APPLYING SURVIVAL ANALYSIS TO INVESTIGATE

MOBILE RETAIL APPLICATIONS

FROM A CUSTOMER PERCEIVED VALUE PERSPECTIVE

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Copyright Statement

Acknowledgements

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Abstract

The purpose of this thesis is to analyse consumer decision-making processes on mobile service channels from both behavioural and perceptive perspectives on time dimension. With mobile channel becoming one of the major service channels, electronic retailers must ensure that their mobile retail application design is able to create usage value to their customers. The investigation of the impacts from the value co-creation on this channel to consumers' actual behaviours is based on the understanding of both cognitive and emotional perspective of consumer decision-making processes. The research aim is to therefore compare the results from survival analysis on behavioural data, and the results from structural equation modelling on questionnaire data, to explore the relationships between the usage of mobile application functions, the time consumption of a decision-making process and the probability of reaching a decision, and to provide insights on designing mobile retail application.

This thesis, on one hand, employs Prospect Theory, the Theory of Planned Behaviour and Minkowski Spacetime as its theoretical foundations, and uses customer perceived value as a research lens to develop the research design. On the other hand, it develops survival analysis to investigate the actual practical value of using mobile retail applications in the context of a major health and beauty retailer, Boots' website, and uses structural equation modelling to test a conceptual model representing the prediction of customer perceived value on mobile service channels. The comparison and contrast between the results from these two separate studies offer a better understanding of consumer behaviours in this context.

This study is one of the first to apply survival analysis to investigate consumer decision-making process on mobile service channels. It is also one of the first research that analyses consumer behaviours and perceptions from a temporal perspective. This work offers original insights and important findings for both marketing academics and practitioners

Chapter 1. Introduction

Since being introduced for commercial application two decades ago, the internet channel service has become one of the most important information communication platforms for businesses. For the retailing industry specifically, there are many communication channels that can be used; for example, the face-to-face channel, the telephone channel, the newspaper and magazine channel and the internet channel. The internet channel is much more than just a communication channel, it offers great potential for expanding markets, generating sales and profits, enhancing brand image - and most importantly for this thesis - engaging with consumers to co-create value both for themselves and for companies. Purchase decision-making on any service channel comprise complex cognitive and emotional processes for all consumers, and both the diversity and levels of different consumers' cognitive and emotional intelligence makes conducting marketing research even more complicated. This has implications for identifying research methods, collecting data, producing sound results and identifying how to improve organisational marketing performance.

Compared with traditional service channels, the Internet provides consumers with enhanced convenience with immediate information access and technology based functions supporting purchase decision-making process (for example, comparing price difference between different supermarket, and reviews from previous customers) and financial assistance for making online transactions. All of those advantages are based on the premise that the internet channel lowers both spatial and temporal barriers to information communication. More than three billion consumers are using information resources on the internet to discover, evaluate and order products (Ozen and Engizek, 2014).

Mobile channel services further lower the spatial and temporal costs of accessing information via the application of mobile networking infrastructures and consumer grade mobile devices. In terms of quantity of information transferred and displayed on mobile handheld devices, there are two technologies that make mobile devices a suitable replacement for desktop and laptop computers. First is the broadband internet connection, which makes large size information files (high-resolution pictures and video files with great details about products or service) transferable to the consumer. Second, mass

production of high-resolution screens (5 plus inches, 720p, 1080p, 2k or even 4k resolution panel) offers a comprehensive solution to early mobile device information density issues. Information density of a communication interface is defined as the compactness of that interface in terms of how much information it can display at once (Jacquet et al., 2010). This was a major drawback in the early age of smartphone production given that screen size on mobile devices is much smaller than it is on a desktop or laptop computer. The high-resolution screen is capable of making fonts look sharper and more comfortable for the consumer to read (note that, this technology must also be fully supported by the given software). Although consumers still need to drag or tap the screen to read the full text and look at the whole picture, there is no technical limitation to capturing all required information. The integrity of the information is vital for information communication, particularly when required by the consumer for performing decision-making processes with confidence (Hotaling et al., 2015).

These technologies make it possible for the consumer to complete the purchase decision-making process on mobile platforms solely and be independent of more traditional and constraining platforms such as desktop or laptop computer. Thus, perhaps the most meaningful feature of the mobile channel service is that it enables consumers to conduct purchase decision-making processes anywhere and anytime they want. Moreover, it allows service and information providers to market directly and at much lower costs compared to those related to more traditional service channels (Friendrich et al., 2009).

Recent mobile hardware developments (primarily smartphones and tablets) offer electronic retailers substantial opportunities to innovate, with both dedicated mobile retail applications and mobilised websites optimised for consumer use (Kushwaha and Shankar, 2013). Throughout this thesis, both dedicated mobile retail applications and mobilised websites designed by the electronic retailer for the purpose of communicating product or service information, are referred to collectively as 'mobile retail applications'.

However, the consumer of mobile retail applications is often put in the awkward position of having to deal with an enormous amount of information (Li and Sun, 2014). The physical and mental pressure of processing a large amount of electronic data may in fact have a negative impact on the decision-making processes and on broader mobile consumer behaviours (Chang and Tuan Pham, 2013). To help overcome this challenge for

consumers; marketing researchers are now investigating the true motivations and social and logistical difficulties that consumers experience when using mobile retail applications, and are looking beyond analysing these social phenomena from a purely technological point of view. The purpose of this thesis is to assist in this process and to help retailers optimise their mobile service provision, and via an association with Boots (the health and beauty retailer) a viable context for research has been secured. In the remainder of this chapter, the research background and research rationale is discussed to show the origination and organisation of this thesis.

1.1 Research Background

Internet commerce has contributed three-quarters of retail sales growth since 2000, and it accounts for approximately 10 percent of total retail figures (ATKearney, 2015). Mobile channel service, for example (mobile retail applications and mobilised websites) has become the fastest developing online service channel, almost one-third of the online sales in Europe and in the USA will occur on the mobile channel by 2016 (ATKearney, 2015). It has been reported, that the UK market has reached that figure even faster than other regions, 35% of internet users shop via a smartphone or tablet (Mintel, 2014). Also in the UK, mobile channel retailing sales were forecast to grow by 64.3% to reach £14 billion in 2015. Meanwhile, on the traditional internet channel, for example, with respect to desktop and laptop computers, the transactions will only rise by 9% to £38 billion from 2015 to 2016.

Mobile service channels are defined as the platform of marketing communication delivered to mobile devices, and offers informational interaction opportunities to create value for customers and companies (Andrews et al., 2012). The recent development of mobile communication technology boosted the mobile application usage greatly, almost a year on year growth of 90% since 2012 (Mintel, 2013). In the year of 2014, the mobile channel became the most popular internet access platform, reaching 2.8 billion of the global mobile broadband connections (Mintel, 2013). For the retail industry, it is no longer the case of asking whether mobile channel service is important. Those retailers and marketers who fail to deliver optimised mobile access to their internet service, will lose their chance to have a substantial generator of sales and profits (Internet Retailing, 2015). Furthermore, consumers could lower their temporal investments and financial consumption on those retailers.

Another interesting phenomenon that draws great attention to the retailing industry is, after initial usage of a mobile retail application, nearly half of consumers will never return to visit a traditional internet website on their mobile devices (Econsultancy, 2015). Although the information on both the channels is identical, electronic retailers that do not offer mobile retail applications face difficulty handling information requests, receiving and processing on a relatively smaller screen for mobility, makes more than half of consumers intend to change retailer until they find the optimised mobile retail application (Statista, 2015). This means that the growth of mobile hardware usage is not the only reason for mobile commerce's continuous growth. The software support is also extremely important, particularly for the retailers in the competition.

1.2 Research Rationale and Aims

This thesis originates in the recent development of mobile communication technology and the applications that enlarge its capabilities for service marketing. Existing marketing publications have indicated the importance of electronic channel service in the business world (Danaher and Rossiter, 2011). On one hand, competition in the retail industry is fierce and retailers are preparing themselves for the revolutionary mobile channel service, which gives them a great opportunity of innovating in their mobile application design with the telecommunication technology development together (Karjaluoto et al., 2012). On the other hand, for the consumers, mobile channel service enables them to access the internet anywhere at any time with the huge amount of information. Every time that one piece of information transferred from the service provider, the retailers, to a consumer, or between different consumers with their own interests, an information interaction occurred. In this digital age, the frequency of information interacting has reached the level that human being never experienced before (Strom et al., 2014).

The central issue, which is measuring the quality of decision-making process, then use it to examine the design of mobile retail applications, requires a great amount of endeavour and in-depth understanding of various issues. There are different ways of defining the quality of decision-making processes. For example, decision quality can be conceptualised as following the appropriate process, at the appropriate time, taking into consideration the appropriate information, under uncertain circumstances (Hess and Bacigalupo, 2011). Within consumer research, decision quality could be indicated by firstly, whether a

decision can be made confidently, then secondly, would the given consumer make a different decision when given an opportunity (H äubl and Trifts, 2000). Similarly, other understandings include whether consumers' cognitive efforts were used wisely, achieving high accuracy when making highly complex decisions (Dooley and Fryxell, 2000). Thus, only the decision maker can decide what information is relevant, and the ultimate quality of their decision-making process.

Thus, this thesis is focusing on consumer decision-making processes on mobile retail applications, and the central concept as well as the key measurements related to this service platform. First of all, decision-making theory and consumer decision-making theory are reviewed in order to identify the two aspects that are influencing decision-making outcomes. These are the perceived value proposition and practical value creation. For measuring those different perspectives of values, two concepts are reviewed and developed in this thesis. Information processing velocity is developed to represent consumers' capacity of information processing, which is also consumers' capacity of receiving practical usage value on mobile retail applications. Customer perceived value concept is selected as the research lens to examine the value co-creation process on mobile service channels. It engages an identification of consumers' main sacrifice when a consumer is conducting information interaction on a given mobile application. This demonstrates a strong relationship between time consumption and perceived value proposition. Secondly, it helps identify one of the research frameworks guiding this thesis, which is Prospect Theory, and the four elements it comprises. They are reference dependency, diminishing sensitivity, loss aversion and probability weighting (Kahneman and Tversky, 1979, 1992). The application of this research framework requires identification of proper measurements and proper analytical methods for both perceived value and practical value so that they can be compared and contrasted. Given that one of the most distinct characteristics of the research context, which is mobile retail applications, is its significantly low temporal and spatial requirements. The universal measurement of value has been identified as the time assumption of information processing on this service platform. This overall mission leads to the following identification and theoretical development based on two other theoretical foundations, namely, the spacetime diagram from Minkowski Spacetime, and the Theories of Planned Behaviours.

Second of all, for performing the practical value creation examination the first research framework requires, in a wide range of academic disciplines, the concept of time is reviewed in Chapter 4 for three purposes. One, is to review three different concepts of time in consumer research, which are Social Time, Physical Time and Natural Time, and to use those concepts to highlight the impacts when implementing mobile technology on consumer decision-making process. Two, is to establish connections between different aspects of the decision-making process to different concepts of time. For instance, the perceived and practical aspects of decision-making process all influence how consumers perceive social time, when they are considering using the mobile platform to make purchase decisions, as well as when they are actually making decisions on mobile devices. Three, is to identify the proper analytical methods to explore the relationship between the usage of different mobile application functions and the ultimate outcomes of the decision-making process. This will also contribute to another set of issues in this thesis, for examples, how a consumer perceives values from processing information with different functions and how to geometrically demonstrate consumer decision-making process. Detailed discussion on these issues will be provided in Chapter 10 and Chapter 11.

Third of all, for performing the perceived value proposition test, the last theoretical foundation, the Theory of Planned Behaviours is reviewed. Furthermore, a framework for defining customer perceived value is provided to demonstrate a strong relationship between value and time, as time consumption is the main sacrifice that consumers need to make to perceive value. This definition framework is also going to support the identification of the four constructs that are closely related to customer perceived value. A number of constructs are selected from a point of view of informational interaction on mobile retail applications in Chapter 5. These constructs include Electronic Risk, Usage Convenience, Electronic Word-of-Month and User Control. As the product of reviewing and examining of these constructs, a conceptual model is proposed as the perceived value proposition on mobile retail applications. Six hypotheses, in Chapter 5, are developed specifically for testing this conceptual model. The testing result, which is the final structural model is provided in Chapter 9. This perceived view is compared and contrasted with the practical view in Chapter 10.

1.3 Research Methodology and Methods

This particular research builds on the ontological position of objectivism, and the epistemological position of critical realism. A deductive approach and quantitative methods are employed in three discreet phases of this thesis.

This project is being undertaken in association with Boots UK Ltd (henceforth named Boots), the high street beauty and pharmaceuticals product retailer, and the Boots website provides research context for this project. Boots' secondary data are produced by IBM Coremetrics, and the first phase of this thesis is used to analyse customers' usage of Boots' mobilised website. All data is on an aggregated level but clear overview of actual electronic channel usage, and more importantly, revealing the average length of Boots' customers' decision-making processes when analysing the primary data. In order to collect users' behavioural data on mobile retail applications, hardware and software are set up to screen-record all the user actions when participants are trying to make simulated purchase decisions on Boots' mobilised website. All the data is manually converted into a database for survival analysis, which is the main analytical technique employed for the first part of this thesis. The results of survival analysis are produced by SPSS.

Additionally, questionnaire data and structural equation modelling (SEM) are used to test a proposed conceptual model of consumer perceived value relating to the use of the website in question. In order to establish and verify the nature of the scale measurements to be used in this thesis, guidance has been taken from the issues of common methods bias (Podsakoff et al, 2003), Churchill's (1979) scale development procedure and Gilliam and Voss's (2013) six-step procedure for construct definition. All measures have been developed using items appropriated from existing, validated scales, which are focusing on digital marketing research. All testing objects and attributes assessed by the scale items have been previously used in this research area. There are 46 scale items measuring five constructs in the conceptual model. Common methods bias test (Podsakoff et al, 2003), Cronbach's alpha test, principle component analysis in SPSS, discriminate validity test and confirmatory factor analysis in AMOS are used to ensure reliability and validity.

217 undergraduate students of Nottingham Trent University were recruited provide two purchase decision-making processes each on the Boots' mobilised website, and complete a questionnaire. All participants met the filtering criteria of having experience of using

mobile retail applications, as well as having a good level of English language skill to understand information on Boots' mobilised website and the questionnaire. The database for analysis consequently comprises evidence of 434 screen recorded decision-making processes for survival analysis (phase 2), and responses from 217 questionnaires for SEM analysis (phase 3).

Figure 1.1 shows an overview of both the theoretical and practical aspects of this thesis. Beginning with a contextual and conceptual review of the research context, the central research question will propose three key areas need for further investigation. They are

1. The likelihood of reaching the expected outcome, or the probability of reaching a decision,
2. The time consumption of decision-making process and
3. Value co-creation during the usage of mobile retail applications.

Three key concepts are theoretically identified and developed to move to research design. The first concept is information processing velocity representing consumers' absolute speed of processing information. Second, it is customer perceived value, which is the ultimate value a consumer perceives after evaluating the benefits and sacrifices of being involved in a service process. Third is user control. This is defined as the extent to which consumer can determine the timing, functionality, and sequence of a decision-making process.

Three theoretical foundations are identified in the literature review chapters. They are prospect theory to address probability issues in decision-making, spacetime diagram in Special Relativity address the philosophical and geometrical understanding of time in consumer research. The last foundation is the Theory of Planned Behaviour, which is supporting the conceptual model development and the structural model discussion.

Fast Moving Consumer Goods Purchase Decision on
Mobile Retail Application

Probability of
Reaching a Decision

Prospect Theory
(Theoretical Foundation1)

Survival
Analysis

Structural
Equation
Modelling

Information
Processing
Velocity

Customer
Perceived
Value

Compare
&
Contrast

Probability
Weighting

Minkowski Spacetime
(Theoretical Foundation 2)

Mediation
Testing

Theory of Planned
Behaviour
(Theoretical Foundation 3)

Time Consumption
of Decision making
process

User
Control

Service Value
Co-creation

Figure 1.1 Research Overview

1.4 Original Contribution to Knowledge

This study adopts a research contribution framework from Gorley and Gioia (2011), and
aims to contribute to consumer behaviour in marketing research on a number of scientific
areas.

First of all, since this thesis is focusing on consumer decision-making processes for
purchasing fast moving consumer goods on mobile retail applications, one of the
theoretical foundations, Prospect Theory, is used as a research framework. Within this
research framework, the first challenge is to theoretically justify the application of Prospect
Theory, which is a decision theory in the behavioural economic realm, to a consumer
behaviour marketing research. Then design a marketing research that can build
understandings and draw conclusions on all four elements of Prospect Theory. In the
process of discussion and presentation in the following chapters, there are two major issues
need to be addressed. The first one is, whether there are differences between consumers'
perceived value proposition and their perceived value creation for using mobile channel

service. The second issue is how Prospect Theory can be used to explain consumer behavioural on making their monetary decision (for example, gambling), when applying it to non-monetary decision (for example, which function that a consumer would like to use to conduct information interaction for their decision-making), what is, and, how to understand the cost of their choices. These two issues are leading a contribution of this thesis.

The second contribution is directly related to the discussion and application of Prospect Theory, and the Theory of Planned Behaviour. Prospect Theory is the first and the more important theoretical foundation, which guides the whole research design, including a prediction of customer perceived value and an actual practical value co-creation. The Theory of Planned Behaviour is the second theoretical foundation, which is guiding the perceived value proposition section. With the supports from both theoretical foundations, this thesis managed to compare and contrast the results from two data analyses sections and provide better understandings on the differences between perceived value and perceived value of consumer decision-making.

The third contribution is this thesis is one of the first research that uses time consumption as the main cost for conducting informational interaction on mobile retail applications. For demonstrating the importance of time, this thesis reviews a wide range of literature to produce a new understanding of the relationships between consumer information processing velocity and the probability of making a decision, and, in a later stage, from the probability of reaching a decision to practice usage value of mobile retail applications.

In the discussion of the thesis in chapter 9, discussions, on which those above contributions are building are provided in greater detail. In the final chapter, chapter 11, both theoretical and practical contributions, along with recommendations to industry and future research are provided.

1.5 Thesis Structure

The thesis is divided into 11 chapters. The overall structure of the thesis is illustrated in Figure 1.2, whilst the narrative below describes the main features of each chapter.

The first chapter is an introduction giving an overall summary of the whole project. Research background, research rationale, research aim and objectives, research methodology and original contributions are highlighted.

Chapter 2 is a literature review of online retailing research. Three key issues are derived from this chapter. They are the probability of reaching a decision, time consumption of a decision-making process and the usage value of mobile retail applications. The central research question is also proposed in this chapter and guides the following three chapters of literature review.

Chapters 3, 4 and 5 are the critical literature review of recent research on the key issues mentioned in the central research question. A number of important concepts and theories are reviewed. Three theoretical foundations are identified in these chapters. They are Prospect Theory, the Theory of Planned Behaviour and Minkowski Spacetime.

Chapter 6, five research objectives based on the literature review in the previous 4 chapters are proposed. The conceptual framework of this thesis is proposed to present the conceptual map and to theoretically guide the research design.

Chapter 7 engages the discussion on research methodology and research methods. Justifications of the selection ontological and epistemological positions, research approach, data collection techniques and data analysis techniques are discussed in great detail in this chapter. In this chapter, research objective 1 and research objective 3 are achieved.

Chapter 8 and 9 focus on data analysis. They are survival analysis on screen recording data and structural equation modelling on a questionnaire survey. All results are clearly demonstrated and prepared for the final discussion in Chapter 10.

In Chapter 10, results from both parts of this thesis are discussed and summarised. The survival analysis results provide answers to research objective 2. The structural equation

modelling section is used to produce the final structural model, which is related to research objectives 3 &4.

Chapter 11, which is the conclusion of this thesis, and theoretical and practical methodological contributions of this thesis are highlighted, followed by researcher's reflection and recommendations for future research in related areas.

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        │ Behaviour Research   │    │ Customer Perceived   │
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        │ Survival Analysis    │    │ and Structural       │
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Figure 1.2 Thesis Structure

Chapter 2. Literature Review 1 - Online Retailing

2.1 Introduction

As the first chapter of literature review, a general conceptual view is provided in the context of online retailing and mobile retailing. This thesis sees mobile retail applications as a service platform. To study any service concept, the starting point should be what this service is offering to its customers and where the service emerges value for its customers. Consumers assess the quality of a service according to their experiences of both what outcomes they can get out of the service process and how their experience interacts with the service process. All the experiences are collected between a starting point and an ending point of a service. It is crucial for a consumer behaviour research like this thesis to identify a number of key issues in this context, and consequently identify appropriate theoretical foundations, which can be used either directly as a research framework, or indirectly to develop a research framework. Therefore, this review is focusing on the nature of the service on mobile retail applications, and being conducted from a perceptive of how consumers derive usage value of their decision-making experiences on mobile retail applications. The central research question will be identified at the end this chapter. A set of research objectives designed to operationalise the central research aim, or rather to answer the central research question will be provided in Chapter 6.

2.2 Mobile Marketing

The American Marketing Association (AMA) defines marketing as the activity and process for communicating information, creating and exchanging value for consumers and society (AMA, 2013). Moreover, marketing is also extremely crucial for companies who want to establish competitive advantages to build a strong brand image, to obtain more market share and to fulfil their social responsibilities (Habel et al., 2016). Combine the two sides of the story together, for both consumers and companies, it emphasises that both the parties have their roles in marketing activities, information communication is the main method for both parties to create value together, and more importantly creating value is the reason that both parties, particularly the consumers get involved or engaged in marketing activities (Zhong and Mitchell, 2013). The Recent debate between Goods-Dominant Logic and Service-Dominant Logic reveals the centre of marketing activity has shifted from

companies to consumers (Edvardsson et al., 2011). Furthermore, development of communication technology facilitates this huge change by lowering the temporal and spatial barriers of communication. In this digital age, any person who is attached to a digital communication channel can easily get involved in value creating with companies or other consumers (Nicolau, 2013).

Comparing to other communication channels, for instance, the face-to-face channel, the newspaper and magazine channel and the traditional internet channel; the mobile channel has been discussed increasingly in recent marketing literature. There are a few perspectives that draw great attention from marketing academics and practitioners, including consumer behaviour on the mobile channel (Bui and Kemp, 2013), consumer value co-creation (Vargo and Lusch, 2016) and mobile advertising (Megdadi and Nusair, 2011). Yet, this thesis is primarily concerned with the utilisation of marketing designs that aim for creating customer perceived value on mobile retail applications.

Consumers' personal preferences are complex and difficult to identify, which creates challenges when retailers are supporting consumers with their decision-making processes. When consumers are making their decisions, they usually keep changing to different strategies, as long as the adaptive strategy is efficient in calculating accurate trade-offs between the potential benefits and sacrifices.

In the context of mobile retailing, consumers interact with a mobile retail application. Like other electronic retailing channels, consumers cannot touch or feel the actual product. However, on the mobile channel, consumers are challenged by other factors, such as, the information density issues caused by the size of mobile devices, the decision-making speed issues given the nature of mobile usage. In order to achieve competitive advantages in the e-retailing industry, it is necessary to provide consumers with a friendlier informational environment that enables them to make their decisions efficiently with great speed and accuracy.

Recent research on mobile channel service has been focusing on a range of issues, for example, mobile commerce acceptance and adoption (Wang and Li, 2012), mobile marketing acceptance (Persaud and Azhar, 2012), mobile applications (Bradshaw, 2013), mobile application design (Chen et al, 2011), mobile brand value (Dunes and Pras, 2013)

and consumer behaviour on mobile channels (Li et al., 2012). However, none of them has investigated consumer behaviour from a customer perceived value viewpoint. Also, prior research has clearly identified sets of variables for measuring the value created by mobile retail applications, and more importantly, consumers' usage of mobile retail applications.

This section starts with a review of recent mobile marketing literature and the connection from the key concepts related to this quickly developing service channel. Studies in general electronic service channels are also mentioned in that section to show the potential measurements for researching in mobile service marketing domain, which brings the end of the contextual section of the literature review.

2.2.1 Mobile Marketing and Internet Marketing

Based on the recent development of telecommunication technology, mobile service channels have been applied increasingly to deliver value-added service with its numerous functions, for instance, fundamental communication functions, entertainment functions and financial transaction functions (Nysveen et al., 2005). Since mobile service channels were introduced into the business world, it has been frequently considered as an extension of traditional electronic service channel such as the internet, because visiting internet websites is an initial and fundamental function on mobile devices (Thakur and Summey, 2007). However, it is also recently regarded as an independent channel for service delivery based on its unique usage value creation patterns, which is, from consumers' perspective, its unique characteristic that offers consumers to use services anytime and anywhere they want (Nysveen, 2005). Accordingly, the value of using mobile service channels contains both sophisticated business theoretical development and complicated information technology development. In order to better understand it, existing electronic commerce research and findings in the business area and in-depth knowledge in other social science disciplines could provide valuable insights.

Both traditional retailers and online service providers have noted the importance of mobile service channels for the current and future marketing activities. From this point of view, a large amount of enhancements for mobile channels have been vigorously added by those multichannel service providers (Kleijnen et al., 2004). Both researchers and practitioners have strong interests in trying to investigate customer behaviour in electronic channel retailing, especially in mobile service channels (Shankar et al., 2010; Yang, 2012). The

differences between traditional offline or online services and mobile services, and how these differences affect customer behaviour are critical for maximising external marketing effects and for determining appropriate business models when organisations establish such services (Chen and Dubinsky, 2003; Methlie and Pedersen, 2007). From a marketers' perspective, they use this platform to provide high level personalisation, high level interactivity and pay a low cost for reaching large target segments, those usages of the mobile channels have been identified as the main benefits of employing mobile marketing strategies (Facchetti et al., 2005). Mobile services have been rapidly introduced to the potential customers. However, compared to the number of customers and their frequencies of using other service channels, only a minority of consumers have expressed their interests in using mobile devices for services transaction (Yang et al., 2015). The main reasons for these disappointing results have been discussed to be two. Firstly, companies have not been able to understand the processes of mobile service channel value creation, and consequently failed to employ their resources to underpin this value proposition (Van der Heijden, 2006). The other one is that organisations have not realised the importance of customer perceived value within mobile service pattern (Pahnila and Warsta, 2010), thus they are facing difficulties understanding decision-making processes on this channel, which plays a significantly important role on their service channel adoptions. It is still unclear that the whole process of generating customer perceived value through mobile channel service delivery, and furthermore, how this process influences future mobile service channel development, taking into account that mobile service channel is a rising and developing service channel.

Earlier electronic channel service research indicates that online consumer purchase decision is generally similar to the traditional offline consumers, regarding the importance of social interaction (Rohm and Swaminathan, 2004) and word-of-mouth effect (Dennis et al., 2009). Recent research suggests that, traditional retailing customers and electronic channel customers have fundamentally different behaviours (Spassova and Isen, 2013; Nicolau, 2013). Electronic channel customers are reported to be more concerned with shopping convenience, and they are willing to pay extra for saving time in certain circumstances (Morganosky and Cude, 2000; Gensler et al., 2012). However, this does not mean customers only adopt electronic channels when they are in time sensitive situations. Based on these points of view, Ganesh et al. (2010) indicate two points for increasing e-

customers' adoption of products or services, which are providing usage convenience and personalised products or services.

