extent of current and perceived future constraints in resources and functions within the process of construction procurement in Malaysia.

Scope of paper

The study adopts the Conseil International du Batiment's (1991) definition of construction procurement, i.e.

> "... the framework within which construction is brought about, acquired or obtained."

Consequently, activities outside the framework of the procurement process (such as sourcing of raw materials for the manufacturing of construction materials, manufacturing of construction materials and components, etc) are not within the scope of the study.

The study is focused at a construction-wide level and therefore will not attempt to identify the types and extent of constraints in resources and functions at micro level, viz: types of construction (buildings, civil engineering and maintenance); categories of organisations that are involved in the procurement process (designer, contractors and clients) (Sharif 1996); sizes of organisations; or geographical locations of construction projects, etc which may be particularly affected.

Further, the study excludes those construction procurement activities such as self help, individual jobbers, rural construction, etc.., which can be described as being in the informal sector (Ofori 1980) of the Malaysian construction industry.

Definitions

For the purpose of the present research, the following definitions apply:

(1) Constraints in construction procurement can be defined as limitations or restrictions imposed on the process of acquiring construction projects.

(2) Current constraints are defined as constraints in resources and functions that are currently experienced by the respondent organisations and/or currently exist in on going construction projects with which the respondent organisations are involved.

(3) Future constraints are those perceived by the respondent organisations will exist until at least 2001.

Vision 2020

Vision 2020, introduced by the Prime Minister of Malaysia in 1991, is a long term strategy aimed at transforming Malaysia from a developing country into a fully developed and industrialised country by the year 2020 (Mahathir Mohamed 1991).

There are economic and socio-political challenges facing Malaysia in its quest towards Vision 2020 (see Mahathir Mohamed 1991; 1997; Mohd Kassim 1993). However, many view these economic challenges as critical in meeting the aims of Vision 2020. They argue that rapid and sustained economic growth will provide the necessary means to meet the overall socio-political challenges of Vision 2020 (Sulaiman 1993; Abdul Rahman 1993; Abdul Hamid 1993).

Consequently, the target set in Vision 2020 that Malaysia's economy must achieve a rapid and sustainable growth rate of 7% per annum in real terms (measured in terms of growth in Gross Domestic Product or GDP) for thirty years from 1991 is seen as the key factor of success in making Malaysia a fully developed and industrialised country (Mahathir Mohamed 1991; Sulaiman 1993; Abdul Rahman 1993; Abdul Hamid 1993).

The targeted growth rate would result in Malaysia's GDP expanding by some eight times, i.e. from RM79 billions in 1990 to about RM630 billions (in constant terms, 1978 prices) in 2020 (Mahathir Mohamed 1991). With the Malaysian population projected to reach around 32 millions by 2020, the per capita income would rise from RM6,180 in 1990 to RM26,100 (in constant terms) or to US$9,500. This would then qualify Malaysia as a high income country (Sulaiman 1993).

In order to achieve the Vision's economic target the Malaysian Government develops and implements various long term and medium term development plans. These development plans include Outline Perspective Plan 2 (1991-2000), which embodies the New Development Policy; The Sixth Malaysia Plan (1991-95); The Seventh Malaysia Plan (1996-2000); Privatisation; and the Accelerated Industrialisation Drive. Central to these development plans are the provision of physical, social and institutional infrastructures aimed at modernisation and industrialisation of the economy and the provision of sufficient housing for the expanding population (Government of Malaysia 1991; 1996; Abdul Hamid 1993; Mohd Kassim 1993; Sulaiman 1993).

The Malaysian Government's efforts so far have produced some very encouraging results. For example, growth in the Malaysian economy since 1988 (measured in terms of percentage growth in GDP) has been consistently above 8% per annum (Table 1); and the manufacturing sector has replaced the primary sector - agriculture and mining - as the leading sector in the economy (Ministry of Finance, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; Salih 1992). Malaysia is now a middle income country and an emerging second-generation newly industrialised country (Auty, 1994).

Table 1. Malaysia: Economy and the Construction Industry
(in RM millions, 1978 constant prices)

Year	Total GDP	Constr.* GDP	% Growth in GDP	% Growth in Constr.* GDP	% Share of Constr.* in GDP
1988	66, 303	2, 133	8.9	2.7	3.22
1989	72, 297	2, 380	9.2	11.6	3.29
1990	79, 329	2, 832	9.7	19.0	3.57
1991	86, 149	3, 240	8.6	14.4	3.76
1992	92, 866	3, 619	7.8	11.7	3.89
1993	100, 617	4, 023	8.3	11.2	3.99
1994	109, 915	4, 589	9.2	14.1	4.18
1995	120, 309	5, 385	9.5	17.3	4.47
1996+	130, 187	5, 870	8.2	9.0	4.50

Average growth in GDP 1988 - 1996 = 8.82%
Average growth in construction GDP 1988 - 1996 = 12.33%
Average share of construction in GDP 1988 - 1996 = 3.87%

Rate of exchange: GBP1 = RM3.9470 @ 14th February 1996
* Constr = Construction
+ Estimates by the Ministry of Finance, Malaysia

Source: Ministry of Finance, Malaysia (1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996)

Long term projection of a country's economy is plagued with various national and international uncertainties (Sulaiman 1993; Merican 1993). Nonetheless, the excellent performance of Malaysia's economy thus far suggests that the economic target of Vision 2020 is attainable (Mahathir Mohamed 1991; 1997; Mohd Kassim 1993; Sulaiman 1993; Navaratnam 1995; UK Department of Trade & Industry 1995).

Construction and Economic Growth

It has been argued by several writers that construction - through its backward and forward linkages with other sectors of the economy - plays a significant role towards sustained economic growth and development in a country (Edmonds, 1979; Turin, 1973a; 1973b; Ofori, 1980; 1988; Edmonds and Miles, 1984; Wells, 1985; 1986; Wang, 1987; Salih, 1992; Ruddock and Lopes, 1996).

The concept, sustainable economic growth, refers to an economy that could continuously grow over the longer term. According to Turin (1973a; 1973b), Edmonds (1979), Edmonds and Miles (1984), Wells (1985; 1986), Ofori (1988) and Ruddock and Lopes (1996) there are two fundamental criteria that the construction industries of developing countries should fulfil if they are to achieve sustainable economic growth, i.e:

(1) construction must grow at a rate higher than the economy; and
(2) there is a minimum size for the construction industry (measured in terms of its contribution to GDP). The minimum size is: 3.6%, 5.2 - 5.4% and 7.3% of GDP for less developed, middle developed and developed countries, respectively (Wells, 1985; 1986).

The first criteria refers to construction capacity (Turin 1973b) while the second criteria refers to construction output (Wells, 1985; 1986). If construction capacity fails to grow at a rate higher than the economy and if construction output falls below the minimum recommended level, inadequate construction capacity and inadequate construction output may be acting as constraints on sustained social and economic development programmes (Turin, 1973a; 1973b; Edmonds, 1979; Wells, 1985; 1986; Al-Mufti, 1987; Ofori, 1988; Al-Omari, 1992; Ruddock and Lopes, 1996).