These two goals are difficult to achieve simultaneously with traditional service channels, because, on one hand, personalized products or services require service providers to deeply understand an individual's demands rather than offer all target customers similar products or services, thus, information exchanging plays a critical role for this aim (Rohm and Swaminathan, 2004). In addition, these information exchanging processes could be time consuming and challenging customers' trust to service providers. On the other hand, for the purpose of time saving, customers would try to avoid any information exchanges that delay their services purchase processes (Evanschitzky et al. 2004). However, the attempts of achieving these two goals could lead up to the same result from both customers and organisations' perspectives, which is the increasing of the level of customer engagement. Customers need a certain volume of interactions to create more value for themselves, such as saving more time than using traditional service channels, meanwhile, organisations need to maintain high long-term marketing performance to continuously provide high quality products and services (Gummerus and Pihlström, 2011).

2.2.2 Mobile Retail Application

Mobile retail applications have generated increasing interest among marketing researchers and practitioners because of the positive impact to consumer interactivity to service providers (Varnali and Toker, 2010). Consumers tend to buy more products and services, share more of their shopping experiences, and even visit stores more often after using mobile applications (Zauberman et al., 2012). Mobile channel service differs from other online marketing activities with its unique characteristics. First, ubiquity reflects that mobile application is used anytime and anywhere (Okazaki and Mendez, 2013). Second, mobile applications enable retailers to provide tailored content to individuals based on knowledge about those consumers' preferences (Adomavicius and Tuzhilin, 2005). Finally, 'informativeness' increases the likelihood that consumers use mobile retail applications to make a decision (Kim et al, 2013). It also shows that with rich and tailored information, the increasing likelihood of using mobile retail applications improves the likelihood of purchasing (Bellman et al., 2011).

2.2.3 Development of Mobile Marketing Research

The received research on the mobile service channel is provided by two main groups of academics. One group emphasises their research on investigating the relationship between consumers' trusting beliefs and mobile services usage intentions (Schlosser et al, 2006; Summey, 2007), because trust issue is identified to be the main barrier of using mobile service channels like how it influences other service channels. The other group is focusing on identifying the main antecedents for consumers to participate in mobile services, however, their conclusions are arguably influenced by the different mediators they used in their research, which shows the complexity of this developing new service channels (Hourahine and Howard, 2004; Nysveen et al., 2005; Kleijnen et al., 2007).

More importantly, the research provided by these two groups of academics have similar limitations. For example, they suffer from a specific limitation, which is how to identify the differences between mobile service and other electronic channel services in a value creation perspective (Goggin and Spurgeon, 2007; Kang et al., 2015). Another one that seems to be shared by all the empirical studies in this area is that, when research seeks to investigate the relationships between different antecedents and mediators, the identification of variables is still not crystal clear (Tojib and Tsarenko, 2011; Nickerson et al, 2013). Current research on mobile service channel context offers little guidance. Thus, both a theoretical and a practical understanding are required in this context.

Mobile service channels are defined as a platform for delivering marketing communication to the mobile devices, offering informational interaction opportunities to create value for customers and companies (Andrews et al., 2012). The value that is co-created on this platform is mainly informational and mobile content functional (Komulainen et al., 2007). However, both marketing researchers and practitioners are increasingly focusing on customers' interactions with their mobile devices, and furthermore the individual's experiences on mobile marketing activities (Gummerus and Pihlström, 2011). A research lens needs to be identified for examining the value proposition behind mobile marketing phenomenon, to understand, not only how mobile communication technology changes and engages customers' marketing activities, but also how customers adopt mobile information technology to enhance their lifestyles (O'Donohoe, 2007).

Several prior works compared traditional face-to-face shop and electronic retailing channels in a different industry, namely music industry (Danaher et al., 2008) and newspaper industry (Thurman, 2014) and furniture industry (Avery et al., 2012). The main advantages of adopting electronic channels are, flexible accessibility of information and service, and effective marketing communication to increase brand awareness (Malthouse et al, 2013), with the disadvantages of lack of physical presence and lack of interpersonal connection between customers and companies (Ansari et al., 2008). Another perspective of this comparison is based on the behaviours of in-store shopping, research reveals that customers typically walk through the store sections that interest them rather than the entire area. Therefore, customers have no access to the information displayed in the areas away from their path. Almost two-third of the whole shop remain unseen (Hui and Bradlow, 2012).

2.3 Customer Experience on Mobile Retail Applications

Customer experience has been defined as the customer's response to the encounter of being a user of a product or service (Lemke et al., 2010). Customer experience has been considered as having strong links to value creation (Prahalad and Ramaswamy, 2004), customer loyalty (Mascarenhas et al., 2006; Reichheld and Markey, 2006) and customer satisfaction (Pullman and Gross, 2004). As the definition indicates, the judgement on the previous interactions within a service process is personal. Accordingly, identifying the measurements of customer experience is the most important issue in customer experience literature (Zomerdijk and Voss, 2010). Prior research suggests that customer experiences should be captured with the specific context it occurred, and the complexity of those context specific variables is the greatest problem in developing acceptable measurements (Palmer, 2010).

Increasingly, by using the link between customer experience and value creation, recent study has suggested that, service providers and their customer are creating value in the service interaction process, which shows the potentials of using the interactivities in a service process as the measurements of both customer experience and customer perceived value (Juttner et al., 2013). This methodological challenges of measuring customer service experiences urge the definitions of three themes: service experience formation process comprises consumers' emotion and cognition, then customers' emotion and cognition are

reformed into customer behaviours through contact point or touch point (Zomerdijk and Voss, 2010). Eventually, all the interactions between consumers and companies generate utilitarian value for the consumers, and both consumers and companies involved in service process become the value creators (Schembri, 2006).

Previous research has confirmed that both consumer cognition and emotion can predict customer satisfaction (Homburg et al., 2006), companies have been designing series of stimuli for trigging consumers' positive cognitive and emotional responses during service processes (Palmer, 2010). However, in service processes, how consumers choose the stimuli to engage their own resources or how much resources that they deem to invest into those triggering stimuli is still unclear that. Furthermore, both consumers' and companies' role in these offering and choosing interactivity also need to be examined.

Since all three themes happened at the same time, the traditional measurement approaches are challenged and forced to shift the emphasis from consumer behaviours to consumers' resources engaged during service processes (Homburg et al., 2006).

2.3.1 Customer Experience and Service Process

Customer experience is generated throughout the holistic service process; the usage of the touchpoints is the key for conducting interactive service process (Frow and Payne, 2007). Furthermore, earlier research examines customer experience from three aspects, which are multi-sensory, fantasy and emotive aspects of product/service use, in terms of experience formation (Tynan and McKechnie, 2009). Lemke et al. (2011) introduce three encounters, which form customer experience. Whereas the service encounter and communication encounter are where all the interactions between customer and company take place, in the usage encounter, a customer may have to perform the service or use the product without any support from a company. Latter studies show the contact between consumers or non-consumers usage encounter might impact the overall customer experience therefore customer experiences can be influenced by any encounters of a service process even the touchpoints usage are not controlled by the company (Palmer, 2010). This point of view raises the importance of control power in the service process, since control power impacts the ultimate evaluation, extends the length of a service process, and brings up the issue of customer memory on the perceived service experience (Frow and Payne, 2007).

On one hand, the construction of product-related experiences has been mainly focused on the pre-purchase search of production information in previous studies (Yoon, 2013). More specifically, comparing to the advertising of the product by the retailers or manufacturers, the direct experiences of using the product and the information about the product have more influences on purchase intentions, for instance, word-of-mouth information has stronger credibility than information provided by companies. This thesis pays attention to the experiential consumption from the perspective of using information service channels, and more importantly, taking into account the beginning point and the end point of the service process on this channel.

On the other hand, in order to investigate the post-purchase experience of the customers, Gu et al. (2013) introduce the concept of "choice closure", which is defined as the psychological process by the customer that come to perceive the finalisation of making a decision. They suggest that customers are more likely to have negative emotional feelings if they cannot have choice closure after making a decision, which leads to the negative experience of the process. This finding also raises the question of how to encourage customers to enter the "closure" process quickly after one service, and rapidly after several service processes. Other research shows that the durability of choice closure can be shortened by the information that counters customers' previous decision (Litt and Tormala, 2010). Alternatively, providing timely access and precise information to the customers for their decision-making, lower the cost of information searching could help them enter the psychological closure state of previous decision (Botti and Hsee, 2010).

In addition, regarding the issues of the time that is spent on making and evaluating decisions, though little research has examined issues in this area due to the difficulties of measuring variables of time (Stilley, et al., 2010). Previous studies on impulse purchase behaviours offer insights on this topic. The availability of time has been suggested as one of the crucial antecedents, it has influences on the impulse purchase frequency, the total amount of time spent on searching information, perceived quality of the product (Mohan et al., 2013). A detailed discussion regarding time issue in the context of decision-making will be provided in Chapter 4.

Prior work on examining decision-making process (Queen et al., 2012) conducts five experiment in the retailing background to indicate the importance of the timing of

information presentation. It shows that customers have positive feelings of having all the information they need, and interestingly, they intend to make different decisions when the timing of receiving information is different (Starcke and Brand, 2006). The previous research is mainly focused on how different timing impacts the final decision between favourable products and its alternatives. Few have addressed how information received timing could influence the decision of buying or not buying, or its further implication of communication technique of different service channel.

2.3.2 Customer Experience and Decision-making

Given that customers are frequently engaged in making sequential decisions, which the latter decision-making is influenced by former ones, the decision-making research shows increasing interests in examining how customers' experiences impact this sequence. There are many psychological meanings based on the variables in a decision sequence, for instance, options in a limited range (Dellaert and Haubl, 2012), psychological implication between options (Keinan and Kivetz, 2011) and decision on the order of information search (Levav et al., 2012). They suggest that customers prefer making a decision with a relatively smaller set of choices and information rather than a wider range, moreover, customers also prefer using shorter time on making decisions even if they have to do an in-depth search on product information. Furthermore, Chang and Pham (2012) suggest that, building on a serial research of Pham (2004, 2007), the decision-making process is intensively influenced by the experience that is closer to the present. Also, customers tend to have a stronger reaction to the events that have a temporally short distance to present (Van Boven et al., 2012). Accordingly, these findings show potentials of enhancing marketing performance by shortening the temporal distance between two decision-making processes.

Furthermore, recent studies have aimed to build a bridge between the decision-making process and time needed for this process. The key link has been identified to be customers' behaviour of receiving and processing information under the time pressure (Krishnan et al., 2013). Customers intend to either filter the information, or just omit part of the information from deliberation, which limits the range of the information that can be received and processed by the customers (Allon and Bassamboo, 2011).

Thus, a link, between the previous experience of using a service, and the time that is going to be spent on current decision-making processes have been implied. However, the role of communication channels in terms of offering ease to the customers to receive and process information is still unclear, few studies answer the questions of how much quicker customers can make their decisions with the assistance of a more easily receiving and processing information service channel.

2.4 Central Research Question

This thesis attempts to explore consumer decision-making processes on mobile service channels. Based on the literature review in this chapter, three key themes have been identified. The first key issue is consumer decision-making, which, essentially, contains all the information interactions that consumers conduct when they have wants and needs to fulfil. This thesis also pays attention to the outcome of a decision-making process, as it is a representation of the ending point of a decision-making.

The second key issue is time. As a service process that aims to derive value for its users, a decision-making process must set up a beginning point and an end point for its customer to evaluate the service quality of this platform. In other words, a consumer will compare what they eventually have after using mobile retail applications to what they thought they would like to have. This also can be seen as a comparison between customers' well-being between the beginning point and the end point of a decision-making process. Thus, this thesis is going to use time as a temporal distance between those two points, and tries to establish relationships between time consumption and what happened in a decision-making process.

The last key theme is value, literature suggests a service is a process of creating, or co-creating value. Value creation is a fundamental objective of consumption. In a decision-making process, all the actions that customers' take are for pursuing value. Therefore, the concept of value and creation of value can be used to explore customer's journey of creating value for themselves, and eventually to demonstrate how the value at the ending point of a decision-making process is reached.

Based on the discussion above, a central research question is proposed to guide the following literature review chapters and to help illustrate research gaps and research objectives. The central research question is when using a mobile retail application and attempting to make a purchase decision, what information-processing factors impact the time consumed, and how this elapsed time impacts the probability of actually reaching a decision? A set of research objectives and a conceptual framework, acting as a research framework, will be provided in Chapter 6.

Chapter 3. Literature Review 2 – Consumer Decision-making

"The confidence that individuals have in their beliefs depends mostly on the quality of the story they can tell about what they see, even if they see little."

(Daniel Kahneman, 2011, p54)

3.1 Introduction

In three literature review chapters (Chapter 2, 3 and 4), key theories, constructs and concepts will be reviewed both conceptually and contextually in order to demonstrate an intellectual map of all the crucial elements as the theoretical foundation of this thesis. This includes research work that has been done in areas of consumer decision-making, time in consumer research customer perceived value and mobile marketing; developing operational definitions for customer perceived value related concepts; identifying measurements for the key concepts; developing one conceptual model for testing the customer perceived value proposition on mobile service channel (which is also one of the five research gaps); and more importantly, identifying research framework and developing conceptual framework. Five research questions and objectives have arisen from the conceptual framework, which is demonstrated in chapter 5.

Chapter 3, the current chapter, is focusing on decision theory, consumer decision-making theory and Prospect Theory, and builds a relationship between decision-making to time and customer perceived value. In Chapter 3, three concepts of time, social time, physical time and natural time, are reviewed in the context of consumer research, which builds a strong link from the theoretical foundation to the main research methods - survival analysis. Chapter 4 addresses issues related customer perceived value, characteristics of mobile retailing, their relationships, and develops a structure model this thesis is going to test the customer perceived value proposition on mobile retail applications. Details regarding this conceptual model and hypothesis contained in it will be provided in section 4.4.

Beginning with a general review of decision theory in the economic realm and consumer decision-making theory in the marketing area, it demonstrates the complexity of conducting consumer behaviour research focusing on both two aspects on an individual

level, which are a perceptual aspect and a practical aspect (Hwang and Kandampully, 2012). For facing this challenge, this thesis adopts the work of a Nobel laureate, Daniel Kahneman and his colleague, Amos Tversky (Tversky would have shared the prize had he not passed away in 1996), to provide deeper insights of decision-making. Their contribution to the behavioural economy realm, Prospect Theory, with its four elements (reference dependence, diminishing sensitivity, loss aversion and probability weighting) is guiding not only the theoretical developments of this thesis, but also the methodological development. In later chapters, it is going to show the way this thesis follows Prospect Theory to provide theoretical understanding and geometrical demonstration of individual consumer decision-making process and how the consumer perceives value when processing information on mobile retail applications.

3.2 Consumer Decision-making Model

Consumer decision-making has long been one of the major issues in consumer behaviour studies. A number of different approaches have been adopted in the study of decision-making.

3.2.1 Consumer Culture Theory

Consumer Culture Theory refers a family of theoretical perspectives that address the dynamic relationship between consumer behaviours and cultural meanings (Arnould and Thompson, 2005). Consumer culture research shares a common theoretical orientation that culture is a system of collectively shared meanings, and explores the distribution of those meanings to different cultural groups and its impact to consumption (Belk et al., 2013). It also conceptualises a commercialised system that makes collective sense of product/service's images, texts and other sorts of information. Those marketing symbols are used by the different cultural group to sense their living style and environment and to orient individual's experiences (Nairn et al., 2008). In short, Consumer Cultural Theory is a research tradition that studies consumer culture and generates empirical findings and theoretical innovations.

Although Consumer Cultural Theory supports researchers who are interested in the social and cultural dimension of consumption to generate new constructs and theoretical insights, it contributes little to studying consumption contexts (Askegaard and Linnet, 2011). More importantly, those dimensions are not accessible through traditional quantitative methods,

for example, experiments or surveys (Nairn et al., 2008). This thesis is focusing on the specific information interactions that occur during consumer decision-making, rather than the symbolic, experiential, hedonic or aesthetic aspects of acquisition behaviours. Therefore, the thesis does not adopt Consumer Culture Theory as a theoretical foundation.

3.2.2 Practice Theory

In contrast to the social and cultural level architecture outlined above, social practice theorists (Giddens, 1984; Bourdieu, 1990; Reckwitz, 2002; Shove, 2010) develop a middle level of factors that are influencing consumer decision-making. This middle level is between individual consumer and social structure, and is in the everyday and routine performance of social practices (Echeverri, and Skålén, 2011). The practice itself becomes the core, which is neither the decision-making journey of the individual agency, nor the social or cultural totality the externally exists in any form (Reckwitz, 2002). With this understanding, consumptions are not seen as the results of individual's attitudes, values or beliefs, but is part of social practices (Gram-Hanssen, 2010). The performance of these social practices, for example, decision-making for purchasing, is part of the routine accomplishment of consumers' normal way of life.

Social practice theory thus diverts attention away from individual decision-making to the performing of social practices (Shove, 2014). It emphasises that it is through doing the practices, that consumers are engaged in those activities that help them better understand the environment around them (Shove and Pantzar, 2005). In such processes individual agency is actively negotiating and perform a set of practices in their everyday life, which forms various consumption patterns that are sustainable (Røpke, 2009). The principal implication of practice theory is that the sources of change behaviours lie in the development of practices (Shove, 2010).

However, one of the major issues of applying practice theory is defining what a practice is (Reckwitz, 2002). Practice theorists mainly have three focuses, some of them focus on the components or elements that comprise a practice (Spaargaren, 2011), some focus on the connections between these connections within a particular practice (Watson, 2012), and others are focusing on the position of a practice as a bridge between individuals' practices and external broader social/cultural environment (Warde, 2005). When combining the

studies on these three perspectives, it reveals how to create a consumption pattern, and more importantly, how to reproduce, stabilise this pattern (Reckwitz, 2002).

Given practice theory does not recognise the connection between a consumption pattern and consumer's individual level of attitudes, values and beliefs, and this thesis is focusing on the information interactions that create value to the users of mobile applications (Sahakian and Wilhite, 2014). Another reason for rejecting practice theory in this thesis is that, in practice theory, consumers' behavioural patterns are developing during their practice and their behavioural pattern are not stable until consumers create a stable and sustainable practice (Hand and Shove, 2007). This thesis is interested in examining how rational consumers respond to different types of information the context of mobile retailing. These practice patterns – purchase decision-making- in this thesis is in a stable form. Therefore, practice theory is not adopted as a theoretical foundation here.

3.2.3 Cognitive approach

In cognitive approach, individuals are viewed as an information processor (Holbrook and Hirschman, 1982). Although the influences from the social/cultural environment and the experiences obtained from everyday practices are acknowledged, the cognitive approach is focusing on the informational inputs aiding individuals' internal decision-making (Stewart, 1994). Cognitive approach explores the mental structures and processes that mediate between stimulus and response (Siegel, 2015), and identifies a range of factors that are involved in this complex process, including: learning, memory, emotion and motivation (Sternberg, 1996; Moran, 2012). Information processing is conducted by the consumer whose past experience will influence the ongoing processing. This point indicates that when individual conducting a decision-making process, not only the current process, but also the processes exist in this individual's memory system will influence the overall outcomes of the current decision-making.

When using a cognitive approach to explain consumer behaviour, and it assumes that a consumer is rational, logical and active in decision-making. It has several advantages: first, the cognitive approach is capable of explaining complex consumer behaviour that identifies contingencies that control response and mediate decision-making (Chudry et al., 2011). Second, it is capable of measuring and analysing the data that describe consumer experience, which the results can be used to directly explain the decision-making process.

Last, it extensively uses other social science and humanity disciplines of cognitivism to assist the conceptual development of consumer behaviour research, which makes it theoretically interesting when building connections between consumer research and other research domains.

There are two types of cognitive models (see Figure 3.1), which are an analytical model and a prescriptive model (Spencer et al., 2012). Analytical models provide a grand framework that contains the key elements needed to explain consumer behaviours. Normally, these analytical models are using the five steps of traditional decision-making processes as the skeleton and attach other elements that related to this central process. The five steps are problem recognition, information search, alternative evaluation, purchase and purchase evaluation. On the other hand, prescriptive models provide frameworks to consumer behaviour organisation. These models include all the causal factors that should be observed and organise them in the sequence of appearing in a decision-making. Prescriptive models are useful when identifying measurements of a consumer behaviour, and it offers insights on how and when to measure those factors (Solomon et al., 2012).
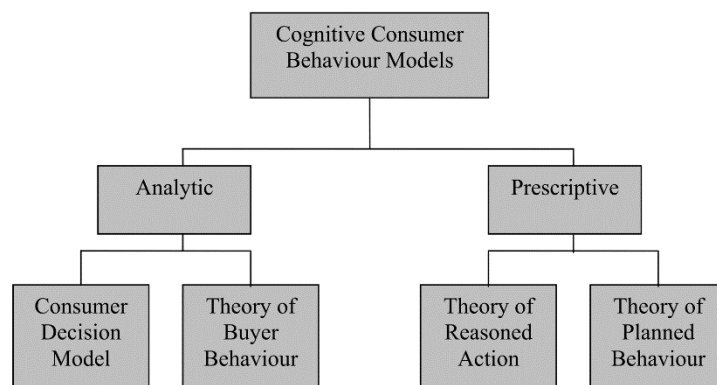
Figure 3.1 Cognitive Consumer Behaviour Models (Spencer et al., 2012)

3.2.3.1 Black Box Theory

In the black box theory, the buying behaviour is based on stimuli, which are coming from environmental factors, such as the 4Ps from marketing area and other economic, technological, political, cultural and demographic factors. The stimuli then go through the buyer black box, which consists two parts: the buyer's characteristics (attitudes, motivation, perceptions, personality, lifestyle and knowledge) and the buyer's decision process (5 steps of the decision-making process as mentioned previously). The thinking

process takes place inside the black box, and, finally, the buyer's response (product choice, brand choice, dealer choice and purchase timing) comes out of the black box.

The black box model shows the interaction of stimuli, consumer characteristics, decision process and consumer responses, however, it is not focusing on how the decision is formed inside the black box, but the relationship between the stimuli and the outcomes of the decision-making.

Similar to other cognitive models of decision-making, the black box model assumes the consumer is a rational decision maker. It acknowledges the interaction inside the box, but does not concern how exactly a decision is formed. Similar to the black box theory, this thesis adopts the point that when studying consumer decision-making, the relationship between the input (external information) and output (the outcome of a decision-making) is vital, and they must both taken into consideration. However, this thesis also aims to provide some, not full, insights on how a decision is formed, or how external information is being processed inside the black box. For further looking into the black box, the consumer decision model (Blackwell and Miniard, et al. 2001) is reviewed in the next section.

3.2.3.2 Consumer decision model (Engel-Blackwell-Miniard Model)
The Consumer Decision Model (Figure 3.2) is structured around a seven-step decision-making process. Compared to the traditional five-step decision model, the differences are, first, the step of information searching is separated into two parts, internal search and external search; second, a final step is added, which is divestment.

Focusing on the information search step, which is closely related to this thesis, the authors argue that for searching and processing external stimuli (external information), all external information needs to go through five stages before storage and use, namely: exposure, attention, comprehension, acceptance and retention. The last four steps are conducted by the consumers'memory system. Most importantly, the memory system is where the interactions between external information and internal memory (consumers' knowledge) occur. This insight offers a potential way of looking into the black box from an informational interaction perspective.

A grand model, such as the consumer decision model, provides the possibility to visually comprehend a complex process with variables and situation flexibility. However, it has been criticised to too restrictive to adequately accommodate the variety of consumer decision-making (Erasmus, et al. 2001; Mandl et al., 2011). For example, the individual factor is only impacting the first, the fourth and the fifth steps of decision-making, however, those individual differences may produce a significant influence on processing the external information. Those difference of processing information is more related to the memory system of an individual consumer, and this model fails to indicate that. Another criticism of this model is that it contains a large number of variables. As such it is difficult to identify a research focus on such a complex model, and consequently difficult to identify accurate representations of consumer behaviours and their measurements.
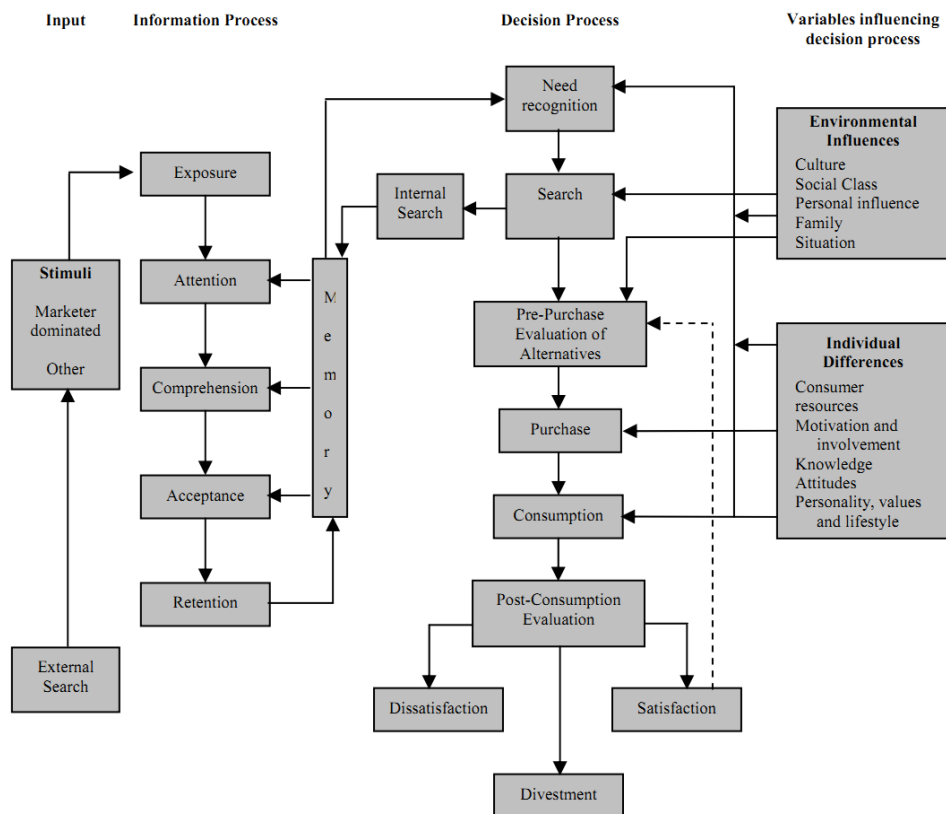
Figure 3.2 Consumer Decision Model (Blackwell and Miniard et al., 2001)

3.2.3.3 Prescriptive Model – TRA & TPB

Prescriptive cognitive models see consumers' beliefs and attitudes as the determinants of consumer behaviour. They assess attitudes and behaviour together to extensively

contribute to consumer research area. The most influential work is the Theory of Reasoned Action (TRA) and the Theory of Planned Behaviour (TPB).

In Theory of Reasoned Action (Figure 3.3), a behaviour is approximately an equal to behavioural intention, which can be derived from consumers 'attitude towards the behaviour and the subjective norms about the behaviour. Also, in TRA, consumers' attitudes towards the behaviour is measured rather than consumers' attitudes towards the object (Sheppard et al., 1988). This point isolates these two different attitudes and indicates it should take into account the attitude towards the behaviour when examining consumer behaviour, since consumers' attitudes towards the product may not influence their actual behaviour.
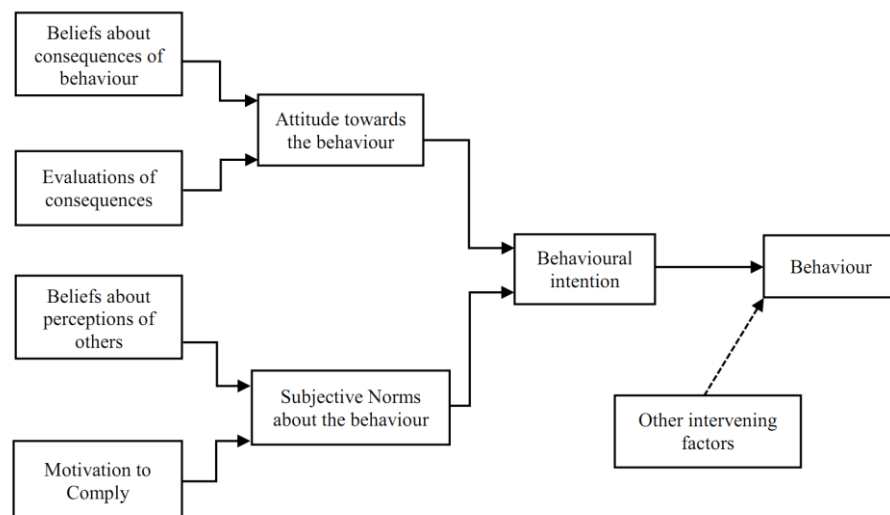
Figure 3.3 Theory of Reasoned Action (Fishbein and Ajzen, 1975)

After many years of empirical tests and application of the TRA, the authors improved the TRA model by bringing a set of important variables, which are related to consumers' control beliefs, and it resulted in an extension of the TRA, the Theory of Planned Behaviour, the TPB Model (Figure 3.4).

In the TPB model, there are three major sorts of considerations that influence a person's behavioural intention (Ajzen, 1991, 2006). First of all, normative beliefs deal with issues such as whether a behaviour can get approval from agencies in social construction, for instance, family, friends, co-workers, etc. Second of all, Behavioural belief is defined as

the considerations of the likely consequences of a behaviour. Behavioural belief also refers to people's consideration of expected outcome, or deliberation of benefits and costs. Specifically, when the perceived benefits outweigh the perceived costs, people generate a positive attitude toward the behaviour, which leads to the intention of acting it. And last, control belief refers to the concerns regarding the factors that facilitate the actual performance of a behaviour. It directly relates to people's perceived behavioural control. In this model, behavioural intention is influenced by a mix of the attitudes, subjective norm and perceived behavioural control factors. One thing that is worth to emphasise is that, in TPB, actual behaviour is mediated by perceived behavioural control. The degree of consumers' perceived behavioural control is determined by the factors regarding control beliefs, which makes measuring control beliefs factors become a proxy for measuring consumers' perceived behavioural control.
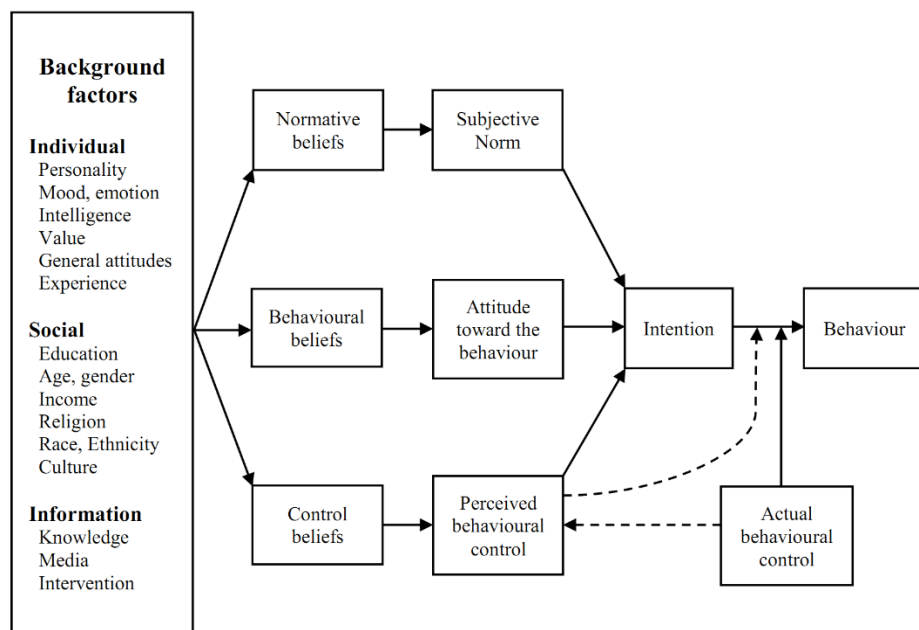
Figure 3.4 Theory of Planned Behaviour (Ajzen, 2006)

Since its introduction to consumer behaviour research domain, TPB has become the dominate expectancy-value theory (Shaw et al., 2000). Empirical tests have found that TPB has significantly improved over the TRA, in terms of providing strong predictive validity of consumer behaviour. Nevertheless, there are a number of potential improving directions that would further complete this model. Firstly, as the fundamental assumption that shared by all the decision models in this domain that the TPB belongs to, it assumes

that the consumer is a rational cognitive decision maker, and all the factors are considered in a completely comprehensive cognitive process (Greifeneder et al., 2011). In earlier research, it reports that consumers' emotion and spontaneity also play important role in their decision-making (Shiv and Fedorikhin, 2002). The TPB model weights less of those emotional and natural factors, which in some cases, are dominating the decision-making (Munoz et al., 2006). Additionally, intention as the outcome of consumers' consideration is a dynamic concept when more information becomes available. Especially in this digital age, it becomes difficult to accurately measure all the information that is involved in a decision-making process. A decision could be provisional before new information comes in, therefore exploring the relationship between factors/information and the provisional decision are challenging, in terms of setting up a temporal frame (Heirman and Walrave, 2012).

3.2.3.4 Prescriptive Model – Technology Acceptance Model

The TPB model discussed above has been modified in several close areas, one of the most notable adaptations if the Technology Acceptance Model (Venkatesh and Bala, 2008). The TAM model is used to explain the determinants of how individual adopt new information technology (Verkasalo et al., 2010). In this model, technology usage is the dependent variable, which is perceived by consumer behavioural intention. Individual's usage intention is determined by two beliefs: perceived usefulness, defined as a consumers' beliefs that using an information technology will enhance his/her performance and perceived ease of use, defined as the consumers' beliefs that how difficult to actually use that technology. The figure below (Figure 3.5) demonstrates the most recent development of TAM model, the TAM 3 model.

The TAM model has been well developed in the technology acceptance field, and has provided deep insights how consumer form a decision regarding his/her acceptance or rejection a technology (Greller and Drachsler, 2012). Although this thesis has a very different focus, which is how consumer making purchase decision with an information technology platform – mobile retail applications, and all the consumers this thesis refers to have already accepted mobile retail applications as their decision-making platform, the TAM does offer a couple of points that will guide the research deign here. First, the recent development of the TAM suggests individual differences should be further investigated

(Brown et al., 2010). Those variables are not explicitly identified by current TAM literature, but a broader line of factors, including emotion and personality difference should be taken into account (Rodger and Gonzalez, 2014). Another one is, research regarding information technology usage should address the relationship between actual usage and objective outcome measures. In TAM studies, it assumes that there is a positive relationship between usage and satisfaction or value. There are few studies attempted to verify that relationship, or identify actual measurements for testing that relationship (Capece and Campisi, 2013).
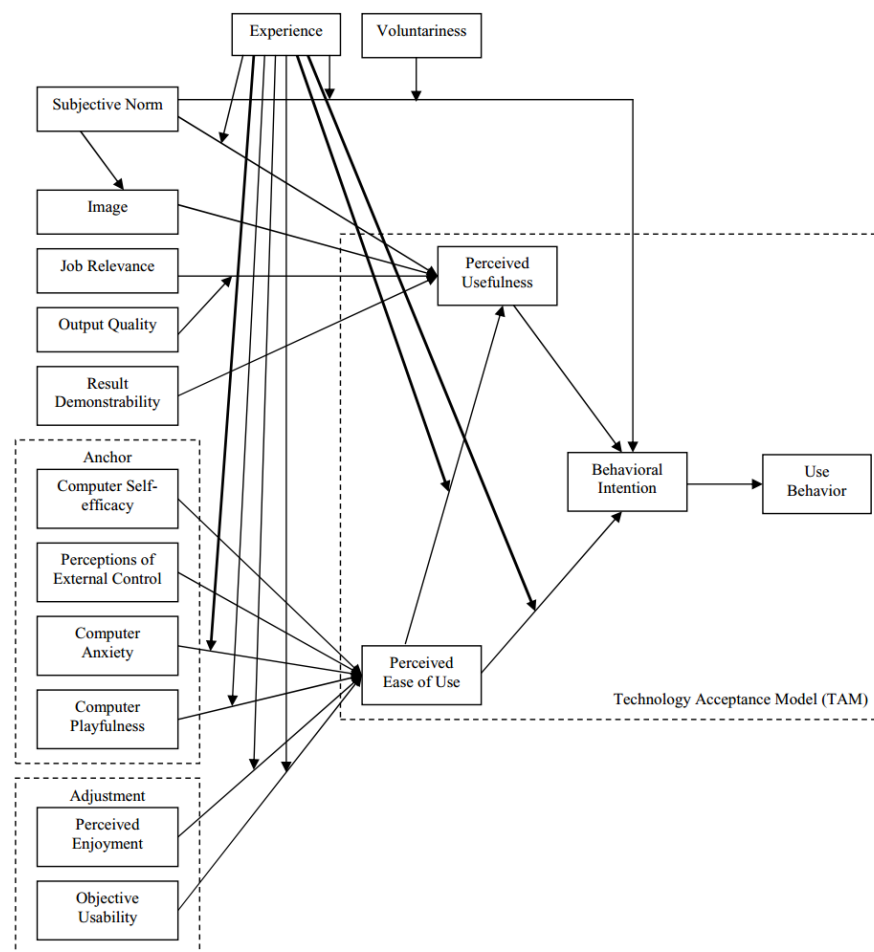
Figure 3.5 Technology Acceptance Model 3 (Venkatesh and Bala, 2008)

3.2.3.5 Unified Theory of Acceptance and Use of Technology (UTAUT) Model
The Unified Theory of Acceptance and Use of Technology model (Figure 3.6) is based on TAM models and attempts to integrate the eight most used models in technology acceptance research into one model (Venkatesh et al., 2003). Those eight models are: the Theory of Reasoned Behaviour (TRA), the Theory of Planned Behaviour (TPB),

Combined TAM and TPB, Technology Acceptance Model (TAM), Motivational Model (MM), Model of PC Utilisation (MPCU), Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT),

The UTAUT has four key constructs that influence behavioural intention and actual use of technology: performance expectancy, effort expectancy, social influence, and facilitating conditions. Their definitions are demonstrated in the table below (Table 3.1).
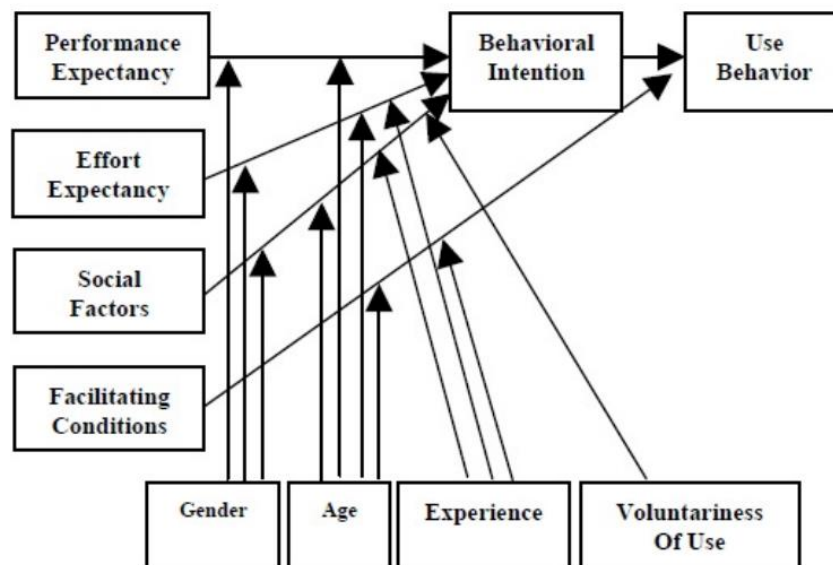
Figure 3.6 Unified Theory of Acceptance and Use of Technology (UTAUT) Model (Venkatesh et al., 2003)

Construct	Definition	Similar Constructs
Performance Expectancy	The degree to which an individual believes that using an IT system will enhance his/her performance at certain activity	Perceived Usefulness (Davis, 1989); Relative Advantage (Moore and Benbasat, 1991); Outcome Expectations (Compeau et al., 1999)
Effort Expectancy	The degree of ease associated with the use of an IT system.	Perceived Ease of Use (Davis, 1989); Ease of Use (Moor and Benbasat, 1991)
Social Influence	The degree to which an individual perceives important others' approval or disapproval of using an IT system.	Subjective Norm (Ajzen 1991); Social Factors (Thompson et al., 1991)
Facilitating Conditions	The degree to which an individual believes that the use of an IT system is supported by technical infrastructure.	Perceived Behavioural Control (Ajzen 1991); Compatibility (Moor and Benbasat, 1991)

Table 3.1 Key Constructs of UTAUT (Venkatesh et al., 2003)

Although UTAUT model has been supporting a wide range of consumer research on their acceptance to IT system (Brown and Venkatesh, 2005; Petter et al., 2001), similar to the reasons that this thesis rejects the TAM model as a theoretical foundation, the development of UTAUT is focusing on consumers accepting a relatively new technology as a service platform, rather than how consumers modify their behaviours on a service platform to maximising the probability of achieving a very fundamental goal, which is a confident purchase decision (of to buy or not to buy). Another reason is, as the construct of facilitating conditions defined in UTAUT model, it represents the supports from the technical infrastructure of the service system. However, in this thesis, as in the context of mobile retail applications, compared to technical supports from the software (mobile retail applications) and hardware (mobile networking infrastructure and handheld device), consumers' control over their behaviour is much more influential to their perceived service process and to the actual service process. Therefore, the searching for a behavioural model that highlights the role of users themselves and the probability of reaching the expected outcome continues in this chapter.

3.2.4 Behavioural Model

The use of behavioural economics in consumer behaviour research provides examples of new ideas and research that are emerging from fields such as economics and psychology (Ho et al., 2006). Marketing researchers can use those studies to enhance their understanding that factors that influence and change people's consumption behaviour in different contexts. The understandings, approaches developed in behavioural economics realm are focusing on how consumer experience consumption activities (Loewenstein, 1999), and establishing a strong connection between those behaviours and their social contexts (Oliver, 2014). Behavioural economists demonstrate a rational and logical path that consumers need to follow when they are making consumption decisions, and they also accept that the central issue of understanding complex consumer behaviour is to examine how they assess the benefits and costs of all the offered options (Sanfey et al., 2003). The behavioural economics perspective recognises the importance of contexts of decisions, and offers different models of behaving in various situation.

3.2.4.1 Decision Theory

Decision theory has developed simultaneously in the psychology, organisational behaviour and marketing disciplines. Within the social science literature, there are three main groups of consumer decision theory:

First of all, normative decision theory prescribes how a decision maker should behave to obtain maximum utility or value. Normative decision theory permits decision makers to be uncertain about the occurrence of events in the external environment, but assumes that decision makers know their own preferences with certainty (Fischer et al., 2000).

Second of all, behavioural decision theory describes that consumers are adaptive decision makers, their preferences are highly dependent on person and context. In reality, consumers' preference uncertainty leads to the contingent use of decision strategies. One of the most well-known decision-making theories identified by behavioural decision-making research is Prospect Theory.

Third of all, in contrast to normative decision-making and behavioural decision-making theories, naturalistic decision-making theory points out that decision behaviour should be observed in its natural settings and decision models should be developed from the observed real-life decision behaviours (Beach, 1998). Thus naturalistic decision theory explains decision-making from both a process and outcome perspective. Naturalistic decision research uses changing conditions, ambiguous information, as well as shifting goals to examine decision-making process.

3.2.4.2 Utility Theory

Decision theory in economics, psychology, mathematics, statistics, and last but not least, marketing is concerned with identifying the values, and uncertainties behind different options in front of decision makers (Dyer et al., 1992). Most decision theories are normative theories, which is concerned with identifying the best decision to make or the best way to make a decision that has the highest accuracy, when the decision maker is fully informed (Wallenius et al., 2008). When designing a research involving decision theory, there are normally two kinds of them. They are, firstly, descriptive research, which is focusing on how people actually make their decisions, and when and why their decision-making behaviours violate the normative theories that they should follow. Secondly,

prescriptive research is concerned with identifying decision-making methods that can increase the accuracy of people's decisions (Bell and Raiffa, 1998).

Further look into decision makers' behaviour, it consists two parts of assessment, which are value assessment and probability assessment (Wells et al., 1997). The former is concerned with how much value the decision maker can perceive when making a decision of choosing one of the provided options (Ariely and Simonson, 2003); and the latter is simply how likely the options can be achieved (Fox and Clemen, 2005). This structure represents the heart of decision theory, and this procedure is referred to as expected value from the 17th century (Bell, 1982). The idea of expected value is that, when a decision maker is facing several options, the procedure is to identify all possible outcomes, determine their values and the probabilities of achieving those values, then multiply the two to give an expected value. A rational decision maker should choose the option that gives the highest ultimate expected value (Tom et al., 2007).

In 1738, Daniel Bernoulli published an influential paper entitled "Exposition of a New Theory on the Measurement of Risk" introducing Utility Theory. Utility Theory is often used to explain individual consumer behaviour. When a consumer is making a decision on consumption of a product or service, they should secure the highest possible level of total utility subject to his/her personal preference. In utility function, where the decision maker's selection of a specific option is measured by a utility function U, which is a mathematical representation of the decision maker's personal preference such as: $U(x) > U(y)$, where the utility perceived from choosing option x is larger than choosing option y. When $U(x) = U(y)$, where choice x is indifferent from choice y, both the options are equally preferred by the decision maker.

It is also to mention, Utility Theory makes a number of assumptions (Rabin, 2000): First of all, the individual consumer can rank order all possible combinations of utility and probability of achieving that utility, which is similar to the value assessment and probability assessment mentioned above. One major difference is, in Utility Theory, the individual consumer is making a decision based on his/her personal preferences, which highlights the importance of identifying a personal reference point when examining consumer decision-making process. Second of all, the individual consumer is following the monotonicity assumption when he/she is considering his/her preference, which is that

consumer is always pursuing more utility. Last but not least, individual consumers are following the assumption of rationality, which is the most important and controversial assumption. Under this assumption, consumers' individual preferences are fixed, regardless of the context the consumption is occurring and the notion of time on consumers' knowledge and experience (Starmer, 2000).

3.2.4.3 Prospect Theory

Daniel Kahneman and Amos Tversky published a paper regarding their development of Prospect Theory in 1979. In this paper, which is titled "Prospect Theory: An Analysis of Decision under Risk", it collects a series of demonstrations of how people systematically violate another widely recognised decision theory, Expected Utility Theory, to make their decisions. Kahneman and Tversky's papers have been cited tens of thousands of times and were decisive in awarding Kahneman the Nobel Prize in economic sciences in 2002. Over the past three decades, researchers in different scientific realms have put many thoughts into how to Prospect Theory should be applied in their areas, and a significant amount of theoretical work incorporates Prospect Theory into different disciplines. In the following sections, this thesis reviews Prospect Theory, builds connections from the development of Prospect Theory to customer perceived value concepts, and adopts it as a research framework.

The evaluation phase of Prospect Theory encompasses two parts, the value assessment function and the weighting function. The combination of these two functions is following the general decision structure mentioned previously, which has value assessment and probability assessment.

Consider a set of options that are in front of a decision maker,

$$(x\text{-}m,\ p\text{-}m;\ x\text{-}m+1,\ p\text{-}m+1;\ \ldots;\ x0,\ p0;\ \ldots;\ xn\text{-}1;\ pn\text{-}1;\ xn,\ pn),$$

Where the notation should be understood as "gain value x-m with probability p-m, and so on," where the value evaluation outcomes are arranged in increasing order, so that $x_i < x_j$ for $i<j$, and where $x_0=0$. Under Cumulative Prospect Theory, this decision-making process is evaluated as

$$\sum_{i=-m}^{n} \pi_i \upsilon(x_i),$$

Where v, the 'value assessment function' is an increasing function with v (0) = 0, and where π_i are decision weights.

This formulation demonstrates the four elements of Prospect Theory: 1) reference dependence, 2) diminishing sensitivity, 3) loss aversion, and 4) probability weighting (Tversky and Kahneman, 1992). The value assessment function has the first three crucial characteristics. First, in Prospect Theory, people derive value from gains and losses, which are relative to the reference point, not in terms of final absolute wealth. This is quite when different compared to Expected Utility Theory, which assumes that the final position in calculating subjective utility is definitive. The reference dependence concept emphasises on that, in the human perceptual aspect of the decision-making process, the reference point keeps changing. This dynamic view highlights the importance of the starting point, which is referred as the reference point. The final value is derived from the difference between the reference point and the amount of shift away from it. All the change of the states of the reference points, during a decision-making process, are contributing to the final evaluation of value. Thus, a value evaluation is not exclusively decided by the final states of a decision maker, rather, it is a cumulative process of decision makers' changing process to the ultimate outcome (McDermott, 2004).

Second, the value function curve is convex below the reference point, which is the region of loss and concave above it, which is the region of gains (Camerer, 2004). This S-shape curve (Figure 3.7) shows that the sensitivity of gains is maximally changing near the area around reference point and becomes progressively less sensitive as it moves away from the reference point. This decreasing marginal utility reflects a general psychophysical principle that comparable changes have a greater impact closer to the steady state of adaptation than farther away from it. This phenomenon is referred as "diminishing sensitivity".

Third, the value assessment function captures "loss aversion", which means decision makers are more sensitive to value loss rather than value gain (Abdellaoui et al., 2007). The value curve in the domain of losses is steeper than in the region of gains. Loss aversion is intimately related to psychological research of happiness. Individuals are

relatively rapidly adapting to a steady state, being relatively satisfied with it, and averse to losing any part of their present position. In customer perceived value concept (see Chapter 5), it also emphasises the difference when consumers are perceiving the same amount of benefits and sacrifice. The impact produced by the amount of perceived sacrifices always trumps the impact caused by the same amount of perceived benefits (Levy, 1992). What can be understood as equal trade in Expected Utility Theory, or in customer perceived value concept, whereby people feel acceptable if getting benefits to cover the same amount of sacrifice, would not happen in Prospect Theory or customer perceived value concept, because it is subjectively a loss in overall value evaluation.
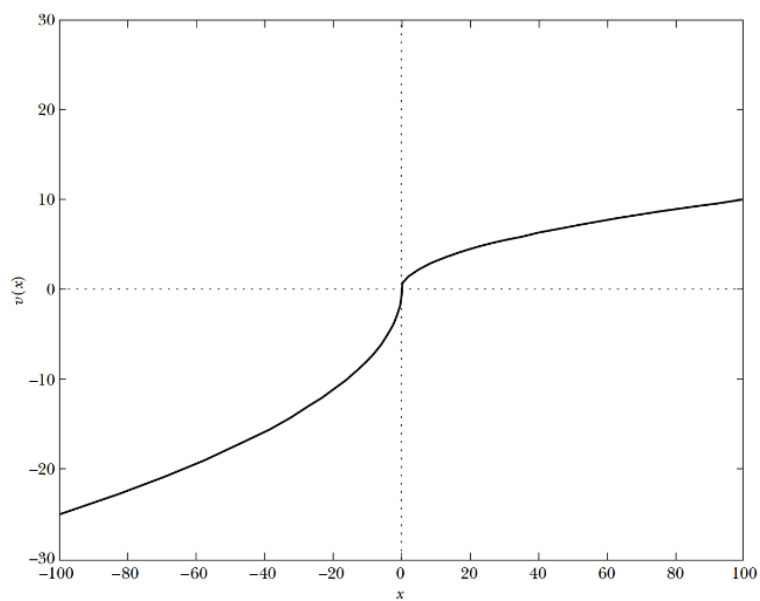
Figure 3.7 the Prospect Theory Value Function (Barberis, 2013)

The final element of Prospect Theory is probability weighting (see Figure 3.8). In making a decision, a decision maker multiplies the value of each outcome by its decision weight (Gonzalez and Wu, 1999). However, decision weight has very different meaning in Prospect Theory than in Subjective Expected Utility Theory (Wu and Gonzalez, 1996). In Expected Utility Theory, decision weights serve as a measure of decision maker's subjective perceived likelihood of an outcome. On the other hand, in Prospect Theory, decision weight represents an empirical assessment of how people actually derive their sense of probability (Abdellaoui, 2000). In other words, decision weight, in Prospect Theory, is a transformed probability based on decision makers' objective sense of a subjective probability, which corresponds to the expected utility benchmark.

The decision weight function in Prospect Theory has one very important feature, which is that low probabilities are overweighed while high and medium probabilities are subjectively underweighted (Kusev et al., 2009). More specifically, occurrences that are estimated to be "likely" and "almost certain" are weighted with less significance than they actually are in the decision-making process. On the other hand, low probability events, which are "unlikely" and "almost impossible to happen" are overestimated by decision makers (Glöckner and Betsch, 2008).
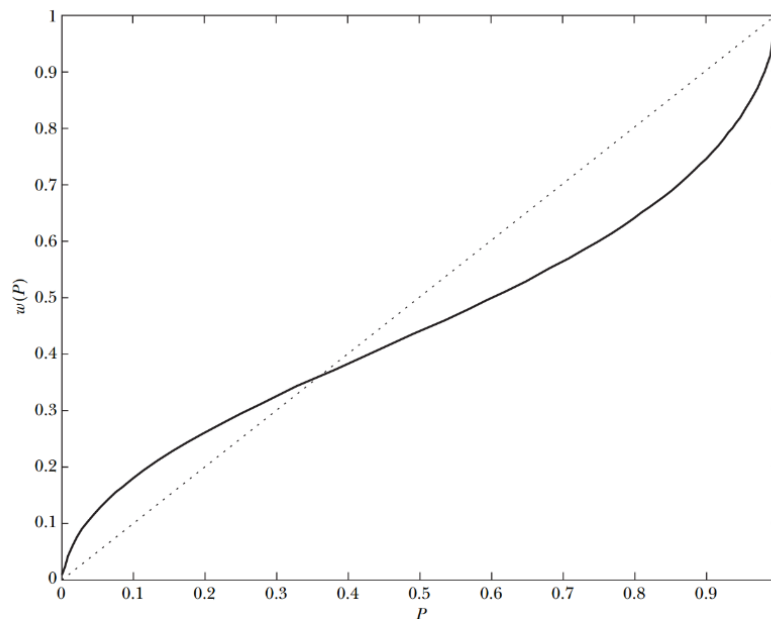
Figure 3.8 Probability Weighting Function (Barberis, 2013)

Prospect Theory is useful to understand the evaluation phase of the decision-making process, which involves a subjective value assessment process and a perceptual likelihood assessment process. However, there are a number of challenges in applying Prospect Theory in various scientific disciplines. For example, as the central idea in Prospect Theory, decision makers derive value from gains and losses that can only be meaningful measured against a reference point. Kahneman and Tversky offered relatively little guidance on how to determine the reference point. Following the issue of measuring gains and losses, the next challenge is how decision makers conceptualise gains and losses in different contexts. So far, the main approach researchers are taking is to derive the predictions under different sets of definitions of gains and losses, to test those predictions, and to see whether there are any sets of gains and losses that are following Prospect Theory (Koszegi and Rabin, 2007, 2009). Another challenge is to apply Prospect Theory is related

to its experimental settings. While it is widely agreed that Prospect Theory offers accurate descriptions of people's behaviours when making a decision under uncertainty, some question if Prospect Theory retains its accuracy outside the laboratory environment (Post et al., 2008).