The Malaysian Economy and the Construction Industry

An examination of the Malaysian economy and construction industry for the period between 1988 and 1996 (Ministry of Finance, 1988-96) revealed the following trends:

(1) The Malaysian economy has attained growth in overall GDP of between 7.8% and 9.7% (an average of 8.8% per annum, Table 1);

(2) The income per capita, at the end of 1995, was US$3,933. The level of income is one of the highest among the developing countries (Navaratnam 1995);

(3) A low rate of inflation (at 3.4% at the end of 1995);

(4) The economy is virtually at full employment. The unemployment rate in 1995 was 2.8 per cent. At the end of 1995, the total number of economically active population was 8.06 million, of which 7.83 million are employed;

(5) Growth in construction GDP ranged from 2.7% to 19.0% (an average of 12.3% per annum; Table 1);

(6) The contribution of construction to overall GDP ranged from 3.22% to 4.50% (an average of 3.9% per annum); and

(7) Growth in employment in the construction industry increased significantly, i.e. from 340,000 persons or 5.5 per cent of total employment in 1988 to 659,400 persons or 8.33 per cent of total employment in 1995, an increase of 1.94 times.

There were many factors that were thought to be responsible for the rapid growth of the Malaysian construction industry between 1988 and 1995. They include:

(1) Stable and rapidly growing economy, whereby improved conditions for the manufacturing, tourism and the services industries led to an increase in domestic demand in the private sector (Ministry of Finance, 1988; 1989; 1990; Bank Negara Malaysia, 1993);

(2) The Government's Privatisation Policy. Privatisation, specifically in the infrastructure sector, became intense from 1987 leading to an escalation in construction activities (Naidu, 1995); and

(3) Massive Government allocations for economic and social infrastructure development under the Fifth and Sixth Malaysia Plans (1986 - 1995; see Government of Malaysia, 1986; 1991).

Detailed examination of the Malaysian economy and construction industry (Table 1) in the context of sustainable economic growth suggested by Turin (1973a; 1973b), Edmonds (1979), Edmonds and Miles (1984), Wells (1985; 1986), Ofori (1988) and Ruddock and Lopes (1996) shows that:

(1) The rate of growth in the Malaysian construction industry over the period between 1988 and 1996 is higher than the rate of growth in the economy (average growth in construction GDP is 12.3% per annum as against 8.8% average growth per annum in the economy); indicating a high level of construction activities; but

(2) The contribution of construction to GDP over the same period - an average of 3.9 per cent of GDP per annum - is lower than it should be (i.e. it should not be less than 5.2% of GDP for a middle income developing country like Malaysia, see Wells, 1985; 1986).

In addition to the low level of construction output, available literature suggests that there has been an increase in construction prices since 1985 (Master Builders Association of Malaysia, 1989/90; Ministry of Finance, 1989; 1990; 1995; Bank Negara Malaysia, 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; Ketua Pengarah Kerja Raya Malaysia, 1996).

According to Wells (1986) such phenomena - low level of construction output and price increases - suggest that demand for construction is exceeding supply or the development of a constraint on the supply side of the Malaysian construction industry.

Given the fact that the Malaysian Government is determined to modernise and to industrialise the economy towards Vision 2020 (for example the Sixth Malaysia Plan, 1991-95 and the Seventh Malaysia Plan, 1996-2000, see Government of Malaysia, 1991; 1996) an increase in demand for construction is imminent. But the constraint on the supply side of the Malaysian construction industry indicates a potential that the Malaysian construction industry may not be able to meet the much higher demand unless radical changes are introduced.

Constraints in Construction Procurement

The works of Turin (1973a), Ofori (1980), Wells (1985; 1986) and Miles and Neale (1991) indicate that there are two fundamental steps to be taken in the approach to develop the construction industries of developing countries: firstly, constraints faced by the construction industry in its own environment should be identified; and secondly, specific measures should be developed and implemented to remove or to alleviate the constraints identified.

Among the many areas of constraints faced by construction industries in developing countries are constraints that exist within the process of construction procurement (Turin, 1973a; 1973b; Ofori, 1980; Edmonds and Miles, 1984; The World Bank, 1984; Wells, 1985; 1986; Wang, 1987; 1991; Sharif and Morledge, 1996; Morledge, 1996; Sharif, 1996). Constraints in the processes of construction procurement restrict or limit the effectiveness of the procurement process. Ineffective construction procurement would affect output and would subsequently inhibit growth in the construction industries (Turin, 1973a; 1973b; Ofori, 1980; Edmonds and Miles, 1984; and Wells, 1985; 1986).

Constraints in the processes of procurement could be due to either one or a combination of two or more of the following factors: unavailability, insufficiency or inappropriate use of resources, functions or institutions (Turin, 1973a; 1973b; Edmonds, 1979; Ofori, 1980; 1984; Edmonds and Miles, 1984, The World Bank, 1984; Wells, 1985; 1986; Wang, 1987; 1991; Keat, 1989; Master Builders, 1989/90; Miles, and Neale, 1991, Al-Omari, 1992, Abdul Rahman and Alidrisyi, 1994; 1995; Morledge, 1996).

Wang (1991), Sharif and Morledge (1996) and Sharif (1996) argued that effective and productive construction procurement could only be achieved if the supply chain of key competencies and resources are in place.

In the context of Malaysia, Wang (1987) listed the following resources and functions as the 'vital ingredients' for efficient construction procurement:

1. Sufficient supply of qualified and experienced technical personnel at professional and sub-professional levels (the latter refers to semi-qualfied personnel such as technicians and technical assistants);

2. Sufficient supply of workers at skilled, semi-skilled and non-skilled levels;

3. Sufficient and timely supply of materials;

4. Sufficient and timely supply of plant, equipment and tools;

5. Availability of land for construction purposes;

6. Willingness on the part of all parties involved to make appropriate changes and to introduce and adopt new technology suitable for Malaysian conditions and environment;

7. Desire and commitment on the part of all parties involved to achieve a high degree of efficiency and productivity;

8. Responsiveness to national and social responsibilities concerning working attitude resulting in a reasonable balance between selfness and public-consciousness;

9. Acceptance of the concept of teamwork and the subjugation of one's self to team discipline; and

10. Reduction of unnecessary red tape and artificial administrative obstruction.

Methodology

There has been little empirical work on the process of construction procurement in Malaysia and the constraints it suffers. Consequently, a postal questionnaire survey was conducted aimed at Malaysian organisations that are currently involved in construction procurement in Malaysia.

The key reasons for choosing the postal questionnaire survey method over other methods of primary data collection were:

(1) A questionnaire survey enables a wider coverage of subjects; and

(2) A questionnaire survey is relatively inexpensive to administer (Sarantakos, 1993).