When developing Prospect Theory, the information that is given to the research sample was precise financial information, for example, "50% chance to win $1,000", "$450 for sure" and "50% chance to win nothing". "50%" means the uncertainty of achieving those results, and relate to the first challenge, in different research contexts, it would be very difficult to provide such precise information to research sample. For example, in the context of current research, consumer purchase decision-making process on fast moving consumer good on mobile retail applications, it is impossible to provide information such as "by using this mobile retail application for viewing 20 pieces of information, you will make an absolutely right decision on this product", or "by review the customer review on this page, you should have 50% chance to find a useful piece of information that would support your decision-making process". This thesis sees the motivation for the consumer to view a piece of information is he/she has a perceived believing that "there is a chance that there is a useful piece of information matching my preference if I tap that button". This perceived chance or perceived expectation is impossible to precisely directly measure from an individual perspective. However, the perceived expectation, along with the element that ultimately influences the actual behaviours can be indirectly measured on an aggregate level. With that being said this thesis needs to measure the exact process of the whole decision-making process as to see how actually the perceived value and practical value are influencing function usage, decision-making length and decision-making outcome.

Since the introduction of Prospect Theory, it has been successfully applied in the areas of finance (Barberis and Huang, 2008), insurance (Sydnor, 2010), industrial organisation (Heidhues and Koszegi, 2012) and labour supply (Crawford and Meng, 2011). There are areas of business research where Prospect Theory has not been applied extensively, for instance, in the marketing area. In the next section, this thesis is going to argue that Prospect Theory can be used as one of the theoretical foundations of this thesis.

3.2.5 Theoretical Foundation Summary

To summarise the review of consumer culture theory, practice theory, a number of cognitive approaches and behavioural models, it raises two general issues that relate to any decision-making process in the business area. They are value assessment and probability assessment, which means the decision maker is in need of considering both how much value they expect to receive from a decision and how likely the value would be actually delivered. Amongst all the decision-making models mentioned in this thesis, two theories have highlighted the importance of the likelihood that the consumers believe they would actually receive the expected decision, which makes those two theories the first and the second theoretical foundation of this thesis.

Adopting this decision-making structure, this thesis aims to use Prospect Theory as the research framework, and manage to deliver better understanding in a research context that is very different from the original Nobel prize winning theory. The four elements of Prospect Theory, reference independence, diminishing sensitivity, loss aversion and probability weighting are all used to guide this thesis.

Prospect Theory, urges this thesis to further look into a number of issues. Firstly, within the frame of Prospect Theory, a decision-making research should conduct both value assessment and probability assessment to the consumer behaviour that this thesis is focusing. Secondly, it needs to identify the value a consumer expects to perceive from using mobile application for making a purchase decision. Thirdly, when examining consumers' actual decision-making process, the reference point of this process needs to be identified. Either every individual consumer has his/her own reference point, or there is a frame of reference that can be used for general population without diminishing the difference between individuals. Fourthly, again, in the context of the mobile applications, the perceived value derived from actual decision-making practice needs to be clearly defined. Further identification of proper measurements and analytical techniques for this thesis should be guided by Prospect Theory. Fifthly, since this thesis is going to examine both predicted perceived value and actual perceived value, the connection and difference between these two also must be identified and explained. And lastly, after achieving all of those above, how this thesis is going to contribute to knowledge and marketing practice?

In order to address those issues, and, following the decision-making structure, an understanding of time consumption on making a decision (see Chapter 4) and the value of co-creation on mobile service channels (see Chapter 5) are required. Meanwhile, a theoretical development of probability assessment on mobile channels is crucial to this thesis. Further review of academic literature is needed to identify measurements and analytical techniques for it.

3.3 Consumer Decision-making Process

In the development of consumer decision theory, researchers have been focusing on the predicted and actual processes that ultimately lead to the final outcome (Hess and Bacigalupo, 2011). According to Lye et al. (2005), there are two information processing approaches that result in two decision-making strategies, which are compensatory strategy and non-compensatory strategy. With compensatory strategy, consumer to make a trade-off between values on multiple attributes. It requires extensive information processing because substantial details are needed to analyse the trade-offs. The non-compensatory strategy enables consumers to restrict attention to only part of the information and eliminate options that meet consumers' requirements.

In the knowledge-based economy, the ability of consumers to contemplate, evaluate quality decisions is dependent upon a number of factors. While the management of extrinsic variables may be more different to control, the identification and self-management of human variables such as emotion and cognition are critical in the effort to increase the quality of decisions and decision-making processes. Understanding the factors influencing consumer decision-making process is important to the understanding of what decision would be made under certain circumstance (Coelho and Henseler, 2012). If the relationship between them can be built, marketers would be able to improve the information communication platform for achieving desirable results in the future.

The simplest and earliest theoretical form of consumer decision model was the 'black box', which provides a simplified model. In that model, external stimuli, or information provided by external environment go through the buyer's consideration process. This process is where a decision is being made. The black box itself consists two parts, which are the consumers' characteristics, and the consumer decision-making process. This early integrated models attempted to provide an understanding of the internal consumer decision

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for marketing purposes. This sort of model was to conceptually demonstrate an integrated model rather than develop a precise research framework. The current powerful analytical techniques may support various tests on consumer decision-making process as a holistic model, just like the 'black box'. Researchers are aware of the existence of the 'black box', but have difficulties to better understand how decisions actually made, given the enormous amount of external information that is going into it. The fundamental question that should be asked is, when research about consumer decision-making process, whether the external information, the internal consumer characteristics and the final outcomes are the all the measurements should be taken.

Basically, all factors, including the ones that are discussed in this thesis and the ones beyond scope of this thesis, can be categorised into several groups, which are cognitive intelligence related factors, for example, knowledge of understanding other consumers' reviews about a product (Kim and Gupta, 2012), and emotional intelligence related factors, such as competence of processing information under psychological pressure (Xie et al., 2015) and other factors that may influence the choice (Guerreiro et al., 2015). Being one of the most fascinating dichotomies, contemporary research on decision-making process has been surrounding the relationship between the roles of emotion and rationality. Stganovich and West (2000) report emotional perspectives of the decision-making process are slower and implicit, on the other hand, cognitive perspectives are faster and explicit. This finding indicates that the process speed is one of the distinctions between emotional and cognitive intelligence, and more fundamentally, time consumption could be crucial when researching decision-making process.

Emotional and cognitive intelligence have been the subject of a significant amount of literature over the past three decades. However, little has been contributed to how the behaviours associated with both emotional and cognitive intelligence may be practically applied to enhance individuals' decision-making. The purpose of this section is to review relevant literature and to identify practical approaches to the application of consumer decision-making process. Moreover, the relationship between time consumption and both perspectives of intelligence are established, which contributes to later identify measurement of the decision-making process.

3.3.1 Emotional Intelligence in Consumer Decision-making Process

The definition of emotional intelligence has been a matter of debate in the literature over several decades. Salovey and Mayer (1990) using emotional intelligence to describe a set of states that can enhance rationality and individuals can better performance with their emotions. This definition is used in this thesis for having a link between emotional intelligence and the practical decision-making behaviour and outcomes, which will provide insights on the decision-making performance measurements (Kidwell et al., 2007). Later research (Brandberry and Greaves, 2003) notes that emotional intelligence skills are more important representing levels of individual's mental and behavioural functions that native intelligence. This concept has been widely accepted in many scientific disciplines, for instance Psychology (Goleman, 1995) and education (Petrides et al., 2007). Its implementation in marketing and consumer research remains underdeveloped, due to the difficulties of identifying indicators, and subsequently the measurements of emotional intelligence (Kidwell et al., 2008).

Addressing the role of emotional intelligence in the decision-making process, Sevdalis et al. (2007) noted that although empirical research has emphasised the relevance of emotions in the decision-making process, individual differences in the perception and experience of emotion has been largely overlooked. For instance, when consumers are making their purchase decisions, they are often in the emotions the desirable outcomes are likely to occur. The emotional aspect of decision-making process normally comprises two parts, which are Self-awareness and Self-management. While much of the literature has focused on the theoretical aspects of emotional intelligence, a significant gap exists in the practical application of these skill to the decision-making process. The emotional intelligence skills in decision-making may be more related to the individual's self-awareness and self-management, and those attributes need to be taken into consideration when researching consumer decision-making process.

Self-awareness competencies, including self-assessment and self-confidence enable consumers to determine their appropriate role in the decision-making process. The recognition of this role contains the first and most important decision of any decision-making process, which is, for an individual consumer, what is the best way of making a decision on this particular subject. Self-management includes a set of behavioural components, for example, self-control, trustworthiness, and conscientiousness and

achievement drive. Those components are equally important emotional intelligence skills for the decision maker. Previous research (Lerner and Shonk, 2010) report decision maker better performed when they are managing the effects of their anger. Additionally, trust is earned over time through a process of recall previous experience and communications and outcomes, and the decision maker needs to be able to establish a consistent record of achievement.

In terms of measuring consumer decision-making process from an emotional perspective, there are two distinct measure approaches on emotional intelligence, which are performance-based measurements and self-reported variants, both of them are philosophically equal on measuring consumers' overall evaluation of service processes (Brackett et al., 2006; Jayawardhena and Farrell, 2011).

Self-efficacy is defined as one's competence to engage and control inner resources to complete tasks for meeting their expectation under certain circumstance (Bandura, 1997). For instance, the consumer is under the pressure of using limited resources to obtain desirable outcomes of their decision-making process. Combining both the concepts of emotional intelligence and self-efficacy, it bridges consumers' resources, consumers' ability of engaging those resources, and their feelings of how well they pursued their goals (in service process) and ultimately, how they judge the overall service process subjectively with their competence of managing emotions (Cian et al., 2015).

Self-efficacy is focusing on a specific task under a specific situation, while emotional intelligence is more related to a much broader evaluation of the outcomes of a few service encounters, therefore, self-efficacy could potentially offer the measurements of consumers' emotional judgements of different service processes, provided the resources invested in, and the outcomes from that service are measurable (Mattila and Enz, 2014).

Prior research also identified consumers' different strategies when they are dealing with problems with limited resources (Baumgartner, 2004). Adopting those strategies to the context of marketing research, which is, an active strategy that is aiming to solve the problem or complete the task. The expressive strategy is aiming to communicate and seek support for the decision-making process, and avoidance strategy is to passively dismiss the current decision-making process (Duhachek, 2005; Duhachek and Kelting, 2009). From

organisations' point of view, the key is helping their customers to employ active strategy or expressive strategy, rather than avoidance strategy. Little, however, has been written on this strategy issue from a perspective of the levels of engaging consumers' resources on difference service platforms.

Recently, the experiential paradigm of consumer behaviour views consumption as emotional responses and sensory pleasure (Cian et al., 2015). Based on this point, this thesis suggests that consumer experiences should be interpreted as a series of interactions between consumers and their marketing environments (Clark, 1997). In other words, individual consumers emotionally react to specific experiences that cause intellectual information communication and engage empirical behaviours. Therefore, it is crucial to conceptually identify the link between and consumers' experiences and their measurable behaviours.

Research has been recently focused attention on the impact of some of the human emotion variable on the decision-making process. Fernando and Jackson (2006), and Hilary and Hui (2009) found that individuals show a high degree of religiosity display lower levels of risk exposure in their decision-making processes. More importantly, a higher decision-making speed is highly valued to avoid decision-making process consume too much valuable time. Time spent on developing the right decision-making process will impact the ultimate evaluation of the quality of the outcome, as well as the level acceptance of the outcome. Wang et al. (2011) document that time pressures often lead decision makers to bad judgments.

Better decisions, or higher quality decisions after consumers evaluated the products or services they have purchased, could be derived by shifting decision makers' emotional and intuitive thinking to cognitive and rational thinking. Louie (1999) reports human expect to experience or have experienced decisions are influencing their current and future decision-making processes. This shows the importance of consumers' evaluation of their previous decision-making process, in turns of both the quality of that decision and the quality of the decision-making process itself. However, the link between emotional intelligence and performance when being tasked at the individual level is difficult to detected or measured (Jordan and Troth, 2004).

3.3.2 Cognitive Intelligence in Consumer Decision-making Process

Buying decision-making process has many antecedents, including product category variables (Sharma et al., 2010), situational factors such as time availability (Beatty and Ferrell, 1998) and information display (Ghani and Kamal, 2010), the convenience of conducting decision-making process (Vahie and Paswan, 2006). Those antecedents also lead consumer towards positive experiences.

From the organisations' perspective, it is crucial to provide consumers with favourable information at the beginning of consumers' decision-making process, since new evidence if often overlooked, or biased when contradicting consumers' prior knowledge (Russo et al., 1998). However, in the earlier research of multistage choice process, it shows service providers may not benefit from revealing all the favourable information immediately when consumers start their decision-making process. On the contrary, deliberately delaying some of the favourable information after consumers' initial scanning of all alternatives may increase the likelihood of buying decision (Chakravarti et al., 2006). However, identifying the information presentation order is difficult due to the variety of individual's preferences on making a decision. Therefore, a key question regarding information interaction is how to determine the order of presenting information, for, generally, enhance the performance of information interaction.

Prior research suggests that consumers' final decision is affected more strongly by the information encountered closer to the end of their decision-making process (Carlson and O'Cass, 2006). More specifically, there are two mental processes involved in decision-making, the first one is to eliminate the alternatives that do not warrant consideration, and the second process is to identify the most favourable alternative among the ones left after the first process (Chakravarti and Janiszewski, 2003). This point of view sheds light on organising information when consumers are dealing with multiple alternatives. Moreover, consumers tend you use different strategies to systematically make their decision. In the first process, a non-compensatory strategy is employed to quickly eliminate choices from further consideration, then a compensatory evaluation of the remains when consumers begin to work towards the final decision (Gilbride and Allenby, 2006). Although this inspires the information presentation order, it is still unclear how to manage the vital variable of time in the consumer purchase decision-making process.

Previous study on decision-making process also reveals that, although all the alternatives need to be processed at the first eliminating process, consumers value the alternatives that introduced after the initial quick assessment more, than the ones that have been considered at the beginning of their decision-making process (Chakravarti et al., 2006). The overall impact caused by the order of information presentation is determined by the interplay between, firstly, the positive effect of presenting alternative close to the end of the first eliminating process, and, secondly, the negative effect of introducing alternative before the beginning of the second stage (Levav et al., 2012). This finding increases the difficulties when service providers try to determine the information presentation orders, given individuals' decision-making process takes a different amount of time, and they are highly situational (Meloy and Russo, 2004).

3.3.3 Factors Related to Consumer Decision-making

3.3.3.1 Decision quality

Measuring the quality of a purchase decision is ambitious and difficult. Usually, the quality of a decision is depending on the decision maker's subjective judgment. For example, general decision quality can be evaluated as making a decision in an appropriate way, spending an appropriate amount of time, receiving appropriate information from appropriate sources, then make the final decision with uncertainty (Chen et al., 2009). For purchase decisions that are made by consumers, whether consumers are given opportunity to reduce cognitive effort (Todd and Benbasat, 1994), consumers' confidence degree in making that decision (Häubl and Trifts, 2000), or consumers' perceptions of the quality of the information used in their decision-making processes (Dooley and Fryxell, 1999) are considered important.

3.3.3.2 Pre-purchase Information

From a consumer's perspective, the purchase decision-making on mobile retail applications involves considering a certain amount of information spread in both physical and online environment, which is larger than any individual can process, thus configuring on information overproduction (Broilo et al., 2016). A consumer would invest more effort on cognitive information processing when there is a large volume of demanding knowledge to make a decision (Dhar and Gorlin, 2013). When searching and absorbing external information, a consumer might have to face their capacity limit of processing information.

In the literature on consumer behaviour and marketing, several issues have been raised, examples include information overload (Lucian and Farias, 2009) and consumer confusion (Tjiptono et al., 2014). Recently, research in this academic realm has been focusing on the internet context (Cummins et al., 2014). It is clear that consumers wish to minimal information processing, even when they have access to multiple credible external sources (Rijnsoever et al., 2012). However, in a mobile retail application environment, how they choose different functions to collect information remains to be addressed and this represents a core objective of this thesis.

3.3.3.3 Choice of Information Sources

Studies on external information searches reveal that consumers prefer to use online channels rather than offline channels for searching information, however, their actual buying behaviour is situational, which means they may process information online and buy offline, and vice versa, or using the same channel for both purposes (Moon, 2004).

Decision-making behaviours may vary according to three main factors (Payne et al., 1993): first, characteristics of the problem, including task and context variables; second, individual characteristics, including cognitive ability and prior knowledge; and third, social context, including the possible need to justify the choice. However, the main factor among these three points is to maximise accuracy and ease of justifying the choice, meanwhile, minimise cognitive effort and negative emotions (Broilo et al., 2016). When consumers are facing a large volume of information, they tend to use heuristics to reach a good enough decision. In consumers' decision-making process, they are not only trying to make decisions based on their personal preferences, they are also building or developing their preferences throughout the process. This building process occurs in the interrelations of individuals, and happening through reviewing of their own experience and beliefs (Bock et al., 2012).

3.3.4 Time Consumption and Emotional Feelings on Decision-making Process

There are recent studies that seek to understand the relationship between the previous experience of making decisions and the importance of current decision (Schrift et al., 2011; Sela and Berger, 2012). More specifically, it is suggested that customers take the difficulty of receiving and processing information, into the account of making decisions of

purchasing a product. By combining the difficulties of these two parts, it gives the customers a subjective feeling of making a more important decision than it should be, which makes them intent to spend more time on considering and deliberating the whole issues of purchasing or not (Thomas and Tsai, 2011). Thus, difficulties of making a decision can mechanically cause the process to take more time, particularly for the decision that initially was considered as unimportant one, the cognitive intelligence is influenced by emotional intelligence, since consumers are not emotionally prepared to spend unexpectedly long time on making a decision that should be an easy one. For instance, if consumers need to process more information than they expected, they would start taking this decision more seriously, as it becomes an important decision during the decision-making process. Furthermore, subjective difficulty can be generated by the factors such as too many alternatives to consider, information overload in short period of time and lack of perceptual fluency (Alter and Oppenheimer, 2008; Labroo and Kim, 2009 and Pocheptsova et al., 2010). Those factors are hardly related to the actual difficulties of a decision, but may nevertheless increase consumers' subjective feelings of difficulties.

According to Strack and Deutsch (2004) and Pham (2007), in consumers' decision-making process, two systems, in consumers' minds, are performing, they are: a reason-based, objective system and a feeling-based, subjective system. It shows that emotional reactions have stronger effects on consumers' behaviours when the event is temporally near (Huber et al., 2011; Van Boven et al., 2012). In other words, consumers are emotionally more intense when they are running out of time to make decisions. When consumers conduct decision-making process, they also subconsciously take into account the time this process consumed, which could increase the difficulties of making a purchase decision (Schwarz and Clore, 2007).

Another interesting phenomenon that is reported by earlier research is when consumers are offered more alternative, they tend to search less than that when they have a smaller range of choices to consider (Hiehl, 2005; Wyer and Xu, 2010). However, it is still unclear the relationship between time consumption on information searching and processing, and a number of choice consumers have.

3.3.5 Information Overload and Consumer Confusion

One of the recent advances in consumer decision process research is to investigate information overload and consumer confusion, which have strong connections to consumers' capacity of processing information. Information overload concept was first brought up in consumer research in the 1970s (Jacoby et al., 1974). Earlier research (Lucian and Farias, 2009) confirms the occurrence of information overload in internet shopping. Functions on retail websites have been designed to provide recommendations to consumers to minimise information overload effects (Gavalas et al, 2014).

Consumer confusion refers to a mental state that may occur when the consumer is processing information that is too similar or ambiguous (Walsh et al., 2007). Three dimensions of consumer confusion are information overload, that consumer is confronted with more information that they are capable of process; information similarity, which refers to consumers' propensity of focusing more on the similarity aspects when facing different product and services; and information ambiguity is defined as consumer intolerance towards processing ambiguous information (Walsh and Mitchell, 2010; Wang and Shukla, 2013).

One example of information overload occurrence influencing consumer decision-making process is when a consumer chooses to read online reviews. When buying products in a store, consumers have access to information that is not normally available to those shopping online, who purchase products with high level of uncertainty compared to transactions made in stores (Dellarocas, 2003). Also, online environment may provide consumers with less information than in-store environment (Joo Park et al., 2006). Therefore, to reduce the uncertainty consumers may experience online, consumer reviews became a solution based upon previous buyers sharing information of consuming products and service (Nam et al., 2006)

Consumer reviews provide a wealth of information on previous consumers' experience of using products or services, or their decision-making process, which are influential to the current decision-making process (Clemons et al., 2006). One of the reasons that consumers use online reviews to support their decision-making processes is it can decrease information search time (Goldsmith and Horowitz, 2006). Additionally, finding and reading a large number of online reviews can provide a sense of the product's popularity

(Sher and Lee, 2009), and a large number of positive reviews may encourage purchase behaviours (Park et al., 2007). However, for having either of the two advantages, consumers need to be able to process relatively large quantity of online review information. Online reviews can benefit both the consumers and the retailers. Other study shows reviewed products in certain product categories sell better than the non-reviewed products (Zhu and Zhang, 2007). However, if online consumers are overwhelmed by the amount of information showed in consumer reviews, there could be potential negative effects on their decision-making processes, regardless the actual reviews are positive or negative (Park et al., 2007). Therefore, it is crucial for electronic retailers to understand how consumers perceive the benefits and sacrifices of using the online review in their online decision-making process.

Despite the positive points of online reviews mentioned above, studies also report several negative aspects (Joo Park et al., 2006; Park et al, 2007). For instance, although large numbers of positive reviews may encourage purchase, the overwhelming volume of information negatively affects the outcomes of decision-making processes. High quantities of reviews may cause information overload, making individuals who are having difficulties processing information feel the greater uncertainty of making a purchase decision. Therefore, consumers perceive both positive and negative aspects from reading and searching online reviews.

3.4 Summary

Adopting decision theories from the behavioural economy realm, conducting both value assessment and probability assessment on consumer behaviour research is the major research gap identified in this chapter. To achieve this goal, Prospect Theory is used as the first research framework. All four elements of Prospect Theory are used to examine consumer decision-making on mobile retail applications. More specifically, reference dependency and diminishing sensitivity are related to practical value creation. Meanwhile, loss aversion is tested and discussed when examining customer perceived value proposition. Finally, the results from these three elements are used to conduct probability weighting discussion.

For the tasks of identifying an appropriate research lens and measurements to apply the research framework, this chapter identifies time as the central concepts that need to be

reviewed and further developed in later chapters for several reasons. Firstly, time, as a very broad concept, is difficult to play the role as monetary value does in original Prospect Theory. The decision-making process in this thesis receives limited influence from products' monetary value, for example, an ordinary cosmetic product from Boots' website have less sensitive prices than higher value goods. Therefore, a further development of the concept of time is conducted in next chapter. Secondly, the lower temporal barrier is the most distinct characteristics of mobile service channels. In this context, time saving or effective usage of time, is the main motivation behind consumers' choice on the service channels. This is related to the customer perceived value proposition. Finally, returning to the last element of the research framework, which is probability weighting, which is comparing and contrasting consumers' practical value creation and customer perceived value proposition, only when both of them are using time as the main measurement, they are comparable.

Chapter 4. Literature Review 3 –
Time Concept in Consumer Behaviour Research

"It is the same with people as it is with riding a bike.
Only when moving can one comfortably maintain one's balance."
(Albert Einstein, 1930)

4.1 Introduction

There seems to be no disagreement that time is an important dimension of consumer research (Arndt and Gronmo, 1977; Macdonnell and White, 2015). Marketing research has pointed out the fundamental relationship between time and consumer behaviour should be integrated more systematically to contribute to empirical studies of consumer behaviour (Mogilner et al., 2012). This integration should be not only practical, for instance, measuring consumer behaviours on time dimension, but also philosophical, with a deeper understanding of time, and theoretical, by adopting time related concepts and theories (Macdonnell and White, 2015). This is challenging marketing researchers to re-examine a large number of existing marketing theories from a temporal point of view, and testing those theories with time related analytical methods. The numeric characteristic of time concept enables research to include time in quantitative research, since time variable, which is the form of number can be analysed by various statistical methods. Therefore, time is often regarded as a general dimension for comparing and interpreting different consumer behaviours (Billington and Skinner, 2006; Bailey and Areni, 2006). In this chapter, there will be a review of the literature on a number of aspects of time, including time as a concept; consumption and time and an understanding of spacetime.

4.2 Development of Understanding of Time in General

Philosophers, natural scientists and social scientists have speculated on the nature of time (Van Fraassen, 1985; Barbour, 2001; Veneziano, 2006; Hawking and Penrose, 2010; Callender, 2014). The ancient philosophers from Greek and Indian cultures were the first to question the mysterious concepts of time. Plato identified time with the motion of the heavenly bodies. Aristotle, defined time as the number of movement with past and future. These early views of time connect the concept with movement, which influences human's later exploration of the nature of time (Butterfield, 1984; Le Poidevin and Macbeath, 1993)

Moving to the age of Enlightenment, early modern philosophy, once again, considered the question of whether time is part of the absolute reality, or merely an intellectual concepts for mankind to sequence and compare events. And if time is independent of the human mind, would there be a beginning of time, and how much time is between the beginning and the present (Le Poidevin and Macbeath, 1993; Øhrstrøm, P. and Hasle, 1995; Venema, 1998). From the 1620s to the 1780s, two great philosophers, physicists and mathematicians also believed to be the two independent developers of calculus, Sir Isaac Newton (1642-1726) and Gottfried Wilhelm von Leibniz (1646-1716) interpret time from two different perspectives. The former believed in in absolute space and absolute time, which means, spatial and temporal dimensions are two independent dimensions. The latter believed that time and space are relational. However, how they are related remained unclear (Le Poidevin and Macbeath, 1993).

Later, German philosopher, Immanuel Kant (1724-1804) argued, from an epistemological point of view, human experience is based on both the perception of external objects and prior knowledge (Shoemaker, 1969). Both space and time are the prior conditions that human mind supplies to experience objects. Spatial measurements are used to quantify the extent of and distances between objects, and temporal measurements are used to quantify the duration of and between events (Davies, 2002). The external reality provides things for human to sense, whereas human mind processes those sense, or information, and organise it in a spatial and temporal order (Michell, 1993). Two important and influential points can be summarised here: firstly, the reality is outside the human mind, however, for a human to understand the reality, the prior condition, space and time dimensions are in human mind. Secondly, quantifying objects is required for experiencing and understanding reality (Davies, 2002).

When comparing with Newton and Leibniz's points of view on time, Kant agreed with Newton that space and time are two separate and independent dimensions, but their separation and independency only exist outside the human mind. Kant also agreed with Leibniz, that space and time are only related together in the human mind (Le Poidevin and Macbeath, 1993; Hawking, 1996; Newton, 1999).

Albert Einstein's (1879-1955) revisited and reinterpreted the physical concepts of space and time, in result developing the General Theory of Relativity and Special Theory of

Relativity provided very different undersigning of the space, time relation issue. Einstein's work contributes to modern physics as one of the two foundations (alongside with quantum mechanics), it is also known for its huge influences on the philosophy of science (Lorentz et al., 1923; Einstein and Cohen, 1956).

By postulating the speed of light is constant to all observers and is the maximum signal velocity, Einstein built the relationship between space and time, which is distance equals to time multiply the speed of light. Since the speed of light is definite, any spatial distance can be and should be measured by how long light travels in that distance, or any temporal duration is measured by how long light travels an observing distance. The speed of light is considered as an external reality that no one can change, or no observer in any frame of reference can perceive differently (Pöppel and Artin, 1988; Callender and Hoefer, 2002). Therefore, research that adopts Special Theory of Relativity is claiming an epistemological position of either positivism or realism (Schlipp, 1949). Time and the speed of light together, in Hermann Minkowski (1864-1909) spacetime diagram, are used to explore the causation relationship between two events (Sklar, 1976). For one event is the reason for another event, the first event must happen before the second event in a specific frame of reference (Lorentz et al., 1923).

However, as early as 1801, Thomas Young (1773-1829) conducted a simple form of the double-slit experiment, which displayed the fundamentally probabilistic nature of quantum mechanical phenomena. The double-slit experiment has become a classic thought experiment, because it demonstrates the fundamental limitation of the ability of the observer to predict experimental results. It further challenges the fundamental postulate of the Special Theory of Relativity (Davies, 1999); firstly, the quantum entanglement phenomenon indicates a signal can be transferred between two particles with a speed that is much faster than the speed of light. Secondly, the observation can change the predicted results in the double-slit experiment, and a human cannot observe the system or measure its properties without interacting with it. Therefore, it claims an epistemological position of interpretivism (Deutsch and Lockwood, 1994). Since quantum physics theory is the study of matters at the atomic level and sub-atomic level, this thesis adopts the understanding of time and space related to the Special Theory of Relativity.

4.3 Time concepts in Consumer Research

This thesis originates from the interest of investigating both the predicted perceived value proposition and actual perceived value creation of mobile service channels (see Chapter 3). Since smartphones and tablets were introduced to the market in the new millennium, there has been an increasing attention to the commercial retail applications of this new communication channel, which provides an information interaction platform with great flexibility. When comparing traditional internet channels (using desktop and laptop computers) and mobile service channels (using smartphones and tablets), despite both channels are providing identical information (identical pictures, identical words, identical functions with slightly different designs for different screen sizes), it shows a general trend that consumers are increasingly adopting mobile service channels. Research (Vilches-Montero and Spence, 2015) has reported the reasons behind this phenomenon are related to consumers' perception of time, for instance, they can access retail information anytime and anywhere they want, they can manage to shorten purchase decision-making processes on mobile platform and they prefer using mobile application under time-critical circumstance (Cova and Dalli, 2009). Therefore, for this thesis to understand consumer behaviour on mobile service channels, the first step is to understand the concept of time in consumer research background, then understand time in the context of how mobile application users could perceive their time consumption on this service platform (see Chapter 2).

A characteristic of time is that time can be used as a measurement of a motion, since the time concept is based on exact measurement by means of sandglass, calendar and clock. Philosophers often associate the concept of time with change, which means time is only meaningful when a change occurs, or time is what a change temporally costs. All changes should be considered as the links between different phenomena or different phases of a process (Van Fraassen, 1985). When a researcher is observing a process, both the different phenomena and the time cost should be measured to obtain a full motion of this process. For example, two different decision-making processes on the same product could reach the same final outcomes after exact same events occurred during the processes. But if the temporal length of these two processes is different, they should be regarded as two different sets of consumer behaviour.

Moreover, when considering time as the link between different phenomena and it is a continuous variable, it also provides a direction of reasoning (Lee et al., 2015). It implies

that a phenomenon is succeeded by another phenomenon, and the old phenomenon should be, fully or partially, the reason that the new phenomenon occurs. Otherwise those phenomena should not be considered as different phases of a single process, but irrelevant independent events in multiple parallel processes that happened to cross each other during the observation.

In social science literature, distinctions are made amongst three concepts of time (Gronmo, 1989; Aaker et al, 2010). Firstly, time can be defined by physical phenomena or mechanical instruments. This physical time is a common frame of reference with the largest extent to every individual in the world. And it is how consumer behaviours are temporally measured externally (McDonald, 1994). For example, a researcher observed a single decision-making process on a mobile retail application, and it took five minutes. If this phenomenon was observed by others, any individual on the earth would make the same record that "a single decision-making process on that a mobile retail application took five minutes, as on a clock". Secondly, time can be understood in relation to social activity, and individuals may perceive time with reference to their own interactive experiences between themselves and social environment (Knights and Odih, 1995). The individual's experience of social time is depending on their participation in the social processes with different groups and individuals, which means the perceived social time is highly subjective (Brannen and Nilsen, 2002). Last but not least, the third concept is natural time, which is determined by nature. This time concept refers to the cycle of natural phenomena, such as day and night, different seasons of the year. More importantly, it is also related to, on a micro level, the biological status of the human body. For instance, different people may have different recovery cyclical period of using retail websites or mobile retail applications. One may feel biologically tired after using mobile retail applications for 20 minutes, others might feel tired after 30 minutes.

4.3.1 Concepts of Time - Physical Time, Social Time and Natural Time
The relationship amongst three different concepts of time is complex (Lee et al., 2015). On one hand, physical time is decided by the mechanical processes within time measurement instruments, and it is subject to an individual's perception. On the other hand, social and natural time can only be understood through the natural and social processes that individuals participate. However, this thesis aims to, theoretically argue that those three

concepts of time should not, and do not have to be considered completely independently. Rather, there is a way of understanding them, using them in this thesis, and subsequently understanding the phenomenon of the decision-making process on mobile retail applications in this thesis.

Furthermore, to understand the relationships among the three concepts of time, it is worth to examine the definition of them (Gronmo, 1989; Rudd et al., 2012). First of all, mechanical time, or physical time and natural time are both determined by natural rhythms, for example, the motion of the earth in its orbit of the sun, one circle is one year, which can be divided into days, hours and seconds (Brannen and Nilsen, 2002). Second of all, as mentioned before, both natural time and social time are highly subjective to the individual human. The difference between them are, natural time is more biologically based and social time is hugely influenced by human experience (Arnould and Thompson, 2005). Natural forces may be important to the social organisations of human activity, however, industrialisation and informatisation are decreasing the importance of natural time and increasing the importance of mechanical time until it touches the limits of human individual biological nature (Van Kooten and Bulte, 2000). In industrial society, social time is more influenced by physical time, in order to measure, coordinate labour, for example, the use of assembly line, where the social time of workers, their manufacturing activities, is co-ordinated by the physical time of the factory (Gurvitch, 2012). This influence from physical time to social time is so direct that many manufacturers run their factories 24/7 and only stop assembly line for maintenance (Knights and Odih, 1995). In the informational society, the influence from natural time is even smaller, since the interactions of society are information based communication. When this communication occurs, only physical time can be used as coordination that is accepted by every party involved in this communication (Gad Mohsen and Dacko, 2013). Thus, physical time is particularly important for the coordination of communication processes (Halinen et al., 2012). And consequently, physical time is even more influential in the post-industrial information society, as a coordination or measurement foundation of all human activity (Lebedev et al., 1994). On the other hand, regardless of the importance of natural time in pre-industrial agriculture society, for instance, farmers need to organise different production activities in different season, and the importance of physical time in industrial and informational society, social time is playing a crucial role in every level and all kinds

of social activities, provided the participation of humans (Eisend, 2004). Since social time is closely related to human interactions and social processes, this thesis, as a research of the temporal dimension of social processes, the decision-making processes on mobile retail applications, should be based on the concept of social time, other two concepts of time, physical time and natural time should be in addition to social time.

Social time is often regarded as a duration of a social phenomenon, an action or a social process, it is both a condition and measure of individual activity, and it is reflecting the development of a social process (Duncheon and Tierney, 2013). Therefore, social time cannot be isolated from social processes (Brooks, 2014). Sometimes social time might be measured with physical time, however, the measurement must be interpreted on an individual level on a specific content. In other words, social time should be perceived in terms of what happens in the time dimension or over a certain period of physical time. For knowing what happened in a particular social process and how much social time it took, the person who is involved in that social process must provide his/her subjective perception of, both the events during the process and his/her individual subjective perception of the physical duration. Therefore, social time should be examined and understood with the participants' individual frame of reference and understanding social time from the actor's point of view means social time is perceived differently by different persons, even they are involved in the same events (DeVoe and House, 2012). Those individuals may perceive time primarily in terms of physical motion from one place to another, or, in his/her mind, mental movement in a direction, for example, from not having the knowledge to make a decision to having the knowledge to confidently make a decision.

This understanding of the subjective perception of social time also leads to the concerns when social processes happened in different contexts. When individuals experience events, within social processes, across various sorts of social structures and communication systems, they perceive social time differently in different contexts. For instance, for making a decision, one requires certain pieces of information, receiving the same piece of information from different communication channels may result in very different perceptions in terms of social time consumption. Note that, if this phenomenon is examined with the concepts of physical time, it may suggest that individual should consume the very similar amount of physical time for making a decision. For instance, if

the environment and condition (for example, font size, font colour and lighting condition on the text) are same, the individuals in different contexts should have very similar perceptions of time consumption on reading the text. However, with social time concept, he/she may have very different views of social time consumption on such activity. Therefore, in addition to time being understood from an individual/personal perspective, time should be understood in relation to a larger context, which defines the meaning of social time for individuals.

Based on this discussion, although social time is perceived individually, it is arguably those individuals who are involved in the same social process are sharing a similar frame of reference for their time perception (DeVoe and House, 2011). Consumer behaviour research related on temporal dimension should pay attention to the larger context of where the social process happens, and if there are many interactions occurred during this social process, that means, all parties who participate those interactions are sharing a common frame of reference, which is physical time, for perceiving time.

4.3.2 Consumers' Temporal Frame of Reference

The biggest challenge for consumer research on time dimension is to get insights on how consumers themselves perceive the temporal frame of reference when interacting with other parties. They may have to share the same frame of reference with others when, and only when they are interacting with others (Van Doorn, 2010). And when it comes to reflecting their own experience of the social process, the final perception of time consumption could be based on their own frame of reference, which no one else can perceive (Stein, 2012).

Conventional wisdom may have offered a solution for this challenge. As mentioned above, philosophers and researchers often use time as temporal coordinates to record changes (Arndt and Gronmo, 1997). A change is indicating the direction of time motion, and implying that some social phenomena are succeeded by others. Time is simply connecting different phases of a social process together, to show that the previous phenomena and current phenomena, or even a future phenomenon are related together. Those phenomena are all allocated on a time axis with their own location. With a different geographical position on the time axis, time marks can be used to represent or measure temporal

distance amongst different events. When researchers perform an observation, and a new location' is observed and measured, a researcher could claim a change of location happened, and consequently a duration could be identified between the occurrences of that two location. Scholars have made great use of this approach when exploring causation relationships on time dimension (George and Jones, 2000).

The issue here with this observation on location changing is measurement is performed on the macro level. All the details on the micro level would be overlooked by such an approach (Avnet et al., 2012). For example, if a decision-making process is considered as a mind journey, two observations at the beginning and the end would provide two mental locations of this decision-making process. However, the detailed information regarding the contributions of the interactions during this decision-making process would be missed. Some of those interactions could positively contribute to the final decision, others are not, or even contributed negatively, in terms of assisting the consumer to make a decision. If the observation can be observed on a micro level, every interaction should not only be counted, but also be observed with a direction of either assisting a decision-making process or producing interference. For this purpose, two concepts that are closely related to, understanding of both time and location, should be valued and employed. They are speed and velocity.

4.3.3 Consumer Information Processing Speed or Velocity
 Physically, on one hand, speed is a scalar quantity that is defined as the rate at which an object covers the distance between two locations. If the two measured locations are same, the object has a zero speed. With this definition, for a moving object, the direction of its motion, is decided by the direction of its speed, which is ultimately decided by the direction from the previous location to the current location, any changes of location between those measurements are not taken into consideration for learning the speed of an object. This understanding may cause issues in the case where location measurements are taking place on a macro level. In other words, location measurements could overlook the path an object moved during two measurements, and cause misunderstanding of the motion. On the other hand, velocity is a vector quantity that refers to the rate at which an object changes its location. In other words, the velocity at any instant is simply the speed value with a direction. Therefore, if the velocity is measurable during the motion of the object, the observation should be able to provide the data of an object's instantaneous

speed and the direction of that speed at any point of the motion, or moving process. It is capable of describing a process with great details on a micro level (Bielen and Demoulin, 2007). For this thesis, which is focusing on individuals' purchase decision-making process on mobile retail applications, a macro level observation should be focusing on the final outcome of the process, and macro level analysis should be to identify the information interactions without being able to learn the directions of their contribution (Castells et al., 2009). On the other hand, a micro level observation should be focusing on the information interactions more than the final decision of decision-making process, and a micro level analysis would be able to identify the directions of every information interaction, in terms of whether they are in the same direction of reaching a decision. Therefore, the implementation of velocity matches the requirement of that, as mentioned above, a study on the relationship between social process and social time, should be focusing more on the micro level than on the macro level (Grant et al., 2013).

Another issue for implementing the concept of velocity of the decision-making process is when using it as part of the description of a consumer decision-making process, what can it contribute to consumer behaviour research while the concept of speed cannot (Licata et al., 2008). Going back to the definitions of both the concepts, the difference between two extreme circumstances would highlight the meaningfulness of velocity, which is when speed is zero and velocity are zero. Since speed is a macro level concept, and it is determined by the starting and ending position of a motion, and the duration of that motion. After the initial observation of starting points, a moving object that returns to the original starting position when the second observation happens can create an illusion that it has zero speed, and it is not moving anywhere. If the concept of velocity is adopted here, the motion of the object is observed on a micro level with two variables of speed and direction, it reveals the truth that, although the object returned to its original position, it had been moving on at least two directions (one direction is moving away, another direction is the reverse of the first direction) in the past.

More important to this thesis and to any research on moving objects, as long as the instantaneous velocity of the object is not zero (either it is caused by the inertia or a new force), it still has a probability moving to another location. When the velocity of an object is zero, it means there is no probability it could move to another location. Any external

force, for instance, a piece of confusing information, or the difficulty of finding a piece of information, that decreases an object's velocity is basically lowering the probability that this object reaches a new location within a certain amount of time. Therefore, the probability for a motion to reach a location within a duration, is the core difference between average speed and instantaneous velocity (Kumar, 2005). For instance, in a space that a consumer decision-making process can be considered as a motion from one point to another point, when the motion reaches a speed of zero, it only means between two measurements of this decision-making process, there was no progress made, since the motion did not change its location at the time that the two measurements happened. It is impossible to determine that after the second measurement, whether this process still has a probability to move somewhere. One the other hand, if velocity is utilised to describe this motion, and when its velocity reached zero, it is confident to say that this decision-making process is not going anywhere. In other words, it does not have a probability to reach a decision.

Thus, anything, or any force that has an impact on an object's instantaneous velocity would have a proportional impact on the probability for that object to reach a location, and vice versa. One crucial point needs to be raised here, which is this understanding is only valid when there is a time limit on the motion of an object. If there is no time limit applied on this understanding, moving objects with different velocities would have equal chances to reach the same location, which is 100%.

Based on the discussion above, this thesis aims to use velocity and probability concepts to evaluate the impacts from using different functions on a mobile retail application to the final result of consumer decision-making process (Anić et al., 2011). It sees the decision-making process as a mind thought that is in a motion to a decision; the final decision is the targeting the location of the motion; the temporal length of a decision-making process is the time limit for calculating the probability of reaching a decision; the usages of different functions are the external forces, not necessarily on mobile channels, but from all information sources, that impact the velocity of this motion, and subsequently impact the probability of reaching a final decision; and value created when using mobile retail applications are the motivation of conducting decision-making processes and interacting with different parties with different functions. However, there is one issue remains. That is, how to observe and analyse consumer decision-making phenomenon simultaneously on

both a larger object context on a social level and a smaller subject perception on an individual level.

In the context of consumer decision-making process, the precise time consumption of a specific decision-making process is the social time that was spent (Callender, 2014). Since social time is the time concept to the individual frame of reference, it cannot be measured externally with any common frame of reference time measurement mechanism. In other words, only the consumer who actually did that decision-making process can express the feeling that how much time was spent. This thesis pays more attention to the velocity of consumers' decision-making process than the mental distance between his/her wants and needs to the final decision, or the social time that consumed by that process. Therefore, the zero velocity of the thinking process is identified as the indicator of the end of a decision-making process. The way of knowing consumers' decision-making process reach zero velocity directly from consumers. That is, when either consumer cannot, or do not believe that they have any needs to continue their decision-making processes, they can clearly indicate the occurrences of zero velocity.

For measuring the internal time consumption of a decision-making process, the end point is, as mentioned above, the occurrence of zero velocity, and the starting point is the beginning of a decision-making process, where the consumer is with his/her maximum capacity/velocity of processing information. The information processing capacity is different on an individual level. It is the existence of these differences, as the results of individuals' different emotional and cognitive intelligence, make the measurements of decision-making processes time consumption the bridge between the individual frame of reference and the common frame of reference. In other words, the internal time consumption of a decision-making process should not be how much physical time, in the external reality, was used. It should be how fast a consumer reached zero velocity relative to their own maximum velocity. In this way, in a consumer research context, with the assistance of a physical mechanism for the purpose of generating numeric data, the externally measured length of a decision-making process could reflect the situation happened in the internal frame of reference.

Therefore, the external measurements of physical time consumption are linked to the internal capacity of process information. The relativity of an individual's maximum

velocity and zero velocity enables consumer research to focus on external measurements rather than both external and internal measurements, and still be capable of providing valid inferences of consumer behaviours.

4.4 Minkowski Spacetime

For better understanding Albert Einstein's theory (1905), in 1907, the mathematician Hermann Minkowski (1908) explored a way to especially well visualise the relationship between spacetime and speed of light (Lorentz, et al., 1923; Epstein, 1983; Torretti, 2012). The German, who was born in the Kingdom of Poland, is best known for his work of spacetime diagram in relation with his former student Albert Einstein's Special Theory of Relativity. With Minkowski Spacetime diagram (see Figure 4.1), Theory of Special Relativity could be understood geometrically.
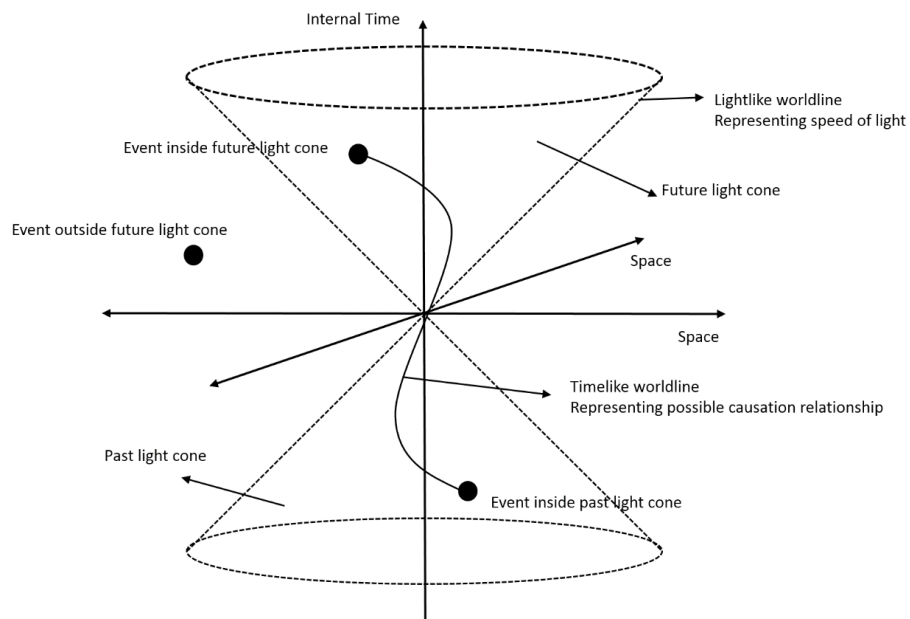
Figure 4.1 Light cone in Minkowski Spacetime diagram.

In the spacetime diagram, any individual point in spacetime represents an event that happens at a specific spacetime coordinate (Reichenbach, 1958). The timelike worldline is the trajectory of a point moving with a velocity that is less than the speed of light. All timelike worldlines are contained within the light cone. The lightlike worldline is the trajectory of a point moving at exact the speed of light, which is the maximum speed in spacetime. All the lightlike worldline lie on the surface of the light cone (French, 2014).

Since the speed of light is the fastest speed any object can achieve in Special Theory of Relativity, and all the lightlike worldline has determined the structure of the light cone, for two events to be connected with a causation relationship, they must be within the parameter of a same light cone in one reference frame (Saunders, 2002). Because a lightcone is a maximum range of a matter or information to spacetime. For any point outside a lightcone to reach a point inside the lightcone, the object (matter or information) need to break the boundary of the speed of light, which is impossible in Special Theory of Relativity (Earman, 1972).

Einstein and Minkowski's work on Special Theory of Relativity, formulate a new coordinate system of space and time (Dainton, 2016). This new coordinate system is capable of setting up a common frame of reference by claiming there is a maximum speed for matter or information to travel in spacetime, and geometrically visualise the causation relationship between events with a structure of light cone. It is also capable of adding another frame of references to the common frame of reference (speed of light) to visually explain the different perception of time in the different frame of references, given they are moving with a different velocity. It is philosophically claiming a realist position of understanding reality, as reality is external but influenced by any individual's observation (McTaggart and McTaggart, 1927), since there is a maximum speed existing in the reality that no one can change (Grünbaum, 1963). It is the variation of observers' relative velocity, when they are in motions, causes they have different perceptions of their internal time (Garrett and Munk, 1975)

Last but not least, this spacetime system contains an operational principle of measuring space and time, which is, that any physical measurement of space and time must establish its relationship to the maximum speed in the common frame of reference, otherwise the measurement can only be valid and recognised within the reference frame that it was undertaken, and consequently produces no meaning to either the common frame of reference or another individual level of frame of references (Norton, 2010). Another operational principle is space or distance measurement can be replaced by a time and velocity measurement in a frame of reference (Callender, 2010). When the velocity of a moving object is known, its internal time consumption can be measured within its own frame of reference. Then convert those measurements to the common frame of reference (Callender, 2002), the spacetime distance, in the external reality can be calculated with the

speed of light and the converted time consumption (Putnam, 1967). Therefore, research can focus on measuring objects' velocity and consumers' internal time consumption, converting those observations to reveal the external common frame of reference (Bondi, 1965). Or, research can convert the results on the common frame of reference to the micro level frame of reference, and predict valid influence on them (Unruh, 1995).

4.5 Information Overload

4.5.1 Learning

Learning is the process of acquiring knowledge or skill by studying, practising, or experiencing something (Mowrer, 1960; Deci and Ryan, 2010). Learning is important in the field of consumer behaviour as a learning process is also a process of changing in attitudes, beliefs or behaviour (McGuire, 1969; Solomon et al., 2012). There are two major aspects of learning, which are behavioural learning and cognitive learning (Sutton and Barto, 1998; Kolb and Kolb, 2005).

Behavioural learning refers the learning activity that is a response to changes in consumption environment (Ormrod, 1999). Cognitive learning theories focus on internal mental processes, and consider learning as a process of mental activity that consumer is thinking through people's behaviours to a certain degree (Tennyson and Rasch, 1988; Cummings, 2003). Cognitive learning is particularly crucial for understanding consumer decision-making the process for two reasons (Gregan-Paxton and John, 1997; Konus et al., 2008). Firstly, it concerns the process where consumers take in and learn new information; secondly, the outcomes of information processing might be committed to their memory, in order to compare the internal old information of previous experiences and external new information (Jayachandran et al., 2005).

Comparing and contrasting these two sorts of the learning process, behavioural learning and cognitive learning, both of them indicate the complexity of decision-making process. The former is more focusing on the external environment, and the latter aims to explain how internal mental processes influence consumer behaviour, which is the central issue of this thesis (Peres et al., 2010). Cognitive learning view of the decision-making process sees humans are generally rational and use the information available to make decisions (Bandura, 1989; Venkatesh et al., 2003). Although there are various conceptions of cognitive learning theory, for example, signalling learning theory (Connelly et al., 2011),

stimulus-response learning theory (Scott, 1994), discrimination learning theory (Sheth and Parvatlyar, 1995), and problem solving learning theory (Anderson, 1993), at the heart of most cognitive learning theory is information processing model, and human's memory (LaBerge and Samuels, 1974; Eysenck et al., 2007).

Information processing model demonstrates how information is received by consumer and then interpreted, stored in their memory, and later retrieved to support consumer decision-making process (Baddeley and Hitch, 1974; Cowan, 1988; Mayer, 2002; Argyriou, 2012). Information processing takes place when consumer received information from external environment

Exposure involves sensory detection and registration through receptor organs. Attention requires the focusing of attention, leading to perception and categorisation of stimuli. Comprehension is where the consumers indefinite the meanings behind that received information. Acceptance/rejection refers that consumer considers existing choice criteria and elaborates the information received to reach a point of acceptance or rejection of the information. Retention is that the outcomes of learning process need to be retained in the memory for future use (Treisman and Gelade, 1980; Siegel, 2015).

For any piece of information to reach consumers' long-term memory, it has to go through the whole process demonstrated in figure 4.2 below.