There are three key categories of organisations involved in construction procurement in Malaysia, namely (1) clients; (2) designers; and (3) contractors (Sharif, 1996). In the present research, the organisations were stratified into the three categories, hence:

(1) Government departments and private organisations that initiate or promote construction projects were classified as clients;

(2) Registered firms of architects, engineers and quantity surveyors and the offices of The Public Works Department (the Public Works Department or PWD undertakes the functions of planning, designing and management of construction projects for clients in the public sector) were classified as designers; and

(3) Registered contracting firms classified as contractors.

In all, a database comprising names and addresses of 1852 organisations currently involved in construction procurement in Malaysia was compiled. It is believed that the database covers the majority of organisations in Malaysia currently involved in construction procurement.

In an attempt to achieve a high rate of response it was decided to include all 1852 organisations in the survey. The questionnaires were addressed to top management personnel (i.e. either Chief Executives, General Managers, Directors, or Principal Partners) of the organisations. Respondents were provided with self addressed internationally pre-paid envelopes and a standard letter explaining the objective of the survey and reassurance on confidentiality of the data to be provided. All questionnaires were mailed in early November 1996. After six weeks, a standard letter of reminder to all organisations was sent through the post. The questionnaire survey was closed at the end of February 1997.

The questionnaire was developed through literature reviews of construction procurement processes in developing countries in Africa, The Middle East, Sri Langka and Malaysia (Turin, 1973a; 1973b; Ofori, 1980; 1984; Edmonds and Miles, 1984; The World Bank, 1984; Wells, 1985; 1986; Wang, 1987; Al-Omari, 1992; Ruddock and Lopes, 1996; Sharif, 1996; Morledge, 1996). Lists of key resources and functions specific to Malaysia, i.e. skilled labour (categorised according to trades), materials, mechanical plant, bond requirements and insurance facilities were compiled from The Laws of Malaysia Act 520 (Malaysian Government, 1994) and Ketua Pengarah Kerja Raya (1992).

The questionnaire is divided into 6 parts. The first part contains questions about the organisation - its type, its size in terms of number of employees, its head office and current projects locations, types of current projects and total value of current projects. Respondents were asked to tick the appropriate boxes.

The second part of the questionnaire contains questions aimed at identifying the type and extent of current and perceived future constraints in resources and functions within the process of construction procurement in Malaysia. Prior to answering the questions respondent organisations were asked whether they or the projects with which their organisations are currently involved experience resources and functions constraints. This approach is taken in an attempt to: (1) obtain an overall expert opinion on the existence or otherwise of current constraint in resources and functions within the process of construction procurement in Malaysia; and (2) obtain data on the type and extent of current constraints in resources and functions basing on respondent organisations' actual experience. Those that indicate experiencing constraints are asked to answer questions on the type and extent of current and perceived future constraints. The respondent organisations that did not indicate that they were currently experiencing constraints were asked to answer questions on perceived future constraints only.

In all 90 variables belonging to 22 groups of resources and functions in construction procurement in Malaysia were included in the second part of the questionnaire. In this research, a subjective assessment approach was used to record the expert opinions of respondent organisations. Respondent organisations were given the opportunity to rate, on a Likert style scale (Sarantakos, 1993), the extent of constraint in each resource or function either 1, 2, 3 or 4 representing No, Low, Medium or High respectively. A rating of 4 (High) indicates high constraints in a resource or function thus implying that the process of construction procurement could be severely restricted or limited. While a rating of 1 (No) indicates no constraint in a resource or function thus implying that the process of construction procurement could be performed very efficiently.

However, consistent with basic economic theory that all resources and functions are scarce (Myers, 1994) it would be highly unlikely that no constraint in resources and functions within the process of construction procurement was experienced. Consequently, the scale of 1 (No) would act as a dummy scale. In the analysis of data the scores for 1 (No) would be combined together with the scores for 2 (Low) to become 1 representing Low constraint. The scoring system is set as 1, 2 and 3 for Low, Medium and High ratings respectively.

In a study applying a scoring system that is consistent with the scoring system used in the present research, Arditi and Mochtar (1996) used weighted mean score in the analysis of data. The equation used is (Arditi and Mochtar 1996):

$$S = \frac{3H + 2M + L}{H + M + L}$$

where S is the weighted mean score, H is the percentage of respondent that gave a High rating; M is the percentage of respondent that gave a Medium rating; and L is the percentage of respondent that gave a Low rating. Further, Arditi and Mochtar (1996) provide the interpretation of the weighted mean score: scores between 1 and 1.66 are classified as low (L), 1.67 - 2.33 as medium (M) and 2.34 - 3.00 as high (H).

Upon examining other methods of analysis of data (for example modal scores and relative indices) it was decided to adopt the Arditi and Mochtar's (1996) method of data analysis. This is because the Arditi and Mochtar's (1996) method provides an interpretation of the weighted mean score, this facilitates categorisation of the scores for each resource and function in the present research into Low (L), Medium (M) or High (H) constraints respectively.

In the second part of the questionnaire, if the respondent organisations indicated that they were currently experiencing constraints in resources or functions in the following major groups of resources and functions: (1) key construction materials (Malaysian origin); (2) efficient transportation; (3) skilled labour (Malaysian citizens); (4) mechanical plant; (5) key design team members (Malaysian citizens); (6) Malaysian contractors; (7) credit facilities/financial backing to contractors; (8) bonds requirements; and (9) insurance facilities; they were asked to state their view on the two most important reasons for the constraints.

Altogether, 11.24% or 205 valid responses were received. Another 28 questionnaires were returned but were invalid responses.

The Ministry of Finance (1994; 1995; 1996) reported that the Malaysian construction industry is currently experiencing a boom. It is to be expected that organisations involved in construction procurement were tied up with heavy workload in a boom period and this probably influenced the rate of response to the present survey. In addition, the size of the questionnaire - 12 pages altogether - could also influence the rate of response. Further, Abdul Rahman and Alidrisyi (1994) pointed out that in the case of Malaysian contractors, a low response rate could be due to (1) lack of interest to respond to a questionnaire survey; and (2) the difficulty of obtaining information where there is no tangible mutual benefit.

Given the fact that the entire population was included in the survey, the response in terms of the number of valid responses received, i.e. 205 responses, is considered to be acceptable. All 205 responses were used in the analysis of the research findings.

The data obtained from the first part of the questionnaire indicates that:

(1) The majority (68%) of the respondent organisations are designers;

(2) The majority (65%) of the respondent organisations have less than 50 employees;

(3) The largest proportion of respondent organisations (38%) had their projects located in the central part of Peninsular Malaysia - either in the state of Selangor, Kuala Lumpur, Negeri Sembilan or Melaka);

(4) The top three types of projects currently undertaken by the respondent organisations are: 'Other Buildings' (excluding housing) (38%); housing (31%); and civil engineering works (20%);

(5) The majority (57%) of respondent organisations were undertaking projects with the total value in excess of RM 40 million; and

(6) the majority (79%) of the respondent organisations are private sector organisations.