An external stimulus can successfully expose to a consumer when it relates to consumers' current needs. However, there are situations that consumer perceives and process information that is not immediately relevant to their current needs, but is simply interesting (Darley et al., 2010). For instance, a consumer might find the story underlying a TV commercial is interesting, and spend time watching it, but never paid attention to the product or service the commercial advertises, because this consumer did not need that product or service at that time. In this case, the whole information processing has no positive contribution to the consumption decision-making.
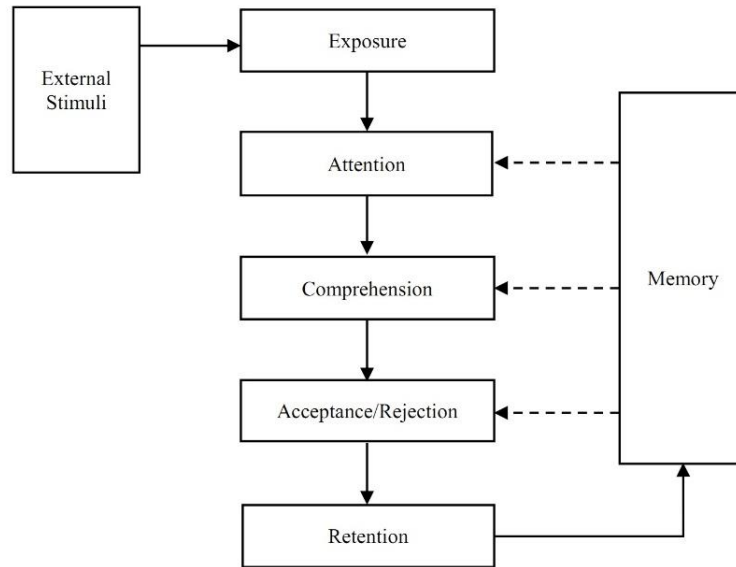
Figure 4.2 Information processing in memory (Szmigin, 2014)

4.5.2 Memory

As discussed above, once a consumer completed a whole process of information processing, the information is retained in consumers' memory to use later. Memory is a system and a process that information is organised, and stored and retrieved over time (Biehal and Chakravarti, 1982). Figure 4.2 shows there are four stages in the memory system, which is one of the central issues to understand consumers' consideration process when making a purchase decision. In this system, after the information is received by a consumer in the first stage of input, it moves to the next stage of Coding. Coding refers to how information enters consumer memory. Then in storage stage, encoded information is retained in consumers' memory and will be used in the future in retrieval stage.

Focusing on the storage system in memory, the model in Figure 4.3 shows three levels of memory, which are a sensory memory, short-term memory and long-term memory (Szmigin, 2014). This structure is referred to as multiple stores of memory. In sensory memory, information is received in its sensory form (sight, smell, touch, taste, or hearing), and is only retained for the amount of time that the sensation is experiencing that information. Short-term memory is where current information is being processed. Compared to other parts of the memory structure, short-term memory can hold a small amount of information in it for a limited and short period of time. In Miller's (1956) experiment, he found people can remember a range of six to nine pieces of information.

For most people, seven items appear to be the maximum capacity of short-term memory. Finally, selected information can be retained in long-term memory, which has the potential to remember information forever.
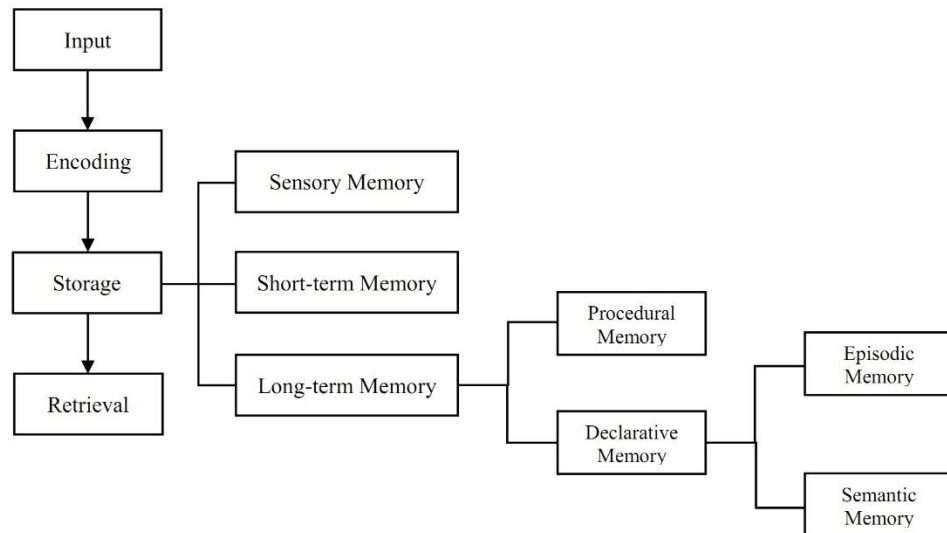
Figure 4.3 Memory Structure (Szmigin, 2014)

There are two types of long-term memory, procedural memory and declarative memory (Yoo, 2008). Procedural memory is memory regarding how to perform tasks and actions, for example, how to drive a car and how to use mobile retail applications. Declarative memory refers to remembering specific events. It can be further subdivided into two types: episodic memory is the memories of specific events and experiences.

4.5.3 Information Overload

The technological developments of the last a few decades have made information more available to consumers. On electronic retailing channels, information is seen as the key to success for both consumers and retailers to conduct interactions (Delone and Mclean, 2004). Electronic retailing channels, for example, the internet channels and mobile channels provide much easier access to information (Weathers et al., 2007). However, research has reported that information can lead to physical and mental health issues (Carstensen, 2006). The manufacturers of physical goods, the providers of service, along with the infrastructure of electronic communication channels are generating and transferring information much faster than consumers can process it. The issue of information overload is widely recognised in many research areas (Edmunds and Morris,

2000; Klausegger et al., 2007; Chen et al., 2009), for example, marketing, consumer research, organisation science and management information systems, since general population is dealing with an overwhelming amount of information in this digital era. Literatures set out, mainly, two dimensions of information overload, they are, firstly, personal information overload that affects individual's ability of decision-making; and secondly, consumers' information overload that affects their purchase behaviours (Jackson and Farzaneh, 2012).

Information overload is defined as a set of issues, such as consumers are burdened with a large amount of unsolicited and irrelevant information, information is transferred too fast for the receiver to process efficiently, or simply, as a point that consumers cannot process information any further (Bawden and Robinson, 2009). Those issues can cause consumers to use too much of their time, to feel too stressed to process information, or to worry missing crucial information during their information processes, which consequently affects their decision-making processes (Speier et al., 1999). Meadow and Yuan (1997) argue that information overload means that more raw information is competing for consumers' attention than consumers' capacities to properly process, and this phenomenon causes the feeling of being overwhelmed by the quantity of information and eventually consumers have to make the final decision with what they have received. The main focus is how the amount of information impact individuals' performance in their decision-making processes. It is also very common for consumers to allow information to come through in the hope that they will process them later, in order to make a better decision, which, is arguably rarely happening (Eppler and Megngis, 2014). Researchers report that the quality of individual's decision-making process is positively related to the quantity of the information he/she receives to a certain point (Lurie, 2004). Any further information beyond that point will, either devastate the quality of the final decision, or will no longer be integrated into their decision-making processes (Scheibehenne et al., 2010). A heavy load of information will make the more useful, or important, information harder to recall or consider (Reutskaja and Hogarth, 2009).

Another way of considering information overload issues in marketing is to examine whether consumers can integrate a certain amount of information into their decision-making processes within a specific period of time (Bawden and Robinson, 2009). This point of view raises the issue of time, since without considering time, it is impossible to

evaluate consumers' capacity of processing information. This temporal perspective has been explained by Tushman and Nadler (1978) via a formula of information overload occurs when "information processing requirements" is greater than "information processing capacities". And both the term of requirements and capacities should be measured on a time dimension. Based on this point, further research has divided into two different streams: subjectively, emotional information overload phenomenon is the feelings of stress, confusion, anxiety, and more importantly, low motivation to continue decision-making process (Walsh and Mitchell, 2010). On the other hand, objectively, cognitive information overload highlights the characteristics of information, such as ambiguity, uncertainty and complexity, can either contribute to or reduce the occurrence of information overload (Schneider, 1987; Eppler and Mengis, 2004).

The internet contributes greatly to the volume of information of the electronic retailing channels, and it has been considered as a major contributor to consumers' information overload. Sweller (1988) and Sweller et al. (1998) propose a theory of cognitive load that emphasises how working memory's capacity influences information processing. In his theory, working memory has seven elements of information can be processed simultaneously. Humans can only process information in their working memory, and store the results, or unprocessed information in long-term memory in the form of schema. Schema acts as one of the seven elements, and it has the functions of, firstly, to provide a mechanism to organise and store knowledge in long-term memory, and additionally, to free working memory load by combining multiple elements together and treat it as a single element, or abandon irrelevant element. More importantly, humans can learn or make decisions more effectively, in terms of both quantity and quality, only when the schema is able to put multiple pieces of highly interactive information into working memory. In other words, the human is controlling schema to control the usage of their working memory to learn, to understand, and to make a decision, and letting schema to put highly relevant, highly interactive information is the key. It suggests any instructional design for the purpose of assisting humans to learn knowledge or to make a decision should not only support schema construction in a human's mind, but also create an external environment that is working like schema, to influence the usage of working memory, for example information filter. Prior research in personal information management (Jones and Thomas, 1997) investigates how computer hardware and software can change the way that internet users manage information.

It reported that users tend to decide which platform they want to use based on their consideration of that device should provide characteristics that most favourable to their task, which highlights the importance of software design, as the potential solution to information overload (Pennington and Tuttle, 2007). Another area of information overload study is focusing on value-added information. Information is arguably not necessarily useful; a further mechanism is required to filter or reorganise them to add value to the processing of that information. Earlier research (Simpson and Prusak, 1995) argues an interface is needed between information providers and information users, since they have different respective views of each other's roles. Combining these two points of importance of software and requirement of the interface, this thesis seeks to offer insights on providing information communication interface between different parties on the mobile channels. The software, which is a mobile retail application, is the key to provide value-added information, and ultimately value-added service, to consumers.

4.6 Summary

The review of the three concepts of time demonstrates the complexity of taking into account all of them in a consumer behaviour research. However, it also shows the potential that using the beginning of a decision-making process, which is also the combination of three different time concepts together can be a solution to identify consumers' temporal frame of reference. And more interestingly, with the support of the second research framework, the spacetime diagram from special relativity theory, consumers' individual frame of reference - their personal capacity of perceiving value from spending time on information processing, and consumers' common frame of reference – the physical time reference shared between consumers and computer system on this planet can be demonstrated simultaneously. With this understanding in mind, a decision-making process can be practically measured as an information interacting process that happened in consumers' memory system. Therefore, the second research gap is identified as the lack of theoretical development on consumers' time consumption and their practical value creation measurement, as well as how processing different types of information would affect consumers' time consumption in their decision-making process. Further discussion on the analytical methods to explore the actual customers' perceived value co-creation, survival analysis, and the results from survival analysis will be provided in Chapter 7, Chapter 8 and Chapter 10, respectively.

Chapter 5. Literature Review 4 – Value Co-creation and Customer Perceived Value

"Nothing either good or bad, but thinking makes it so."

(William Shakespeare, 1599-1602, Act 2, Scene 2, p11)

5.1 Introduction

As mentioned in Chapter 2, value is the trade-off that can be perceived and experienced by customers in an exchanging process (Vargo and Lusch, 2008); pursuing value and creating value is the reason that consumers are actively involved in consumption process (Payne et al., 2008). In this chapter, value creation and value co-creation become the central issue. Beginning with a review of the value related literature, it moves to develop a framework that takes into account several milestones in this academic domain. Then, using this framework, the usage value of mobile retail applications for the purpose of making a purchase decision is defined. In Chapter 7, this framework is used again for research design purpose. Also, combining the review of value concept and the research context, this chapter identifies a research gap that this thesis aims to fulfil.

5.2 Understanding of Value

5.2.1 Value Creation and Experience Creation

The co-creation of customer experiences is identified as the third theme within a service process (Tynan and McKechnie, 2009). Since the experience is co-created, either by consumer or company alone, but by both of them along with other consumers, company's control power is limited to the extent that it can only design and facilitate a platform for experience creation (Grönroos, 2008). In other words, consumers' usage of a service can still be guided by the service provider, but it is mainly controlled by the consumers (Edvardsson et al., 2007). And consumers' behaviours, within the service process, is driven by "value-in-use", in order to pursue desirable outcome, purpose or objective (Vargo and Lusch, 2008, 2011).

This understanding of experience co-creation highlights that, as customers' behaviours are purposeful, customers' behaviours throughout a service process is driven by their commitments of value pursuing. Regardless of whether the service brings them positive or

negative emotion, their usage of touchpoints expresses their motivation of achieving their goals (Kim et al., 2013). Experience stimuli are therefore considered as the facilitators of customers' experience creating tools, the usage of those tools are dominantly influenced by customers' personal value (Chan et al., 2010).

Consumers control their service stimuli from three perspectives: firstly, it is consumers' control power to determine whether a company designed stimulus is recognised as an experience creation tool. Secondly, it is consumers' control power to influence the actual usage of the touchpoints. Finally, the ultimate evaluation of the outcomes of a service is also affected by consumers' control power (Palmer, 2010). Although other social, cultural and personal characteristics could also systematically differentiate consumers' behaviours, their personal value and the value creation within service process dominate the ways that individuals perform service and how much resource is engaged in the service process.

Furthermore, this experience and value co-creation understanding may provide a methodological implication in terms of identifying customers' experiences and value measurements (Ranjan and Read, 2016). This conceptual link implies that measurements of either customer experience or customer perceived value should reveal the touchpoint/stimulus that the interactions occur. Identifying the touchpoints is essential, because they influence how much customers are willing to get involved in service process and purchase decision-making process (Lemke et al., 2010).

5.2.2 Service Dominant Logic
Recent literature suggests value could be created or possessed, not in a product or good, but rather in the process of service or in customers' experience, which highlights customers' participant role in the value creation process (Holbrook, 1994, 2006). This point of view has been adopted by Vargo and Lusch (2004, 2007, 2008, 2012 and 2014) in their theoretical development of service dominant logic theory. From this philosophical and economic perspective, arguably, companies cannot produce value by manufacturing good for their customers, companies can only offer value propositions to customers and use a value proposition to attract customer to participant the value creation process together with companies and possibly other customers. In the process, service dominant logic conceptualises customer as the determinant of value rather than a passive receiver or a co-producer, the customer has become central in the value co-creation process (Chandler

and Vargo, 2011). Vargo and Lusch (2008) also develop then fundamental premises of service dominant logic as follow (Table 5.1):

	Foundational Premises	Explanation and comment
FP1 AXIOM1	Service is the fundamental basis of exchange.	The application of operant resources (knowledge and skills), "service", is the basis for all exchange. Service is exchanged for service.
FP2	Indirect exchange masks the fundamental basis of exchange.	Goods, money, and institutions mask the service-for-service nature of the exchange.
FP3	Goods are distribution mechanism for service provision.	Goods (both durable and non-durable) derive their value through use – the service they provide.
FP4	Operant resources are the fundamental source of strategic benefit.	The comparative ability to cause desired change drives competition.
FP5	All economies are service economies.	Service (singular) is only now becoming more apparent with increased specialisation and outsourcing.
FP6 AXIOM2	The customer is always a co-creator of value.	Implies value creation is interactional.
FP7	The enterprise cannot deliver value, but only offer value propositions.	The firm can offer its applied resources and collaboratively (interactively) create value following acceptance, but cannot create/deliver value alone.
FP8	A service-centered view is inherently customer oriented and relational.	Service is customer-determined and co-created; thus, it is inherently customer oriented and relational.
FP9 AXIOM3	All social and economic actors are resource integrators.	Implies the context of value creation is networks of networks (resource integrators).
FP10 AXIOM4	Value is always uniquely and phenomenologically determined by the beneficiary.	Value is idiosyncratic, experiential, contextual, and meaning laden.
FP11 AXIOM5	Value co-creation is co-ordinated through actor-generated institutions and institutional arrangement.	

Table 5.1. Service-dominant logic foundational premises
Source: Vargo and Lusch (2014)

Since service dominant logic is introduced as a philosophical way to understand the relationship between service and goods, and more importantly, the relationship between companies and customers, there are several issues has been raised. First of all, in FP6, it states that, the customer is identified as a co-creator of value along with companies, and it is the interaction between companies and customers that create value. However, it is still unclear the way companies and customers are interacting in the service process (Aitken et al., 2006), particularly, when the interactions are on the foundations of information exchange. Secondly, on one hand, it emphasises the role of customers in service as the co-creator in an ongoing process, and as the ultimate evaluator with their post-purchase personal experiences after the process. However, it has not shown how the customers can use their control power to influences the service process, which makes the theory of service-dominant logic more company-centric rather than customer-centric (Grönroos, 2011).

In order to better understand the issues above and further theoretically apply service dominant logic into marketing research, Vargo and Lusch (2004, 2008) offer their insights on how customers interact in the service to perceive value. It is the resources that customer has to enable the interactivities in the network of the economic system. All resources can be categorised into two kinds, which are operand resources and operant resources. Operant resources refer to the cultural or intellectual resources, for instance, knowledge, skills, information, etc. Operand resources are physical resources, such as human resource, financial resources, machines and materials, etc. Service, as the resource integration, is the activity to keep the network (either operand or operant resource) together, everything and everyone are working together under the value proposition to co-create value (Grönroos and Voima, 2013). Mobile technology, as an operand resource, enables information interactivity and connect users in the way that requires significantly lower temporal and special barrier than other communication technology. By using it, customers are able to invest more resources into service process. Therefore, this thesis will focus on the value proposition of mobile service channels, aims to offer deep understandings on maximising the value this channel created. Furthermore, in the proposition of service-dominant logic, customisation, rather than standardisation, is an important goal for service providers, in terms of co-creator value for both consumers and companies (Vargo and Lusch, 2004; Vesanen and Raulas, 2006).

5.2.3 Value Co-creation

In the prior literature, marketing has been defined as a process that customers and companies create and exchange the value of products and services for fulfilling what they want and need (Kumar, 2000). This definition emphasises the importance of value, given it is the value that attracts both sides of consumers and service providers into the process of co-creating and exchanging (Vargo and Lusch, 2011). It also has been widely accepted by marketing researchers and practitioners, that product and service differentiation is one of the sources of competitive advantage. Service customisation has been identified as one of the most important co-creator of customer perceived value, particularly from the perspective of perceived quality and trust (Coelho and Henseler, 2012). Customisation, as the differentiation that is on an individual level, aims to offer tailored product or service to meet individual customers' wants and needs (Simonson, 2005). This point of view has been challenging companies to identify profitable market segments and innovatively design products and services for them (Becerra and Korgoankar, 2011). Service customisation has been identified as one of the most important co-creator of customer perceived value, particularly from the perspective of perceived quality and trust (Coelho and Henseler, 2012).

The effect of customer value is based on the customers' experiences of previous interactions with the service provider, while influencing their intentions of future behaviours (Hansen et al., 2013). Those memory-based deliberation and judgements are not only simply affected by the external information source, for instance, advertisements and word-of-mouth, but also customers' own systematic way of processing information restored in their memory (Rottenstreich et al., 2006).

Customer perceives the value of participating business activities as an interactive and preference experience. This experiential view of value contains traditional perspective of value in terms of a calculation of sacrifices-benefits (Zeithaml, 1988), for instance, the customer perceived value in mobile service channels will be influenced by information exchange activities (interactive), significantly different usages of mobile devices and value computing process on individual level (preference). Different from the traditional value creation definition, which is a process that is conducted by the company to create the product or service, the customer is more engaged and involved nowadays in various stages of a process. The concept of value creation has been shifting from the earlier company-

centric perspective to the more recent company-customer interaction perspective (Zainuddin et al., 2013). However, this does not necessarily mean that customers will play a more important role in value co-creation process, organisations are also critical in this process, in terms of providing administrative, technical and interpersonal quality (Dagger et al., 2007; Chandler and Vargo, 2011).

Since the development of information technology in this digital era, customers are increasingly resisting the passive control of receiving information, but being engaged in the value co-creation activity (Konczal, 2008). Customers, as the value co-creator, are always engaged and involved in the marketing activities, what they need is the platform of the value and information exchange, and, occasionally, offers and suggestions on value propositions (Grönroos 2008, 2011). It suggests that the level of control and the level of involvement are the most important variables when conducting co-creational marketing activities (Gamble and Gilmore, 2013). It is the dynamic online interactions between customers and company building relationship outside the physical business world (Christodoulides et al., 2006). Customers are more likely to use the internet to obtain information from retailers or service providers, which gives them rich experiences of conducting informational interactivities on the internet with their computers or mobile devices. Those experience will result in judgements about a company's credibility, reliability, accessibility, and more importantly the ability to create and delivering value to customers (Trueman et al., 2012).

Retail services contain all forms of customer support, pre-sale informational advice, post-purchase services, technical support and service recovery services, combine them together to enable customers to overall evaluate their purchase experiences (Yan and Pei, 2009). Information technology is offering huge opportunities to enhance cost efficiencies to engage the customer, the revolutionary application of the Internet in the business world is replacing interpersonal service with interactions on electronic service channels to the degree that maximises the value co-created by both customers and companies (Edvardsson et al., 2011). The participation and engagement of customers are fundamental to value co-creation. The temporal cost in one of the resources that customers need to sacrifice to participate in this process, along with other resources, for instance, financial costs, emotional input, informational interactivity (Chan et al.,2010).

The theoretical understanding of value co-creation has been a growing focus since the millennium, from Prahalad and Ramaswamy's (2000, 2002 and 2004) work of defining value co-creation, to Vargo and Lusch's (2004, 2006, 2008 and 2014) the most recent development of Service-Dominant Logic theory. As the core of all value co-creation theories, the interaction between all the parties that involved in service process is shifting the control power from companies to consumers (Labrecque et al., 2013). The barriers for consumers to interact with other parties have been significantly lowered by technological advancements in this digital and mobile age (Berthon et al., 2008; Burmann, 2010). Grönroos (2011) argues that consumers are co-creator of value, along with company as the service provider.

5.2.4 Four Parties Involved in Value Co-creation
Value creation is a fundamental concept of service marketing. Service-Dominant Logic suggests that all value creation is co-creational and at least two parties are involved, which are service providers and customers. The interaction must happen directly between different parties at a joint activity. Research acknowledges the difficulties of observing, measuring and analysing those joint events, has attempted to conduct studies in this regard.

In the literature, value itself has been understood in a number of different ways. In general, the value can be defined as a state of customers' well-being in some respect. A value co-creation is a process that increases customers' well-being. However, when the customer is engaged with a value creation process, it does not necessarily have to be a positive value increase. Actually, a customer's overall experience of value creation could be negative (Echeverri and Skålén, 2011). In the context of this thesis, value co-creation may have both positive and negative impacts on value formation for customers. More specifically, when the consumer is trying to make a purchase decision on a mobile retail application, they predict that a decision, either is to buy or not to buy, could be reached at some time. Later on, when they complete their decision-making process, they will compare the current result to their predicted result. In the case that they predicted they can make a decision and they eventually made one, the value of using mobile retail applications increases, since customers have become better off with a confident decision. On the other hand, in the case that they could not make a decision, at that point of time, the value of using mobile retail applications decreases, because consumers are worse off compared to their prediction.

Grönroos (2012) suggests a value co-creation process requires different sorts of resources, which appear in direct interactions between different parties. This point establishes the relationship between the different parties, the resources those parties carries and the direct interactions between different parties. Grönroos (2012) further identifies four parties that are involved in value co-creation in a broad service context. They are: contact employee (information providers that offer information on the service platform and the goods it sells), physical resources (hardware), the focal customer (first party consumer) and fellow customer (the third party consumer, who present during the service process). If applying this classification to the research context of this thesis, the four parties here are: first, the service provider in mobile retailing is the electronic retailer that the provides a mobile retail application; second, the physical resources or artefacts are the mobile networking infrastructures and the handheld device (smartphone, tablet, etc.); third, the focal customers – the first party consumer - are the ones who are trying to make purchase decision on mobile retail applications, and they can control the information interaction sequences and timing; and finally, the fellow customer – the third party - is the previous customers who are not presenting physically, but left their feedbacks or reviews digitally on the service platform. The point that the value derived from the interactions and perceived by the different parties involved in the interactions has been adopted as an effective angle in social sciences research (Hiller and Rosborough, 2015).

To sum up, in this thesis, all the interactions on mobile retail applications are informational and four parties that involved have been identified. In the next session, in order to identify the constructs to represent those four parties, a review of literature will provide insights on the candidates. Further discussion of the constructs will also be from conducted in beneficial and sacrificial perspectives.

5.3 Customer Perceived Value

Customer perceived value concept is a development of customer satisfaction measurement (Christopher, 1996; Ravald and Grönroos, 1996). It defines value from customers' point of view as the trade-off between perceived benefits and perceived sacrifice. In marketing and service literature, customer value not only is the most commonly used perceptual metric to predict future spending but also, but also it can be universally applied across all products and services (Homburg et al., 2005). Customer perceived value is significantly influenced by both the level that products or services fulfil customers' expectation and the attribution

that customers make about the success or failure in products or service performance (Tsiros et al., 2004). Expectation plays an important role in determining customer perceived value in both the traditional face-to-face marketplace and the new electronic retailing channels (Zeithaml et al., 2002). However, due to the natural differences between traditional retailers and electronic channel retailers, many tangible signals of service become unobservable (Pan and Zinkhan, 2006). Therefore, how to dynamically and effectively control customers' expectation and satisfaction to enhance service provider's performance is crucial to the electronic channel service providers (Kopalle and Lehmann, 2006). Generally, the relationship between electronic customer perceived value and purchase decision is assumed to be positive (Olsen, 2007), however, only weak associations have been reported by research (Mittal and Kamakura, 2001; Hackman et al., 2006). One reason is suggested to be that only in the situation that customer experiences a service failure, the customer perceived value becomes an important determinant of repurchase (Van Doorn and Verhoef, 2008). Therefore, a more appropriate measurement is required for the more sophisticated adoption and usage decision analysis, and more ideally, if it has a strong relationship with customer perceived value concept, many classic theories could be transferred to better understand this measurement.

Co-creational marketing is a consumer centralised concepts that reconceptualised market as a platform that consumers can enhance their own value through their participation. In particular, the rise of service dominant logic theory (Vargo and Lusch, 2014) highlights the importance of value proposition, as it is what consumers would be judging to decide whether or not they want to participate one specific service process. For instance, efficiency highlights time consumption and successful decision-making as two key aspects when consumers are evaluating how much value they perceived from their previous marketing experiences.

Value co-creation requires a service platform that integrates resources in a process when different parties are interacting with each other (Grönroos, 2012). Perceived sacrifice involves all costs customers incurs when they make a purchase, for example, purchase price, acquisition costs and risks of poor performance. Meanwhile, the Perceived benefits include a combination of elements, such as physical attributes, service attributes and technology attributes (Holt and Payne, 2001). Woodall (2003) offers a diagrammatic form of benefits and sacrifices, from customers' perspectives, on one hand, service quality,

added service features, personal benefits, social benefits, practical and financial benefits are classified to be benefits' elements. On the other hand, price, search costs, usage costs, time and effort are categorised to be sacrifices when customers purchase services or products.

From organisations' perspectives, organisation's long-term performance requires necessary capabilities of identifying and developing customer needs, competitive actions and market trends, and active information acquisition from multiple channels could be a highly effective investment to organisations (Day, 1994). Furthermore, if those capabilities become more distinctive are compared to other competitors over a long run, they could result in sustainable competitive advantages (Kumar, 2011). Therefore, marketing orientated organisations have their primary objective of generating and delivering superior value to their customers, based on the knowledge of customer and competitor analysis and processes throughout the organisation (Kumar et al., 2011). When an organisation understands the value co-creation and value proposition to specific segmentation of customers, better tailored products or services could be offered according to customers' changing needs and requirement (Berger et al., 2002).

Perceived customer value has attracted much attention in marketing research, especially on the studies of customers' behavioural intention, because of two main reasons. Firstly, perceived customer value can not only be used to predict customer behaviour, but also offer organisations competitive advantages (Chen and Dubinsky, 2003). Secondly, perceived value constitutes the overall assessment of the utility of a service, and this utility is influenced both by prior experience with same service and similar experience of related services (Thørbjornsen et al., 2009). It has been found that perceived value has a strong positive relationship with customers' willingness to pay more to a retailer (Netemeyer et al., 2004). For example, in the research of Chaudhuri and Ligas (2009) about the value creation of the general retailing industry, they argue that store convenience plays a significantly important role in building customers' repurchase loyalty and attitudinal loyalty. The conceptual link between customer perceived value and usage intention have provided the primary goal of most organisations (Bolton et al., 2006). In the marketing fields, organisations seek to underpin their ability to deliver value to customers to ensure customer retention (Cooil et al., 2007). However, previous study suggests that customer

perceived value may have no impact on repurchase under certain circumstances, such as low-involvement customers and repurchase is not convenient (Seiders et al., 2005).

Customer perceived value has been argued to be the core in the framework of an organisation's strategy and future success (Salem Khalifa, 2004). Many organisations have been interested in customer perceived value analysis, which includes a conceptual analysis of the antecedent factors of perceived value, moreover, with the concerns of how to deliver superior value to customers together become significantly important in today's marketplace (Hume and Sullivan Mort, 2008).

In the current competitive marketing environment, customer perceived value is a critical strategic asset for an organisation to maximise long-term performance (Vogel et al., 2008). However, it is still inconclusive about how to identify the detection signals of monitoring customer perceived value and how to use appropriate programme to enhance it (Vogel et al., 2008). Recent research has introduced a comprehensive customer value model to identify different drivers of an organisation's performance (Rust et al., 2004). The model contains three equity drivers, which are value equity, brand equity and relationship equity. Although the research attempts to identify the relationships between these three drivers and customers' equity, the switching process is still unclear because of the reliability issue of self-reported data (Keiningham et al., 2003), particularly considering the self-reported data could be largely changed over time (Johnson et al., 2006). Later research from Vogel et al. (2008) combines self-reported survey data and real purchase data together for providing more reliable and accurate behavioural data to evaluating the effectiveness of an organisation' s marketing strategy. Furthermore, they also take the effect of inertia shopping into account to better understand the decision-making process, which could benefit future research to realise the importance of long-term relationships with customers. Last but not least, their research provides two important findings. Firstly, value equity, which should be considered as a primary outcome of an organisation, could be achieved by delivering to the customer high quality service and products, reasonable price and convenience. Secondly, high brand equity is nearly as important as value equity to customers, which could bring advantages when an organisation develops a new channel to existed customers and new customers (Ailawadi and Keller, 2004; Woodside and Walser, 2006).

5.3.1 Customer Perceived Value on Electronic Service Channels

The effect of customer perceived value on the adoption decision-making is widely reported (Parasuraman and Grewal, 2000; Molesworth and Suortti, 2002), it is commonly recognised that consumers only intent to adopt an innovation when it can offer better value than existing alternatives. However, consumers have difficulties of judging value of technology innovations when they compare to substitutes or alternatives (Wood and Moreau, 2006), because assessing the future success of technological innovations usually takes a long time, which could make consumers drop the usage before getting satisfying results (Ehrenberg et al., 2006).

Earlier researchers have emphasised on using the electronic channels on customer value creation, loyalty and retention (Bendoly et al., 2005; Venkatesan, Kumar and Ravishanker, 2007). Those research report the significant advantage of using electronic channels to communicate information with customers. In addition, customer perceived value contributes to positive word-of-mouth and increases products or service usages (Danaher and Rust, 1996), and more usage might lead to more effective cross and up selling (Li et al., 2005).

Particularly for information and networked services, much of customer perceived value is from the benefits associated with other service users, not only the service attributes (Birke and Swann, 2006). In other words, for many information technologies and communication services, it is commonly understood that the perceived benefit of using a service could increase the number of users, (Gupta et al., 1999). Marketing research and practice are shifting from a product centred to a service centred logic (Vargo and Lusch, 2004). From this point of view, customers are value co-creators rather than value receivers and organisations become facilitates providers of value creation process rather than standardised value producer (Payne et al., 2008). Customer participation should create more value to both customers and organisations (Auh et al., 2007), customers are more satisfied when they perceive more value from their service encounters (Ouschan et al., 2006). Chan et al. (2010) indicate that customer participation can create economic value, for example, better service quality and more control.

5.3.2 Customer Perceived Value Definition Framework

In this section, it is going to review literature that addresses the definition of customer perceived value construct, identified a number of aspects the formulate a customer perceived value construct for a context and finally, present a framework that can be used to define the customer perceived value construct and its relevant constructs for this thesis.

The use of the concept of perceived value has been crucial to maintaining sustainability in fierce market competition. The marketing applications of the concept of customer perceived value not only contribute to creating more satisfied customers, but also produce a direct positive effect on increasing customer purchase intention, customer repurchase intention and customer loyalty (Lee and Lin., 2005). It has been regarded as an interesting and challenging topic since decades ago (Huber et al., 2007). One of the reasons is, in different contexts of products or services, it is difficult to identify the perceived benefits and perceived sacrifices the customer is taking into his/her consideration, especially when there are multiple dimensions of value and various different type of value are involved simultaneously. This leads to the need for a deeper understanding of customer perceived value concept, and consequently, a more proper identification of the measurements of customer perceived value in different product and service context.

In the case of customer perceived value concept, the lack of agreement on its definition indicates that perceived value is a highly complex concept that may require one or more ways to understand it (Lapierre, 2000). This thesis is going to review a number definition of customer perceived value, and develop a definition suitable for the contextual background of the decision-making process on fast moving consumer goods on mobile retail applications.

Day (1990) defines customer perceived value as the difference between customer perceived benefits and customer perceived costs. Woodruff and Gardial (1996) suggest consumers' judgement of value is the results from a dynamic process of calculating or considering the trade-off between positive consequences of receiving benefits and negative consequences of making sacrifices. Based on this dynamic view of value judging process, Zeithaml (1998) proposes another view of customer perceived value with identifying four stages of how the customer is going to perform their evaluation process.

As defined by Zeithaml (1998), customer perceived value is consumers' overall assessment of the utility of a product/service based on his/her perceptions of what are the benefits and sacrifices. He noted four types of consumer definitions of value, which are:

1. Low price (focus on sacrifice);
2. What a consumer wants to receive from using a product or service (focus on benefits);
3. The quality obtained from the above two types of consumer value (focus on the trade-off); and
4. Total benefits received for the total sacrifice made to obtain those benefits (focus on the overall evaluation, have multiple dimensions than the product/service price and what consumers initially wanted).

Horovitz (2000) argues that customers receive value when the benefits exceed the sacrifices, and Treacy and Wiersima (1995) suggest a simple subtractive manner for calculating customer perceived value, which is the sum of benefits received minus the sum of sacrifices in acquiring a product or service. They also mention that the time spent is one of the major sources on sacrifices.

Grönroos (2000) describes customer perceived value (CPV) by the following three equations:

CPV1 = (episode benefits + relationship benefits) / (episode sacrifice + relationship sacrifice);

CPV2 = (core solution + additional services) / (price + relationship cost);

CPV3 = core value ± added value. (The core value means the benefits of a core solution compared with the price paid for that solution, whereas the added value is created by additional services over time).

He also mentions that the negative added value would be destructive to the overall evaluation. Even an excellent core value can be quickly destroyed by negative added value, which might be caused by, for example, lack of after sale support, late deliveries or unfriendly and untrustworthy personnel (Grönroos, 2000).

Another way of understanding different dimensions of customer value is through Woodruff's (1997) customer value hierarchy model, which conceptualise value into three hierarchy levels, desired attributes, desired consequences, and desired end-state (Figure 5.1). Starting at the bottom of the hierarchy, when customer purchase and use a product or service, they generate expectations based on their preferences to facilitate achieving desired consequence experience. When the desired consequences are achieved, customers use the ability they learned from desired consequences to achieve their higher level goals. From the top of the hierarchy, a customer uses a higher level of the structure to guide their choice of lower level options. This model helps to explain the complexity of perceived value as well as why customer weights various benefits and sacrifice differently. It also points out the importance of customers' personal preferences when judging product or service's attributes and consequences. Although it did not include customers' sacrifices in the hierarchy, customer certainly has to consider the trade-off between benefits and sacrifices in the pre-purchase stage, in-use stage and post-use stage a (Parasuraman, 1997).
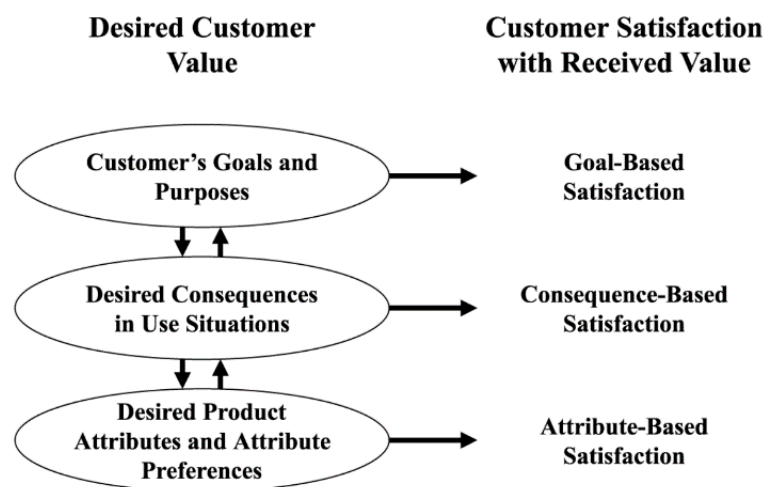
Figure 5.1 Customer Value Hierarchy Model (Salem Khalifa, 2004)

From a perspective of utilitarian value, Sheth et al. (1991) develop a theory of consumption value that is based on the outcome of consumer decision-making process. The main indicators of customer perceived value are customers' choice of whether to purchase or not to purchase, or to choose between similar alternatives. The five dimensions of consumption value are functional value which is related to the utilitarian purpose of the product or service; social value which is concerned with the image obtained from the social environment of the customer; emotional value which is related to psychological feelings of

using a product or service; epistemic value that fulfils customers' desire for knowledge; and last but not least, conditional value, which is derived due to the specific situation that the consumer is facing.

The consumption value model provides a much clearer way of identifying the sources or dimensions of value. The value generation process, however, was not as comprehensive as that in the following value model. Holbrook (1996) defines perceived value as an interactive preference experience. He claimed that customer perceived value is not generated in purchase stage, or in the lowest level of customer value hierarchy in Woodruff's (1997) work, but rather in the consumption stage, which is the middle level of desired consequences in use situation.

Holbrook (1996) also develops a framework that has eight dimensions of value, they are efficiency value, play value, excellence value, aesthetic value, status value, ethics value, esteem value, and spirituality value. Despite the model has been perceived as comprehensive as other models, some of those value dimensions of value are difficult to identify proper benefits and sacrifices on. Woodall (2003) proposes a table, which displays the nature and variety of benefits and sacrifices (Figure 5.2). He further employs a diagrammatic representation to categorise similar value-based components into four major groups. Two of them are related to perceived benefits, which are benefits derived from the attributes of a product or service, and benefits derived from the outcomes of consumption of a product or service. The two categories related to sacrifices are monetary sacrifice and non-monetary sacrifices (for example, psychological costs, time and effort).

Benefits		Sacrifices	
Attributes	**Outcomes**	**Monetary**	**Non-Monetary**
Goods Quality	Strategic Benefits	Price	Relationship Costs
Service Quality	Personal Benefits	Search Costs	Psychological Costs
Core Product Features	Social Benefits	Acquisition Costs	Time
Added Service Features	Practical Benefits	Opportunity Costs	Effort
Customisation	Financial Benefits	Disposal Costs	
		Maintenance Costs	

Figure 5.2 Benefits and Sacrifices (Woodall, 2003)

Based on the models discussed above, this thesis develops a framework (Figure 5.3) for defining customer perceived value and its antecedents. The customer perceived value definition framework begins with an understanding of the research background, which including both conceptual background and contextual background. Then, from a consumers' perspective, using a top-down direction to identify the value that consumers received from a product or service. Combining with the outcomes of value hierarchy, research needs to decide which value definition type would be appropriate to further examination of the value. If the dispositional definition is chosen, research must state what concept is interacting with the customer perceived value in this thesis, and what the relationship between them is. Moving on to identifying value dimension, this framework adopts the work of Sheth et al. (1991), which focusing on consumption value and using results of consumer decision-making process as the indicator of perceived value. The final stage is, for each value dimension, the benefits and sacrifices need to be clearly identified. As mentioned above, Woodall's (2003) work on categorising perceived benefits and perceived sacrifices is guiding this stage.
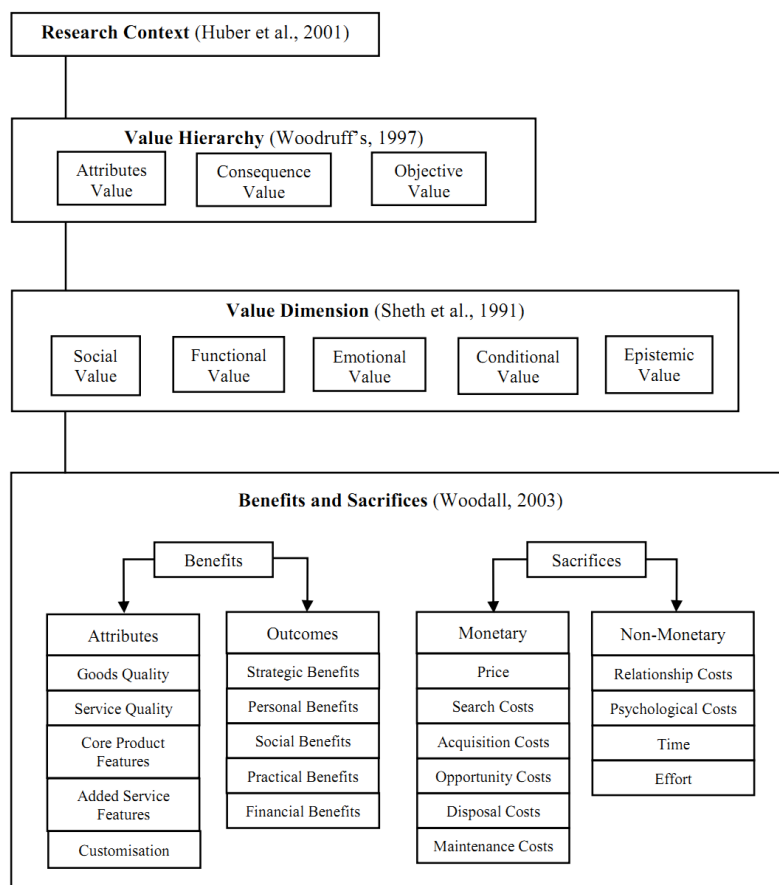
Figure 5.3 Customer Perceived Value Definition Framework developed in this thesis

5.3.3 Customer Perceived Value Definition in this Thesis
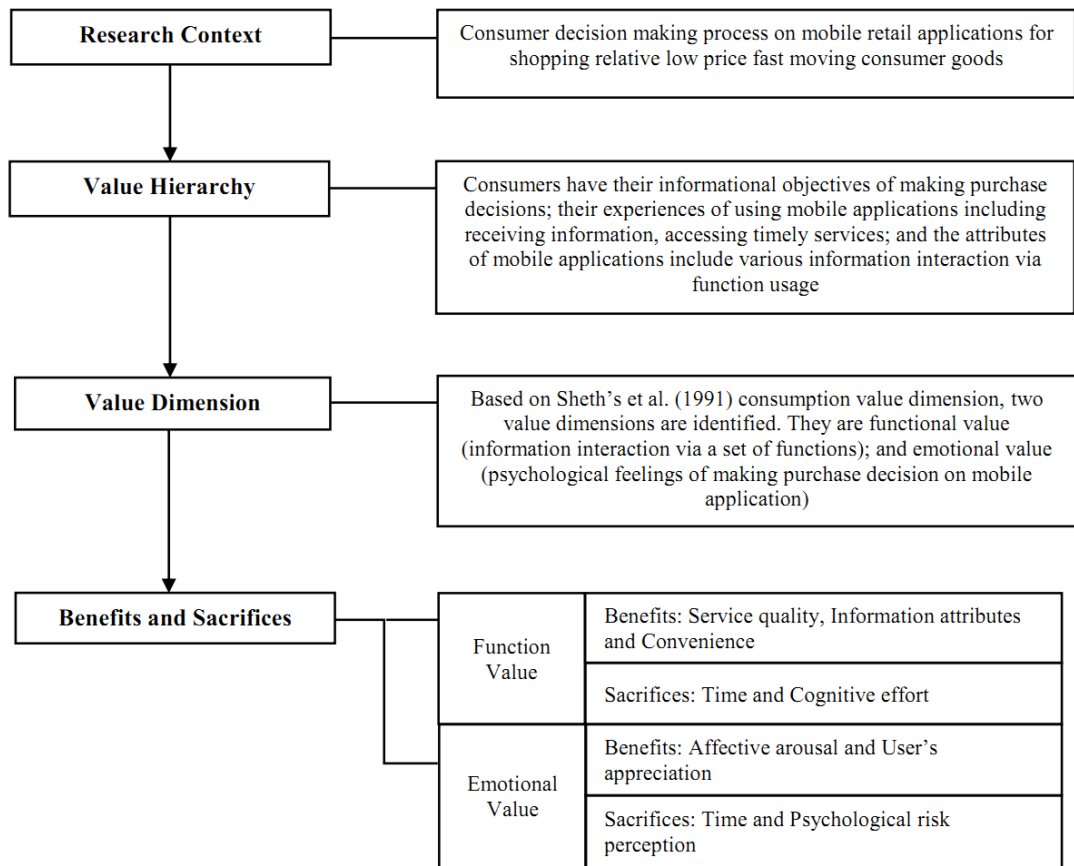
Figure 5.4 Customer perceived value definition for this thesis
based on the definition framework

As shown in Figure 5.4, the process of defining customer perceived value concept begins
with the contextual background. As mentioned in the introduction section, this thesis is
focusing on customer decision-making process on mobile retail applications. This thesis is
particularly interested in a single continuous decision-making process on relatively low
price fast moving consumer goods. Next step is using Woodruff's (1997) value hierarchy
to identify the three levels of value that consumer expects from using mobile retail
applications. The lowest level, which is attributes value, can be perceived throughout the
usage of various functions on mobile applications. Each function is providing certain types
of information to consumers. The middle level of consequence value presents the
experiential value that consumers receive, including timely informational service that
provides opportunities to conduct information interaction. The highest level of objective
value is being able to process information, and consequently make a purchase decision

with great flexibility on time dimension. In other words, mobile retail applications enable consumers to make purchase decision anywhere and anytime they want.

Since Sheth et al. (1991) uses whether a consumer buys or not as the indicator of customer perceived value, which offers a highly appropriate conceptual background, this thesis adopts their five dimensions. Note that, given this thesis only captures decision-making process that is made by a single consumer in one single session on a fast moving consumer good, social value and epistemic value are not considered in this regard.

Finally, this thesis also needs to identify all the benefits and sacrifices on each value dimension with the supports from Woodall's (2003) benefits and sacrifices table. For the first value dimension, functional value, which means the information interaction opportunity when using a variety of functions on mobile retail applications, the benefits are including service quality and information attributes, whereas the sacrifices are time consumed for making a purchase decision and the cognitive effort for rationally conducting information interaction and processing that information. The second value dimension is emotional value, which is the positive or negative feelings of using or after using mobile application. Affective arousal and user's appreciation are the main benefits, while on the other hand, psychological risk perception and time consumption are the major sacrifices.

With the needs of examining customer perceived value proposition on mobile service channels, Chapter 5 begins with review and discussion of general understanding of value in consumer research. It develops a crucial framework for defining customer perceived value in this thesis. This framework is also going to be used to identify a number of relating constructs.

Chapter 6 Research Objectives and Conceptual Framework

6.1 Introduction

To summarise the full body of literature concerning the three key issues addressed by the central research question, this chapter focuses on establishing the connections between key theories and key concepts reviewed in the literature review chapters. The three issues are consumer decision-making process on mobile retail applications, understanding of different time concepts in consumer behaviour and customer perceived value with its definition for understanding the value proposition on mobile service channels.

In order to answer the central research question – 'when using a mobile retail application and attempting to make a purchase decision, what information-processing factors impact the time consumed, and how this elapsed time impacts the probability of actually reaching a decision?' (Section 2.4), five research objectives are illustrated with support from the literature review. A conceptual framework (see Figure 6.1) is developed, to demonstrate how this thesis pursues these research objectives.

6.2 Research Objectives

Based on the literature review, three theoretical foundations have been established. For examining consumer decision-making process on mobile retail applications, Prospect Theory and the Theory of Planned Behaviour are used. In order to identify the relationship between the time consumption of making a purchase decision, Minkowski's Spacetime diagram in the theory of special relativity demonstrates how three different sorts of time can be understood within one frame of reference. Meanwhile, the Theory of Planned Behaviour and the concept of customer perceived value, together, build a strong relationship between information factors (in the Theory of Planned Behaviour) and information interactions (customer perceived value co-creation).

In this following section, the five research objectives are organised into three groupings: detailed discussions are provided.

6.2.1 Research Objective 1 & 2

In chapter 3, two theoretical foundations of this thesis are established; they are Prospect Theory (Kahneman and Tversky, 1979, 1992) and the Theory of Planned Behaviour (Ajzen, 1991, 2006). Those two were selected for isolating the probability of reaching a decision as an important and independent factor (Kusev et al., 2009; Chudry et al., 2011). The probability of reaching a decision at the end of a decision-making process can be separated into two kinds. The first one is the actual probability after what the consumer has actually done in a decision-making process. This requires a full examination of the actual decision-making processes on a mobile retail application, including what foundations have been used to collect the preferred information to support the decision-making process (Sternberg, 1996) as suggested in a cognitive approach of understanding decision-making (Foxall, 1993); and what the final result was (Argan and Akyildiz, 2014), including 'to buy', 'not to buy' or 'no decision can be reached'. However, for customers to evaluate their decision-making journeys, there is another crucial part of their experience, which is the time consumed. Literature in customer experience has suggested that customers tend to evaluate their service experiences differently under time pressure (Cian et al., 2015). However, little has addressed what the nature of this time pressure is (Bazerman and Malhorta, 2006), or where this time pressure comes from (Fernando and Jackson, 2006). Is, for example, the source of this time pressure the busy everyday lifestyle as part of the external environment or something related to customers' internal factors? (Shove, 2010).

Additionally, the results of this examination will be geometrically demonstrated to provide a strong connection to the concept of information overload (Solomon et al., 2012). The geometrical method is following the third theoretical foundation – spacetime diagram in Minkowski's perspective on the theory of special relativity (Dainton, 2016).

Therefore, this thesis proposes the first general study objective, which will split into two specific research objectives. They are:

Study objective 1. To explore the relationships between mobile retail application function usage, the probability of reaching a decision, and the time consumption of the decision-making process.

This is split into two research objectives:

> Research Objective 1 (RO1). To develop a time-related analytical approach for measuring and analysing consumers' behavioural data on mobile retail applications.

> Research Objective 2 (RO2). To explore the relationship between the usage, the time consumption and the results of consumer decision-making process using the method developed in RO1.

6.2.2 Research Objective 3 & 4

According to Prospect Theory, consumers weigh the actual probability of reaching a decision and their predicted probability of reaching a decision differently (Kahneman and Tversky, 1979, 1992; Gonzalez and Wu, 1999). This difference is influential to the ultimate evaluation of the service quality and the customer experience on mobile retail applications (Grönroos, 2012). The Theory of Planned Behaviour (Ajzen, 1991), another theoretical foundation, suggests that a consumers' control beliefs mediate information processing during a decision-making process (Ritter and Walter, 2012). More importantly, consumers generate those control beliefs prior to their actual actions. The control beliefs of a consumer are functioning in such a way that consumers predict that they can maximise the probability of reaching a decision (Homburg et al., 2006). Once a consumer rationally decides his/her next move of searching, receiving and processing information on mobile applications, their control beliefs become actual control, which impacts their actual behaviours (Shaw et al., 2000). This thesis sees the deliberating of control beliefs as a dynamic process and that the predicted usage value is constantly impacting the result of this deliberation (Greifeneder et al., 2011). This dynamic and value oriented view urges this thesis to conduct an examination of how consumers predict the value that they will perceive from using a mobile retail application. The construct of Customer Perceived Value offers a very capable research lens suggesting, first, a beneficial and sacrificial view for examining value creation (Sanfey et al., 2003; Woodall, 2003); second, an interactive perspective for analysing value co-creation with the parties involved identified (Chakravarti et al., 2006); and finally, the role of the focal consumer in all the interactions between them and other parties (Grönroos, 2012).

Therefore, this thesis proposes a further general study objective. Similar to the first general study objective, two specific research objectives are formulated to ensure the general one can be achieved. They are

Study objective 2. To explore the role of User Control on how consumers believe they should perform their decision-making in the predicted value proposition of mobile service.

This is further split into two research objectives:

Research Objective 3 (RO3). To develop a conceptual model as one perspective of understanding the predicted value proposition on mobile service channels.

Research Objective 4 (RO4). To test the conceptual model from RO3 for exploring the role of User Control in the final testing result – the structural model.

6.2.3 Research Objective 5

When the first four research objectives have been achieved, as suggested by Prospect Theory and the Theory of Planned Behaviour, a comparison between consumers' predicted value of using mobile retail application and their actual perceived value is to be conducted. This task is related to the probability weighting concept in the first theoretical foundation – Prospect Theory (Kahneman and Tversky, 1979, 1992), and the difference between consumers' control beliefs and actual control in the second theoretical foundation – the Theory of Planned Behaviour (Ajzen, 1991, 2006). Specifically, this theoretical discussion will generate practical suggestions for mobile retail application design.

Therefore, the third general study objective, and at the same time research objective 5, is:

Study objective 3

Research Objective 5 (RO5). To offer suggestions on mobile retail application design to enhance customer perceived value generation.

6.2.4 Where Objectives Will Be Pursued

Sub-objectives RO1 and RO3 will be pursued via a process of theory development in the context of the chapter on Research Methodology (Chapter 7).