Based on the characteristics of respondent organisations and the fact that respondent organisations were stratified it is believed that the survey represents the opinion of the majority of organisations in Malaysia currently involved in the process of construction procurement.

Results

Constraints in Construction Procurement in Malaysia

From the results, the majority of respondent organisations (83% or 170 organisations) indicate that in Malaysia constraints in resources and functions within the process of construction procurement are currently experienced. In addition, the results indicate that constraints in resources and functions within the process of construction procurement are perceived to exist in the future for up to five years.

The results show that no resources or functions scored high for current constraints. The results show that 29 variables belonging to 9 groups of resources and functions scored medium for current constraints. The remaining 61 variables scored low for current constraints.

The results show that none of the resources or functions scored high for perceived future constraints. The results show that 32 variables belonging to 8 groups of resources and functions scored medium for perceived future constraints. The remaining 58 variables scored low for perceived future constraints.

In this study the resources and functions that received high or medium scores are considered to be constrained. This approach is taken because: (1) a high rating or a medium rating for a resource or function indicates that the constraint is critical and could severely restrict or limit the process of construction procurement; and (2) a high rating or a medium rating suggests that there is an urgent need for strategies to remove or to alleviate the constraint in that resource or function in order to boost construction output. The resources and functions that are suffering constraint currently and are perceived to be in constraint in the future are given in Tables 2 and 3 respectively.

Table 2. Current Constraints Identified*

Types of resources or functions	Mean score	extent of constraint**	Relative ranking
1. At project planning stage			
(a) Constraint caused by procedures in obtaining statutory approval	2.07	M	3
2. Availability of key materials (Malaysian origin)			
(a) Cement	1.84	M	19
3. Availability of labour (Malaysian citizens)			
(a) Unskilled	1.88	M	17
(b) Semi-skilled	2.08	M	2
(c) Skilled labour (according to trades)			
(1) Concretor	1.83	M	20
(2) Bar-bender	1.85	M	18
(3) Carpenter	2.03	M	7
(4) Bricklayer/mason	1.94	M	13
(5) Plasterer/pavior	2.06	M	4
(6) Tiler	1.93	M	14
(7) Joiner	1.91	M	15
(8) Metalworker	1.83	M	20
(9) Welder	1.82	M	23
(10) Plant operator	1.89	M	16
(11) Plumber	1.70	M	29
(12) Licensed electrician	1.80	M	24
4. Availability of facilities for training skilled workers	2.18	M	1
5. Availability of key design team members (Malaysian citizens)			
(a) Professional (degree/professional qualifications)			
(1) Architects	1.83	M	20
(2) Civil & structural engineers	1.95	M	12
(3) Mechanical & electrical engineering	2.01	M	8
(4) Quantity surveyors	2.00	M	10
(b) Semi-professional (technical assistants/ technicians)			
(1) Architectural	1.97	M	11
(2) Civil & structural engineering	2.01	M	8
(3) Mechanical & electrical engineering	2.06	M	4
(4) Quantity surveying	2.06	M	4
6. Availability of technically competent, experienced and financially capable Malaysian contractors			
(a) Specialist contractors	1.74	M	27
7. Constraints caused by procedures in obtaining Certificate of Fitness	1.77	M	26
8. Constraints in contract administration due to political and/or bureaucratic interference	1.80	M	25
9. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	1.72	M	28

* Only resources and functions that received high and medium mean scores are shown.
** H = high constraint 1.00-1.66, M = medium constraint 1.67-2.33, L = low constraint 2.34-3.00.

Table 3. Future Constraints Identified*

Types of resources or functions	Mean score	Extent of constraint**	Relative ranking
1. At project planning stage			
(a) Availability of suitable sites	1.69	M	30
(b) Constraint caused by procedures in obtaining statutory approval	1.94	M	16
2. Availability of key materials (Malaysian origin)			
(a) Timber	1.68	M	31
3. Availability of labour (Malaysian citizens)			
(a) Unskilled	2.00	M	8
(b) Semi-skilled	2.09	M	3
(c) Skilled labour (according to trades)			
(1) Concretor	2.00	M	8
(2) Bar-bender	1.98	M	10
(3) Carpenter	2.12	M	2
(4) Bricklayer/mason	2.03	M	5
(5) Plasterer/pavior	2.15	M	1
(6) Tiler	2.06	M	4
(7) Painter	1.79	M	24
(8) Joiner	2.01	M	6
(9) Metalworker	1.95	M	15
(10) Drain-layer	1.78	M	25
(11) Glazier	1.78	M	25
(12) Welder	1.93	M	17
(13) Plant operator	2.01	M	6
(14) Plumber	1.86	M	22
(15) Licensed electrician	1.88	M	20
4. Availability of facilities for training skilled workers	1.97	M	11
5. Availability of key design team members (Malaysian citizens)			
(a) Professional (degree/professional qualifications)			
(1) Architects	1.72	M	27
(2) Civil & structural engineers	1.85	M	23
(3) Mechanical & electrical engineers	1.90	M	18
(4) Quantity surveyors	1.88	M	20
(b) Semi-professional (technical assistants/technicians)			
(1) Architectural	1.90	M	18
(2) Civil & structural engineering	1.96	M	14
(3) Mechanical & electrical engineering	1.97	M	11
(4) Quantity surveying	1.97	M	11
6. Availability of technically competent, experienced and financially capable Malaysian contractors			
(a) Specialist contractors	1.68	M	31
7. Constraints caused by procedures in obtaining Certificate of Fitness	1.71	M	29
8. Constraints in contract administration due to political and/or bureaucratic interference	1.72	M	27

* Only resources and functions that received high and medium mean scores are shown.
** H = high constraint 1.00-1.66, M = medium constraint 1.67-2.33, L = low constraint 2.34-3.00.

In addition, data obtained from the respondent organisations indicates the reasons for the constraints. The reasons for current constraints in selected resources and functions are as shown in Table 4.

Table 4. Reasons for Current Constraints in Resources or Functions
(respondents were asked to state two key reasons, n = number of respondent)

	Frequency		% in sample
1. Reasons for constraint in key construction material			
(a) High demand	85		63.91
(b) Monopoly	21		15.79
(c) Government protection	13		9.77
(d) Transportation constraint	10		7.52
(e) Others	4		3.01
Total	133	(n = 100)	100.00
2. Reasons for constraint in efficient transport			
(a) High demand	31		36.90
(b) Monopoly	3		3.57
(c) Poor infrastructure	34		40.48
(d) Strict enforcement	13		15.48
(e) Others	3		3.57
Total	84	(n = 63)	100.00
3. Reasons for constraints in skilled labour (Malaysian citizens)			
(a) High demand	77		45.83
(b) Competition with other economic sector	47		27.98
(c) Migration to other countries	15		8.93
(d) Inadequate training facilities	27		16.07
(e) Others	2		1.19
Total	168	(n = 111)	100.00
4. Reasons for constraints in mechanical plant			
(a) High demand	46		50.55
(b) High maintenance cost	9		9.89
(c) High capital cost	18		19.78
(d) Inadequate plant operators	13		14.29
(e) Others	5		5.49
Total	91	(n = 64)	100.00
5. Reasons for constraints in key design team members (Malaysian citizens)			
(a) High demand	99		68.75
(b) Competition with other economic sector	18		12.50
(c) Migration to other countries	4		2.78
(d) Inadequate training facilities	19		13.19
(e) Others	4		2.78
Total	144	(n = 108)	100.00

	Frequency		% in sample
6. Reasons for constraints in Malaysian contractors			
(a) High demand	30		37.97
(b) Contractors diversified into other economic sectors	3		3.80
(c) Inadequate trained staff and workers	14		17.72
(d) Inexperienced/incompetent	30		37.97
(e) Others	2		2.53
Total	79	(n = 62)	100.00
7. Reasons for constraints in Credit facilities/financial backing to contractors			
(a) Lending prudence	34		61.82
(b) Lack of collaterals	10		18.18
(c) High cost of borrowing	8		14.54
(d) Lengthy process	2		3.64
(e) Others	1		1.82
Total	55	(n = 43)	100.00
8. Reasons for constraints in bond requirements			
(a) Lack of confidence	11		20.75
(b) Lack of collaterals	16		30.19
(c) High cost	18		33.96
(d) Lengthy process	6		11.32
(e) Others	2		3.77
Total	53	(n = 38)	100.00
9. Reasons for constraints in insurance facilities			
(a) High demand	4		11.11
(b) High cost of premium	15		41.67
(c) Inexperienced insurers	10		27.78
(d) Lengthy process	2		5.56
(e) Others	5		13.89
Total	36	(n = 30)	100.00

Figures in brackets denotes number of respondents.
(Maximum number of respondents is 170).

Note: From the overall results on current constraints however, efficient transportation, mechanical plant, credit facilities/financial backing to contractors, bond requirement and adequate insurance facilities are not considered as constraints.

In examining the data from the three categories of organisations - clients, designers and contractors - it appears that overall the data is consistent. This suggests a general consensus of the type and extent of current and perceived future constraints in resources and functions within the process of construction procurement in Malaysia.

Discussion of Findings

The results indicate that within the process of construction procurement in Malaysia constraints in resources and functions are currently experienced and that constraints in resources and functions are perceived to exist in the future.

Specifically, there are 7 types of resources and functions that have been identified to be suffering constraint currently and in the future for up to five years. They are:

(1) constraints at project planning stage caused by procedures in obtaining statutory approvals;

(2) constraints in availability of indigenous labour;

(3) constraints in availability of facilities for training skilled workers;

(4) constraints in availability of indigenous design team members;

(5) constraints in availability of technically competent, experienced and financially capable specialist Malaysian contractors.

(6) constraints caused by procedures in obtaining the Certificate of Fitness (CF) necessary for completed projects; and

(7) constraints in contract administration due to political and/or bureaucratic interference;

In addition, 2 types of resources and functions have been identified to be in constraint currently but are perceived to be unlikely to suffer constraint in the future. They are:

(1) constraint in the availability of local cement; and

(2) constraint in the availability of reliable sources of information (on statutory requirements, cost data, and project opportunities).

Furthermore, 2 types of resources and functions have been identified to be not in constraint currently but are perceived to be in constraint in the future. They are:

(1) constraint in the availability of suitable sites; and

(2) constraint in the availability of Malaysian timber.

The results also indicate that high demand for a particular resource or function is among the predominant reasons for its constraint currently experienced. Perhaps the prolonged and rapid expansion in the Malaysian construction industry since 1988 led to higher demand for construction resources leading to the current constraints.

In addition, given the Malaysian Government's continuous efforts to modernise and industrialise the economy to achieve Vision 2020, it is inevitable that future demand for construction resources and functions will continue to rise. Therefore, the respondents' belief that constraints in resources and functions will continue in the future is justified.

The findings confirm opinion and speculation raised by several commentators that the Malaysian construction industry suffers from constraints in resources and functions (Ministry of Finance, 1994; 1995; 1996; Abdullah 1995, Yaacob 1995, Sharif 1996, Morledge 1996, Kong 1996). But more importantly, the findings provide empirical evidence of the type and extent of those constraints, both currently and in the future for up to five years.

In examining the types of resources and functions that have been identified to be in constraint both currently and in the future, two patterns can be identified. On the one hand, the constraints in availability of unskilled labour and in availability of suitable sites appear not to be the constraints that were often associated with the construction industries of the developing countries (see Turin 1973a, 1973b, Edmonds and Miles 1984, The World Bank, 1984, Wells 1985, 1986, Al-Omari 1992).

On the other hand, other constraints such as procedural constraints, inavailabilities of key construction materials, semi-skilled and skilled labours, facilities for skills training, key designers, specialist contractors and bureaucracy in contract administration, all appear to be consistent with constraints that would normally be found in most construction industries in the developing countries (Turin 1973a,1973b, Edmonds and Miles 1984, The World Bank, 1984, Wells 1985, 1986).

The two patterns of constraint in resources and functions identified above indicate the transitional nature of the Malaysian economy, i.e. a developing economy moving towards a developed economy. Consequently, it could be expected that characteristics of both developing and developed economies prevail in the Malaysian construction industry.

Conclusion

The findings of this study confirm speculation that constraints in some resources and functions within the process of construction procurement in Malaysia are currently experienced and that constraints in resources and functions are perceived to exist in the future for up to five years. The areas where these constraints exist now and are perceived to exist in the future have been identified by this research, and strategies can therefore be developed to focus on these areas of greatest constraint.

Consequently, strategies to remove or to alleviate the constraints are needed in order to achieve effective construction procurement and the aims of Vision 2020. Research into the development of appropriate strategies to remove or to alleviate the constraints identified forms further study, and is currently in progress.

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CONSTRUCTION PROCUREMENT PROCESSES IN MALAYSIA: CONSTRAINTS AND STRATEGIES

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This paper is based on a study on the identification of constraints in resources and functions within the processes of construction procurement in Malaysia, and the development of proposed strategies to remove or alleviate the constraints identified. The study employed the triangulation research approach in data sources and analysis. Respondents to the study were Malaysian organisations involved in the processes of construction procurement in Malaysia. The findings of the study suggest the areas of most constraints and the strategies that could be implemented to remove or alleviate the constraints identified.

Keywords: Construction procurement, constraints, economic growth, Malaysia, strategies.

INTRODUCTION

One key purpose for seeking to achieve construction growth is to stimulate and to sustain growth in the other sectors of a country's economy and to raise overall growth in the economy. Many researchers and writers have confirmed that construction plays a vital role in socio-economic growth and development.

The principal policy promoting socio-economic growth and development in Malaysia is 'Vision 2020'. The key objective of Vision 2020, launched in 1991, is to transform Malaysia from a developing country to a fully developed and industrialised country by 2020 AD (see Mahathir Mohamad, 1991). The implementation of this policy requires the establishment of physical, social and institutional infrastructures, housing and facilities for the manufacturing and services sectors capable of meeting the needs of a modern and developed society. Fulfilling these requirements will inevitably demand a high level of construction output. Malaysia therefore, requires a capable, indigenous construction sector, i.e., in terms of its relative size and the adequacy and timely supplies of the key resource and functions required for its processes.

According to Wells (1986) there is a minimum size for a country's construction industry. The size - measured in terms of construction's contribution to GDP - is dependent upon the country's level of economic growth and development. For a developing country such as Malaysia, Wells (1986) suggested the size to be not less than 5.4 per cent of GDP. Wells (1986) and Ruddock and Lopes (1996) warned that should the size of a country's construction industry fall short of the recommended minimum size, inadequate construction capability may be acting as a constraint on long term sustainable growth in the economy.

An examination of available statistics show that the size of the Malaysian construction industry between 1988 and 1996 ranged from 3.22 to 4.70 per cent of GDP (Ministry of Finance 1988-97). In relation to the minimum size recommended by Wells (1986), the size of the Malaysian construction industry is small.

In addition to the relatively small size of the Malaysian construction industry, there are several issues prevailing in the Malaysian construction industry. The issues include (1) the relatively poor performance of construction in terms of failure to implement planned development projects (Yaacob 1996), of failure to meet target delivery dates (Abdullah 1995 and Yaacob 1996) and of poor health and safety records on construction sites (Abdullah 1995 and Yaacob 1995), and (2) continuous and upward increases in construction prices (Master Builders Association of Malaysia, 1989/90 and 1996; Ministry of Finance 1988-95).

According to Wells (1986) if both inadequate construction capability and sharp rise in construction costs prevail, the phenomena suggest either that effective demand for construction is outstripping the supply or that constraints in the supply side of a country's construction industry are developing. These issues therefore, pose several questions, the more important ones being:

1. Are there constraints in the Malaysian construction industry that may inhibit the level of construction output?
2. If there are constraints, can the types of constraint be identified and their extent ascertained?
3. If there are constraints and the types identified and their extent ascertained, are there appropriate strategies that could be implemented to remove or alleviate the constraints identified?

In order to seek answers to these questions, a study was undertaken by the authors. This paper provides an outline of the study, its methodologies and findings.

THE ECONOMY AND THE CONSTRUCTION INDUSTRY

An examination of the Malaysian economy and construction industry for the period between 1988 and 1996 (Ministry of Finance 1988-96) revealed the following trends:

1. The economy has attained growth in GDP of between 7.8% and 9.7%
2. The economy is virtually at full employment. The unemployment rate in 1995 was 2.8 per cent. At the end of 1995, the total number of economically active population was 8.06 million, of which 7.83 million are employed
3. Growth in construction GDP ranged from 2.7% to 19.0%
4. The contribution of construction to overall GDP ranged from 3.22% to 4.50%
5. Growth in employment in the construction industry increased significantly, i.e. from 340,000 persons or 5.5 per cent of total employment in 1988 to 659,400 persons or 8.33 per cent of total employment in 1995, an increase of 1.94 times

Long term projection of a country's economy is plagued with various national and international uncertainties (Sulaiman 1993; Merican 1993). Nonetheless, the excellent performance of Malaysia's economy thus far suggests that the economic target of Vision 2020 is attainable (Mahathir Mohamed 1991; 1997; Sulaiman 1993; UK Department of Trade and Industry 1995).

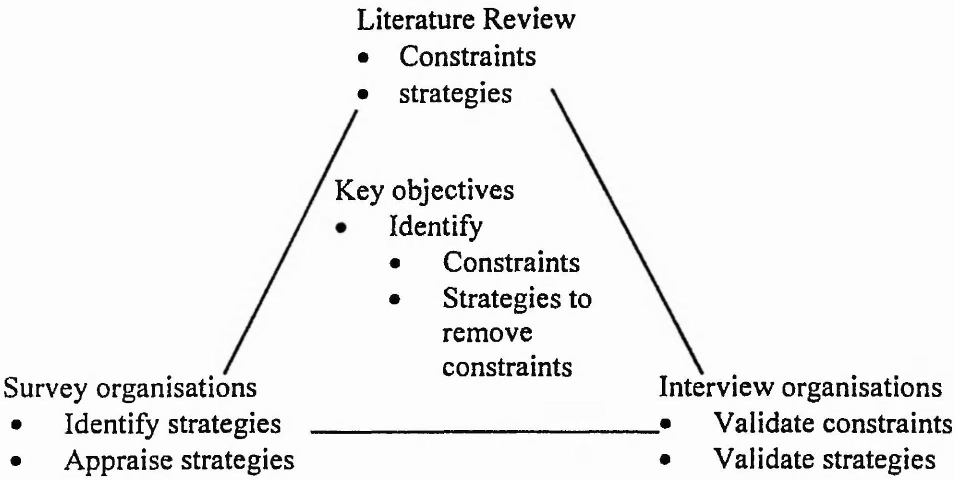

Figure 1

CONSTRAINTS IN CONSTRUCTION PROCUREMENT

Among the many areas of constraints faced by construction industries in developing countries are constraints that exist within the processes of construction procurement (Turin 1973; Ofori 1980; Edmonds and Miles 1984; The World Bank 1984; Wells 1986; Wang 1987; 1991; Sharif and Morledge 1996; Morledge 1996; Sharif 1996). Constraints in the processes of construction procurement restrict or limit the effectiveness of the procurement process. Ineffective construction procurement would affect output and would subsequently inhibit growth in the construction industries (Turin 1973; Ofori 1980; Edmonds and Miles 1984; and Wells 1986).

Constraints in the processes of procurement could be due to either one or a combination of two or more of the following factors: unavailability, insufficiency or inappropriate use of resources, functions or institutions (Turin 1973; Ofori 1980; Edmonds and Miles 1984, The World Bank 1984; Wells 1986; Wang 1987; 1991; Master Builders 1989/90; Miles, and Neale 1991; Morledge 1996).

Wang (1991), Sharif and Morledge (1996) and Sharif (1996) argued that effective and productive construction procurement could only be achieved if the supply chain of key competencies and resources are in place. In the context of Malaysia, an efficient and effective processes of construction procurement requires inputs that include (Wang 1987):

1. Sufficient supply of qualified and experienced technical personnel
2. Sufficient supply of workers at skilled, semi-skilled and non-skilled levels
3. Sufficient and timely supply of materials
4. Sufficient and timely supply of plant, equipment and tools
5. Availability of land for construction purposes
6. Reduction of unnecessary red tape and artificial administrative obstruction

OBJECTIVES AND SCOPE OF THE STUDY

The study represents the first major attempt to study empirically the processes of construction procurement in Malaysia.

The study is focused at a construction-wide level. In addition, the study excludes construction activities in the subsistence sector such as self-help, individual jobbers, rural construction, etc.

In this study, construction procurement is defined as the framework within which construction is brought about, acquired or obtained (CIB 1991). In the context of Malaysia, the framework of construction procurement encompasses the processes of (1) Initiation / promotion, (2) Funding, (3) Designing, (4) Statutory approval, (5) Tendering, (6) Construction, and (7) Risk allocation among the parties involved (Arbi 1985; Wang 1987; Sharif 1996).

For the purpose of this study, the concept 'constraints' within the processes of construction procurement is defined as limitations or restrictions imposed on the processes of acquiring construction projects. For the purpose of this study, 'strategies' to remove or to alleviate the constraints identified are defined as plans or methods to be employed to remove or to alleviate the constraints identified.

METHODOLOGY

This study adopts the triangulation method (see Sarantakos 1993; Lenard, Raftery and McGeorge 1996). It involves: (1) an extensive literature review, two questionnaire surveys, i.e., Survey 1 and Survey 2, and semi-structured face to face or telephone interviews; and (2) multiple data sources from literature, primary data from respondent organisations and professional institutions. The research processes therefore, are robust and enabled to achieve high quality data and findings. The research methodology described is illustrated in Figure 1.

There were three stages to the study:

The primary objective of Survey 1 was to identify the types and extent of constraints in major resources and functions within the processes of construction procurement in Malaysia that may inhibit the level of construction output. Survey 1 was carried out by post between November 1996 and January 1997.

The database comprised the names and addresses of 1,852 main Malaysian organisations - clients, designers and contractors - currently involved in construction procurement in Malaysia all of which formed the questionnaire sample. The client organisations are drawn from government departments and private organisations that initiate or promote construction projects. The private organisations are all the property development companies listed on the Kuala Lumpur Stock Exchange as of July 1996. The designers comprise all registered firms of architects, engineers and quantity surveyors and the Public Works Department offices. The contractors are those firms that are registered with the Construction Industry Development Board (CIDB) Malaysia for the year 1996.

In this study, a subjective assessment approach was used to record the expert opinions of respondent organisations. Respondent organisations were asked to rate, on a Likert style scale the extent of constraint in each resource or function either 1, 2, 3 or 4 representing No, Low, Medium or High respectively. A rating of 4 (High) indicates high constraints in a resource or function thus implying that the process of construction procurement could be severely restricted or limited. While a rating of 1 (No) indicates no constraint in a resource or function thus implying that the process of construction procurement could be performed very efficiently.

However, consistent with basic economic theory that all resources and functions are scarce (Myers 1994) it would be highly unlikely that no constraint in resources and functions within the process of construction procurement was experienced. Consequently, the scale of 1 (No) would act as a dummy scale. In the analysis of data the scores for 1 (No) would be combined together with the scores for 2 (Low) to become 1 representing Low constraint. The scoring system is set as 1, 2 and 3 for Low, Medium and High ratings respectively.

In the analysis of data, the equation used by Arditi and Mochtar (1996) was adopted:

$$S = \frac{3H + 2M + L}{H + M + L}$$

Where S is the weighted mean score, H is the percentage of respondent that gave a High rating; M is the percentage of respondent that gave a Medium rating; and L is the percentage of respondent that gave a Low rating. The interpretation of the weighted mean score is as follows (Arditi and Mochtar 1996): mean scores between 1 and 1.66 are classified as low (L), 1.67 - 2.33 as medium (M) and 2.34 - 3.00 as high (H).

In this study the resources and functions that received high or medium scores are considered to be constrained.

The primary objective of Survey 2 was to appraise proposed strategies designed to remove constraints within the processes of construction procurement in Malaysia. The constraints identified in Survey 1 provided the focus for the development of the strategies. Survey 2 was carried out by post between April and June 1997.

The database for Survey 2 was compiled from those respondent organisations in Survey 1 who indicated willingness to participate in Survey 2. In all, a list of 186 organisations was compiled.

The proposed strategies were developed from procurement strategies adopted by the construction industries in the United Kingdom, Japan and South Korea where sustained growth in construction had been achieved.

Survey 2 provided an opportunity for the parties who matter most in the procurement process - clients, designers and contractors - to appraise the suitability of the proposed strategies in the context the conditions and environment in Malaysia.

Stage 3 involved reviewing the proposed strategies in the light of the analyses and comments of the respondent organisations in Survey 2 and the carrying out of semi-structured interviews to Malaysia. The objective of the interviews was to validate the proposed strategies and to solicit additional information including information to validate the constraints identified.

Respondent organisations for the interviews were compiled from: (1) the respondent organisations in Survey 2 that indicated willingness to participate in the interview (24 organisations); and (2) a stratified random sampling from the database used in Survey 1 after excluding the organisations that indicated willingness to participate in the interview (40 organisations).

In addition, the database for the interviews includes seven professional organisations: six professional institutions, i.e., one representing the clients, three representing the designers and two representing the contractors; and the CIDB. The CIDB is a semi-government body established in 1995 entrusted to develop the construction industry in Malaysia. It is felt that these organisations, being professional bodies that command high level of integrity and reputation would offer independent and unbiased opinion on the issues being investigated. This aspect of the interview forms the third part and is the vital process of the triangulation research method adopted in the study. In all, the interview database comprises names and addresses of 71 organisations.

In the interview questionnaires each constraint was provided with a list of strategies that have been appraised in Survey 2, listed in order of importance. The respondents were asked to indicate their agreement or disagreement to each strategy in terms of its viability and feasibility.

In all, forty-seven interviews, mostly face to face at the respondents' premises but some through telephones were performed in Malaysia between August and September 1997. From the forty-seven interviews, four interviews were with the professional institutions and one interview with CIDB.

RESULTS

Identification of constraints

In all, 205 organisations (11%) returned completed questionnaires for Survey 1. All 205 responses provided the basis for the research findings.

From the results, the majority of respondent organisations (83% or 170 organisations) indicate that in Malaysia constraints in resources and functions within the process of construction procurement are currently experienced. The resources and functions that are suffering constraint are given in Table 1.

Chi-square Test of Independence was performed on each constrained resource or function in relations to the categories of organisations - clients, designers and contractors. The value of p was set at < 0.05. The results show that there were no significant relationship between the constrained resources and functions and the categories of organisations. This suggests, therefore, that there is a general consensus amongst the clients, designers and contractors on the type and extent of current and perceived future constraints in resources and functions within the process of construction procurement in Malaysia.

Appraisal of proposed strategies

In all, fifty-four organisations (29%) returned completed questionnaires for Survey 2. All fifty-four responses provided the basis for the research findings.

The results on the two most frequently agreed strategies that could be applied to remove the constraints identified are as shown in Table 2.

Chi-square Test of Independence was performed on each prominent strategy in relations to the categories of organisations - clients, designers and contractors. The value of p was set at < 0.05. The results show that there were no significant relationship between a majority of the appraised strategies and the categories of organisations. However, the chi-square test results also indicate that there were several proposed strategies that did not receive a full consensus. The latter illustrates the need for carrying out the validation interviews.

Validation of strategies

In all, forty-seven interviews (66%) were performed. All forty-seven interviews provided the basis for the research findings.

The results on the interviews with the representatives of the clients, designers and contractors organisations show a high level of agreement with the prominent strategies. They also indicated agreement to the relative ranking of the prominent strategies.

The results of the interviews with the representatives of the professional institutions show a high level of agreement with the constraints identified and the prominent strategies.

The respondents indicated that principally, it is the government that possesses the legal framework and should initiate and implement the strategies.

CONCLUSION

The use of the triangulation method of data sources and data collection enabled a robust study to be performed without a compromise on either the quality of the data or the findings.

In relation to the questions set out at the beginning of the study, the findings indicate that:

- Constraints in resources and functions within the process of construction procurement in Malaysia are currently experienced.
- the areas where these constraints exist have been identified by this research
- the strategies focusing on the areas of greatest constraint were developed, appraised and validated indicating that there are strategies that could be implement to remove or alleviate the constraints identified

In addition, the findings of the study indicate that government intervention is seen as the prime mover in strategy implementation.

The findings of the study provide useful guidance for the authorities responsible for the development of the construction industry in Malaysia.

The methodology used in this study may be repeated in conducting similar studies in construction industries elsewhere.

Table 1: Constraints identified*

Types of resources or functions	Mean score	Extent of constraint**	Relative ranking
1. At project planning stage			
(a) Constraint caused by procedures in obtaining statutory approval	2.07	M	3
2. Availability of key materials (Malaysian origin)			
(a) Cement	1.84	M	19
3. Availability of labour (Malaysian citizens)			
(a) Unskilled	1.88	M	17
(b) Semi-skilled	2.08	M	2
(c) Skilled labour (according to trades)			
(1) Concretor	1.83	M	20
(2) Bar-bender	1.85	M	18
(3) Carpenter	2.03	M	7
(4) Bricklayer/mason	1.94	M	13
(5) Plasterer/pavior	2.06	M	4
(6) Tiler	1.93	M	14
(7) Joiner	1.91	M	15
(8) Metalworker	1.83	M	20
(9) Welder	1.82	M	23
(10) Plant operator	1.89	M	16
(11) Plumber	1.70	M	29
(12) Licensed electrician	1.80	M	24
4. Availability of facilities for training skilled workers	2.18	M	1
5. Availability of key design team members (Malaysian citizens)			
(a) Professional (degree/professional qualifications)			
(1) Architects	1.83	M	20
(2) Civil & structural engineers	1.95	M	12
(3) Mechanical & electrical engineers	2.01	M	8
(4) Quantity surveyors	2.00	M	10
(b) Semi-professional (technical assistants/ technicians)			
(1) Architectural	1.97	M	11
(2) Civil & structural engineer	2.01	M	8
(3) Mechanical & electrical engineer	2.06	M	4
(4) Quantity surveying	2.06	M	4
6. Availability of technically competent, experienced and financially capable Malaysian contractors			
(a) Specialist contractors	1.74	M	27
7. Constraints caused by procedures in obtaining Certificate of Fitness	1.77	M	26
8. Constraints in contract administration due to political and/or bureaucratic interference	1.80	M	25
9. Availability of reliable source of information (on statutory requirements, cost data, project opportunities)	1.72	M	28

* Only resources and functions that received high and medium mean scores are shown.

** H = high constraint 1.00-1.66, M = medium constraint 1.67-2.33, L = low constraint 2.34-3.00.

Table 2: Strategies to remove or alleviate constraints within construction procurement processes in Malaysia

Constraint and strategy	p (%)	r
1. Constraint at project planning stage caused by procedures in obtaining statutory approvals		
Streamline and standardise administrative procedures in Local Authorities	88.89	1
Simplify and standardise procedures nationwide	85.18	2
2. CONSTRAINTS IN AVAILABILITY OF MALAYSIAN PRODUCED CEMENT		
Existing cement plant should increase production to relieve shortages	92.31	2
Improve enforcement to curb hoarding and black marketeering of cement	94.23	1
3. Constraint in availability of unskilled, semi-skilled and skilled Malaysian labour		
Increase intake of new trainees	94.31	1
Contractor should move towards greater use of plant to reduce the use of labour	92.45	2
4. CONSTRAINTS IN AVAILABILITY OF FACILITIES FOR TRAINING SKILLED LABOUR		
Current training centres should increase ability to train semi-skilled and skilled workers consistent with planned growth	96.15	1
CIDB and other bodies should set up new training centres specializing in the training of skills required by the construction sector	90.38	2
5. CONSTRAINTS IN AVAILABILITY OF KEY DESIGN TEAM MEMBERS - ARCHITECTS, ENGINEERS AND QUANTITY SURVEYORS AND THEIR ASSISTANTS		
Promote the construction industry and its key professions to schools	96.15	2
Expand the capacity of existing university/colleges to train more students in key construction courses	98.11	1
6. CONSTRAINTS IN AVAILABILITY OF TECHNICALLY COMPETENT, EXPERIENCED AND FINANCIALLY CAPABLE MALAYSIAN SPECIALIST CONTRACTORS		
Encourage Joint Ventures between foreign specialist contractors and local specialist contractors to expedite technology transfer	86.79	2
Develop mechanisms to allow local specialist contractors to gain experience	88.46	1
7. CONSTRAINT CAUSED BY PROCEDURES IN OBTAINING CERTIFICATE OF FITNESS FOR OCCUPATION (CF)		
Streamline and standardise administrative procedures in Local Authorities	92.31	2
Disseminate information on approval procedures	94.00	1
8. CONSTRAINT IN CONTRACT ADMINISTRATION DUE TO POLITICAL AND OR BUREAUCRATIC INTERFERENCE		
Superintending Officer should be fully qualified and experienced professional	98.08	1
Improve organizational and functional coordination between clients and other bodies to avoid administrative bottlenecks	92.31	2
9. CONSTRAINTS IN AVAILABILITY OF RELIABLE SOURCES OF INFORMATION (ON STATUTORY REQUIREMENTS, COST DATA, PROJECT OPPORTUNITIES)		

Encourage local universities/colleges to conduct relevant research and development and in publishing the findings	96.15+	1
Encourage professional institutions to conduct relevant research and development and in publishing the findings	96.15+	2
10. GENERAL STRATEGIES		
Government to develop mechanisms to monitor construction demand and supply so that demand matches the capacity of the construction industry	88.46	2
Government and the private sector should prepare an overall policy on the development of the Malaysian construction industry	90.38	1

In this study proposed strategies that have been agreed by not less than eighty percent of the respondent organisations (overall) are considered to be predominant. However, in this study only the top two strategies are reported

p Percentage of respondent organisations indicating agree and strongly agree with the proposed strategy (i.e. scoring more than or equal to 4)

r Relative ranking in accordance with percentage of respondent organisations indicating agree and strongly agree with the proposed strategy

+ Equal percentages; ranked in accordance with the number of organisations indicating strongly agree with the proposed strategy

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