Sub-objectives RO2 and RO5 will be pursued via empirical research reported in Results Chapters 8 and 9.

Objective RO5 will be pursued as a matter of Discussion in Chapter 10.

6.3 Conceptual Framework Discussion

To address the issues pursued in all five research objectives, the conceptual framework of this thesis is presented in figure 6.1.

First of all, beginning with the most fundamental issue of this thesis – the consumer decision-making process - this thesis sees this as a form of general decision-making (Chudry et al., 2011). The major difference between general decision-making and consumer decision-making is that consumer decision-making has a specific context which, in this thesis, is making fast moving consumer good purchase decisions on a mobile retail application (Ho et al., 2006; Moran, 2012). Therefore, to guide the development of this thesis a conceptual framework is developed, which, later on, is used as the research framework.

After the review of decision-making theories and consumer decision-making models, the work in behavioural economic realm suggests that a decision-making process is a process whereby the decision maker needs rationally to consider how much value can be created out of the final decision (Loewenstein, 1999; Fox and Clemen, 2005). Meanwhile, the decision maker also needs to consider the likelihood that an ideal outcome can be achieved (Abdellaoui, 2000). These two parts of a decision-making are determined as value assessment and probability assessment (Wells et al., 1997).
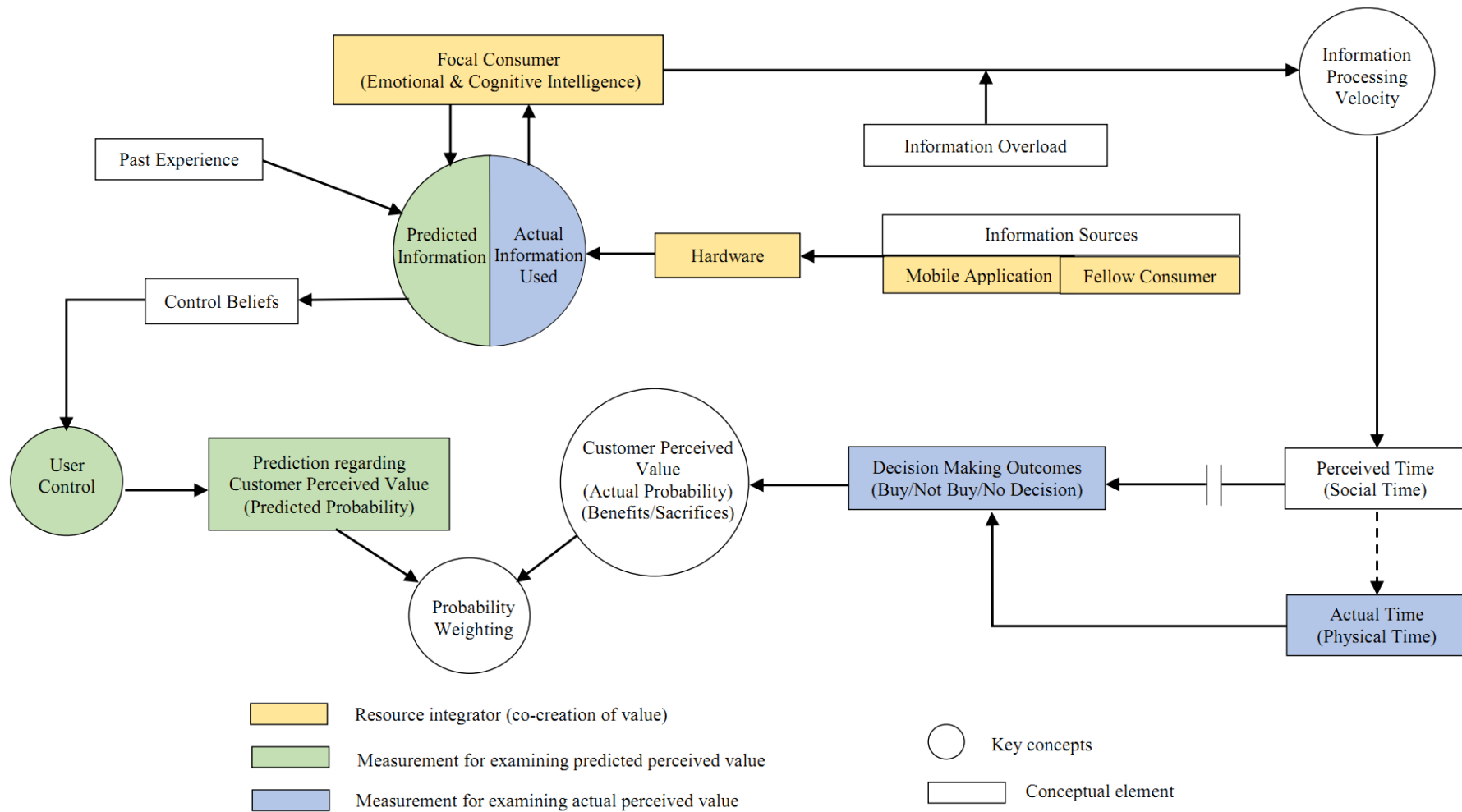
Figure 6.1 Conceptual Framework of this thesis

As the first theoretical foundation - Prospect Theory - suggests, four specific elements (reference dependency, diminishing sensitivity, loss aversion and probability weighting) are connected and all have their own roles (Tversky and Kahneman, 1979, 1992). But, probability weighting, as the most distinctive element when comparing Prospect Theory to other decision-making models (Gonzalez and Wu, 1999), suggests that a difference exists between the actual probability of reaching the expected decision and how decision makers are evaluating what they believe the probability will be in the future (Abdellaoui, 2000).

In other words, the decision maker's behaviour is determined by two types of probability evaluation: 1) the predicted probability evaluating that decides 'what to do' next in a decision-making process, or 'not to do' anything to end a decision-making process, and 2) the actual probability evaluating that happens after knowing the final outcome of a decision-making process (Glöckner and Betsch, 2008). If the predicted probability exceeds the actual probability, the decision maker will consider using this service as a *loss* of value; if the actual probability is underestimated, the decision maker will perceive a value *gain* (Koszegi and Rabin, 2007, 2009).

The importance of probability weighting in decision-making underpins the basic structure of the conceptual framework; that is, when a consumer is performing a decision-making process, there are two decision-making processes that are occurring. One is the actual decision-making process when the consumer is processing the actual information in front of him/her, consuming actual time (internally the social time and externally the physical time) and evaluating the actual probability of reaching the decision as the value perceived. The other one is the predicted decision-making process, where consumer uses his/her previous experience to predict what information they would need to process, how the process should proceed to maximise the likelihood of reaching a decision (in terms of control, the sequence to maximise the efficiency of time consumption), and finally to evaluate this predicted probability.

In the conceptual framework (Figure 6.1), the predicted decision-making process is highlighted on the left side and the actual decision-making process is on the right. Based on the discussion above, the three measurements needed for examining the predicted decision-making process are: Predicted Information (what information should be

processed), User Control (consumers' control over the sequence and timing of processing information) and Predicted Probability. Also on the left side, the information source of Predicted Information is the focal consumer (decision maker) with his/her previous experience. The purpose of this predicting behaviour is, as suggested in the Theory of Planned Behaviour via the elements of 'control beliefs', to maximise the likelihood to reaching an expected outcome.

As stated in the central research question of this thesis, 'when using a mobile retail application and attempting to make a purchase decision, what information-processing factors impact the time consumed, and how this elapsed time impacts the probability of actually reaching a decision?', the three main issues are the information that was processed, the time that was consumed and the final result. The conceptual framework identifies the appropriate measurements for this relationship testing.

Beginning with identifying the information factors, it adopts Grönroos' (2012) point of view on resource integrators (four parties: focal consumer, fellow consumer, mobile application (proxy for contact employee activity) and hardware (proxy for physical environment), see section 5.2.4) to demonstrate the parties that are involved in the value co-creation process on mobile service channels. After receiving the information displayed on a mobile hardware, a consumer starts to process them with both his/her cognitive intelligence and emotional intelligence (Kim and Gupta, 2012). The involvement of a piece of information to a decision-making process is decided by the factor whether the decision maker consumed his/her information processing capacity to process it (Dhar and Gorlin, 2013), rather than the relevance/importance of the information (Hogan et al., 2004). In other words, once a piece of information is processed by a customer, it influences the final outcome, given it has caused consumption of the decision maker's information processing capacity. On a mobile retail application, information is either from the service provider (via the application) or via fellow customers (as word-of-mouth, represented by recommendations and reviews). All information displayed on the screen should be considered as being pertinent to the value co-creation process taking place between the different parties. This information, therefore, can be externally directly measured.

When identifying the measurements for understanding the time consumption of a decision-making process, this thesis recognises that the most appropriate time measurement is the

social time consumption, rather than consumption of either physical time or natural time (McDonald, 1994; Green, 2002). The reason is, as suggested in the Theory of Planned Behaviour, that individual factors and social factors produce strong influences on decision-making behaviour (Ajzen, 1991) and impact how a consumer perceives time consumption within his/her frame of reference. Thus, to accurately measure a decision-making process on time dimension it is necessary to somehow (directly or indirectly) measure the consumers' social time perceiving process.

A consumers' cognitive intelligence and emotional intelligence are important social and individual factors, and the combination of them represents a consumers' capacity to process information (Lucian and Farias, 2009). This thesis considers that the changing process of a consumers' information processing capacity is the same as the social time consuming process. The beginning point of these processes is when a consumers' information processing capacity is at its maximum level; that is, when the consumer has not processed any actual information for his/her decision-making process. The ending point is when a consumer runs out of his/her information process capacity.

Those two points are not only coincident in social time perceiving process and information processing capacity changing process, but also in the information process velocity changing process. With the same beginning point, the end point can be also seen as a consumers' short-term memory and the consumers' long-term memory cannot exchange information anymore in a single continuous decision-making process (Szmigin, 2014). In other words, consumers' information processing velocity (for the current decision-making process) reaches zero, and this consumer will not be able to internally process any information or externally request any new information. Thus, a relationship between factors internal to the customer and external measurements has been established. Utilising an information processing velocity point of view (4.3.3), this thesis is able to indirectly measure consumers' internal process of consuming social time, as well as use the external temporal measurement (physical time) as the proxy of the internal perceived time (social time).

In order to understand the result of a decision-making process, it must first understand the customer perceived value each of the three outcomes is representing. As indicated in the conceptual framework, the three recognised outcomes are 1) a 'to buy' a product decision;

2) a 'not to buy' any product decision; and 3) 'no decision' can be made after spending time on a decision-making process. From a customer's perspective, both a 'to buy' and a 'not to buy' decisions are representing his/her appreciation for the information attributes and service quality of a decision-making process (Ajzen, 1991; Woodall, 2003). In short, a clear decision (either 'to buy' or 'not to buy') represents the benefits of engaging a decision-making process. On the other hand, in this thesis, it is considered as no benefits when 'no decision' can be made. It is acknowledged that, in a 'no decision' situation, a customer may perceive a variety of benefits, for example, increase of knowledge of a product category (Adomavicius and Tuzhilin, 2005) or entertainment benefits (De Marez and Verleye, 2004), however, based on the customer perceived value definition framework and its discussion in Section 5.3.3, those benefits are not taken into consideration here. For all three situations mentioned above, the major sacrifice is the social time consumption (Brannen and Nilsen, 2002), which is representing the expending of cognitive and emotional efforts in pursuit of a confident purchase decision.

A consumer will consider the trade-offs between the benefits and the sacrifices he/she committed in a decision-making process to evaluate the ultimate value (Woodruff and Gardial, 1996; Vargo and Lusch, 2008). However, it has been argued in Chapter 4, that social time, as the sacrifice, cannot be accurately externally measured. Thus, this thesis is not aiming to provide a normative theory of how this trade-offs calculation is performed, but, rather directs the research design to explore the dynamic relationship between the benefits (a clear and confident decision) and the sacrifice (cognitive and emotional efforts represented by the social time consumption, and physical time is the proxy of social time). With a deeper understanding of this relationship, an appropriate mobile application design can help the customers better control their decision-making processes, to achieve a higher level of customer satisfaction (Etkin et al., 2015).

Figure 6.2 below demonstrates the understanding of the actual decision-making process, the three main factors that need to be measured and other five processes that are synchronising with the actual decision-making process. This synchronisation understanding is guiding this thesis to identify an appropriate analytical method for examining the actual decision-making process.

In the next chapter, for achieving all five research objectives, the justifications for the research designed are provided with great detail, starting from the philosophical understandings of consumer behaviour on mobile retail application to the practical research methods adopted. This will also include theoretical understandings of key concepts involved in the research objectives (RO1 and RO3) to the identification of data sources, data capture methods and data analyse techniques.
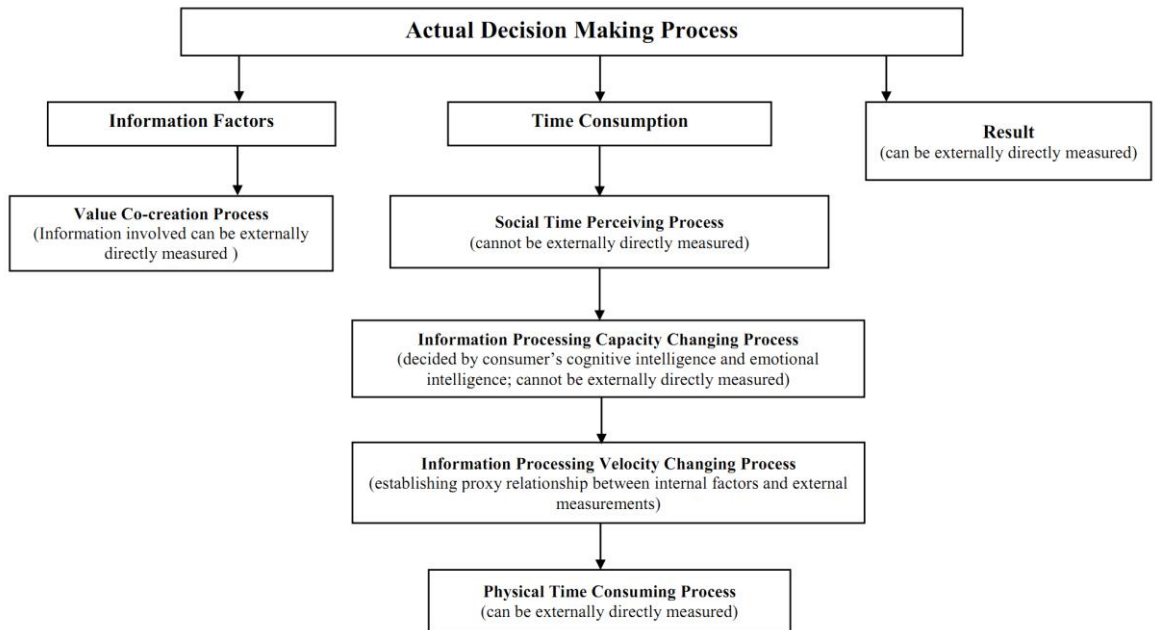
Figure 6.2 Understanding of the actual decision-making process and other five synchronising processes for identifying measurements.

Chapter 7 Research Methodology

7.1 Introduction

Previous chapters have set up the research scene for this thesis to identify: 1) how time consumption and the success rate of decision-making processes can be related to providing usage value of mobile channel services in the research rationale section; 2) how the time consumption for rational and emotional interactions of information impacts customer perceived value in the literature review section; and 3) why User Control is proposed to play a mediator role in the mobile channel service value proposition in the conceptual framework section. Given research that aims and research objectives have been highlighted, this leads to a discussion of how to link the theoretical foundations and the methodological issues to design a reliable and valid fieldwork plan. This chapter discusses research philosophies, methodological considerations, research approaches, data collection methods and analytical techniques, in the field of marketing and, more broadly, social sciences research. For the current research, this chapter provides justification for the selections on the above issues.

This thesis aims to investigate the usage value proposition of mobile service channels. The key question is how consumers value the performance of the service channels (Gaski, 2008). When consumers are evaluating their experience of using mobile retail applications, do they solely focus on the performance of the service platform, or, do they also take into account how well they and the service platform work together? And, regarding performance, what are its indicators? Are they quantifiable, as surely the role of a consumer behaviour researcher is to find a way of measuring what is in people's minds? The understanding of those questions is, not only impacting but also challenging the selection of the research methodology and research methods.

As the conceptual model shows in the previous chapter, the value proposition needs to be theoretically tested, to confirm or reject the model. From a practical perspective, also as mentioned previously, the customer perceived value concept is used as the research lens. Time consumption and the final result of purchase decision-making processes are vital indicators of customer perceived value on mobile service channels. All the mobile retail application functions that have been used during a decision-making process need to be collected and analysed. A particular method for this purpose needs to be identified and

proper implementation of that method requires further discussion and justification. Therefore, since both theoretical testing and practical investigating are conducted to fulfil the research aim and objectives, two separate studies - guided by the same conceptual model but from two different perspectives - are designed to offer insightful understandings of this newly and quickly developing marketing area.

Given this thesis is focusing on motions in mental space within different temporal frames of reference, it might be possible to use one element from Einstein's Special Theory of Relativity to enlighten the theoretical development of this thesis, but applied from a philosophical, rather than physical or mathematic perspective.

In Newtonian physics and philosophy, two systems are predicted to have the same physical time rates. That is, they are able to be located on the same time frame of reference. This holds even if two identical systems are in relatively constant motion with respect to each other. For example, there are two identical clocks running on two systems that have different speeds, one is running in a stationary laboratory on earth, the other is running in a spaceship travelling at very high speed between two planets in the Milky Way. With classical physics, those two clocks should be running at the same time rate as they are two identical time measurement systems, since all objects in the same space should share the same frame of reference. The Special Theory of Relativity, however, contradicts classical physics by predicting that the rate of a specific time system varies with its velocity, its motion in space. If observe the fast moving clock on the spaceship from the laboratory on earth, since the earth has a much slower velocity relative to the spaceship, the clock on the spaceship should run slower than on the clock on the earth. If observe the stationary clock in the laboratory from the spaceship, the clock in the lab should run faster. Therefore, the greater a system's velocity, the slower its internal processes go, and the less time is internally consumed. And for all systems in the reality, the maximum possible speed is the speed of light. When a system reaches the speed of light, the internal processes in that system would stop completely, which grants the system the state of immortality.

7.2 Research Approach

Designing a programme of research requires a deep understanding of the nature of research problems, and the knowledge of different research methods and techniques. In this section, both philosophical and pragmatic justifications of the methods selection are provided, with

strong connections between them. After doing this, the researcher will explain how the fieldwork for this project was managed, including collecting data, analysing and interpreting data, and drawing warranted conclusions on the results (Harrison and Reilly, 2011). The methodological discussion not only builds a solid foundation of research reliability and validity, but can also improve the depth of research findings and its industrial implementation potential.

7.2.1 Research Philosophy

Research philosophy is how the researcher understands issues such as how the world is perceived and how to obtain the knowledge for understanding the world. Those issues inevitably influence the way a researcher designs and conducts a research. Ontology and epistemology are the starting points for researchers to show how they view the world (Gelo et al., 2008). More specifically, when it comes to the study of consumer behaviour, it is important to clarify whether the truth exists internally in research objects' and the researchers' mind. Alternatively, the theories and reasons behind consumer behaviour exist outside their minds, which can be measured by the researcher, consumers only need to offer their data, to test the researcher's proposition (Bryman and Bell, 2003). With researcher's different understandings of the nature of reality, different approaches are chosen to fulfil their research aims and objectives.

7.2.2 Ontology

Ontology is the philosophical issue concerning the nature of the world and the reality. It raises questions to every researcher, whether reality exists and functions inside a human's mind or outside the mind (Malhotra and Birks, 2007). It can be separated into two perspectives, if a researcher accepts that reality is a social construction, created with individual perceptions and experiences, and that individual has his/her unique position of understanding the world, this researcher accepts the ontological position of subjectivism (Neuman, 2009). If a researcher accepts that reality is an external existence outside of any individual's mind, and no individual perceptions or experiences can alter the law or the theory behind social phenomena, this researcher accepts objectivism as his/her ontological position (Harrison and Reilly, 2011).

7.2.2.1 Subjectivism

Subjectivists view social phenomena as the creations of individual perceptions and experiences. Those perceptions and experiences are continually revised and developed

through the process of social interactions (Saunders et al., 2009). Subjectivism is often associated with social constructionism, which views the world as phenomenologically determined. Individuals who are acting in their environment have different interpretations of the situation or position they are at, and consequently have different choices of responding from their own perspectives. The reality perceived by one individual in an organisation is separated from the situations other social actors believe they are at (Taylor et al., 2015). Also, since every social actor has their unique position in the social structure and they are continuously interacting with each other, the structure is never stable, and is changed when the interaction occurs. Therefore, subjectivists believe there is no social entity maintains unchanged, and understanding of the social construction is constantly evolving as a result of experiences (Leech and Onwuegbuzie, 2009).

7.2.2.2 Objectivism

This philosophical position holds that reality exists externally to social actors. The reality is out the control of any individual. The meaning of reality is universal. Individuals are learning, and consequently acting, throughout their interactions in society (Hussey and Hussey, 1997). The Society maintains stability with its basic rules and scientific laws and the individual keeps learning from a faction to another faction of the society. The learning process could be personal, which means after the social actors personally experienced a social event, they started to understand it. It could also be indirect, as they understand the event through other individual's factual information (Silverman, 2011). Therefore, the understanding of reality is objective and unbiased. People have different understandings of reality because they obtained different pieces of information as their learning materials. Reality itself never changes; it waits for people to discover more of it (Harrison and Reilly, 2011).

The following table (Table 7.1) highlights key differences between objective and subjective perspectives.

Objective Perspective	Subjectivist Perspective
Independence	Interaction
The observer is independent of what is being observed.	The observer interacts with subject being observed.
Value-freedom	Value-laden
The choice of what to study, and how to study it, can be determined by objective criteria rather than by human beliefs and interests.	Inherent biasness in the choice of what to study, and how to study it as researchers are driven by their own interests, beliefs, skills, and values.
Deduction Method	Induction method
Science proceeds through a process of hypothesising fundamental laws and then deducing what kinds of observations will demonstrate the truth or falsity of these hypotheses.	Develop ideas through induction from evidence; mutual simultaneous shaping of factors.
Operationalisation-quantitative methods	Operationalisation-qualitative methods
Concepts need to be operationalised in a way which enables facts to be measured quantitatively; static design – categories isolated before study.	Qualitative methods – small samples investigated in depth or over time; emerging design – categories identified during research process.
Generalisation	Generalisation
In order to be able to generalise about regularities in human and social behaviour it is necessary to select samples of sufficient size; aim of generalisations is to lead to prediction, explanation and understanding.	Everything is contextual; patterns identified – theories then developed for understanding.

Table 7.1. Key Research Implications of the Subjective and Objective Perspective
(Saunders et al., 2009; Harrison and Reilly, 2011)

7.2.3 Epistemology

Ontology embodies the relationship between reality and the people, whereas epistemology is the way used by people to understand and discover the reality (Tan, 2010). Epistemology establishes the relationship between knowledge and researcher, it concerns how knowledge should be investigated, developed and understood. Mainly, there are two epistemological paradigms, which are interpretivism and positivism (Gelo et al., 2008). On the one hand, interpretivism is associated with subjectivism in that if reality exists only when humans perceive it, the best way of learning it is to collect data from those who have deep insights into the reality or have experienced that reality (Hackley, 2003). On the other hand, positivism is associated with objectivism in regards that reality exists independent of human observations or knowledge and individuals are only following the natural laws when acting (Saunders et al., 2009). There are other epistemological positions that can be employed when designing research, for instance, critical realism. They are all related to the two fundamental epistemologies, interpretivism and positivism in certain ways. Key epistemological positions will be discussed in more detail below.

7.2.3.1 Interpretivism

Interpretivism is used to stand for the epistemological assumption that reality is multiple and depends upon individual situations and understandings of meanings (Bryman and Bell, 2003). Thus, the multiple reality is difficult to interpret in a fixed research system. Interpretivists avoid rigid research structures and adopt more flexible research settings. They try to make sense of what is perceived, by the research subjects, as part of their reality (Hackley, 2003). An interpretivist researcher needs to have prior insights of the research context but remains open to new knowledge with the assistance from informants. Thus, the goal of an interpretivist research is to understand the meanings in human behaviour rather than testing hypotheses of relationships between causes and effects (Malhotra and Birks, 2007).

Another reason for interpretivism to be considered an insightful epistemological position is, unless the objects are observed in the natural scientific area (e.g. celestial bodies in the universe), human beings tend to change their behaviours when they know they are under observation (Collins, 1984). This challenges the reliability and validity of social science research because outcomes are based upon data that have been deliberately altered by people (Saunders et al., 2009).

However, while interpretive research is recognised for providing more contextual depth than positivist research, issues regarding validity, reliability and generalisability are often brought up as the main criticisms. The following table compares and contrasts topics around positivism and interpretivism (see Table 7.2)

Ontology	Positivist	Interpretivist
Nature of 'being'/ nature of the world	Have direct access to real world	No direct access to real world
Reality	Single external reality	No single external reality
Epistemology		
'Grounds' of knowledge/ relationship between reality and research	Possible to obtain hard, secure objective knowledge	Understood through 'perceived' knowledge
	Research focus on generalisation and abstraction	Research focuses on the specific and concrete
	Thought governed by hypotheses and stated theories	Seeking to understand specific context
Methodology		
Focus of research	Concentrates on description and explanation	Concentrates on understanding and interpretation
Role of the researcher	Detached, external observer	Researchers want to experience what they are studying
	Clear distinction between reason and feeling	Allow feeling and reason to govern actions
	Aim to discover external reality rather than creating the object of study	Partially create what is studied, the meaning of phenomena
	Strive to use rational, consistent, verbal, logical approach	Use of pre-understanding is important
	Seek to maintain clear distinction between facts and value judgments	Distinction between facts and value judgments less clear
	Distinction between science and personal experience	Accept influence from both science and personal experience
Techniques used by researcher	Formalised statistical and mathematical methods predominant	Primarily non-quantitative

Table 7.2. Comparison and contrast between positivist and interpretivist perspectives.
(Carson et al., 2001, p. 6)

7.2.3.2 Positivism

Positivists believe that reality can and should be measured and analysed with the methods of the natural sciences. They also believe that social scientists should try to quantify every observation and analyse the reality in a quantitative fashion (Harrison and Reilly, 2011). Positivism encompasses a cluster of notions, including, reality and truth can be settled in a proposition, and the purpose of a research is to figure out whether a proposition can be used to predict human behaviours (Leech and Onwuegbuzie, 2009). The reality is said to exist externally and can be measured using objective methods, e.g. mathematical and statistical methods. Research participants are parts of the worldly objects that are following the same objective proposition (Saunders et al., 2009).

In the positivist view, theories should be tested against the observations (Carson et al., 2001). More importantly, when testing those theories, it should apply the methods of the natural sciences. Positivistic research has the advantages that, firstly, the theory that is tested and validated in positivistic research can be generalised to a larger population. Secondly, data collection and analysis is highly structured through a system that employs quantitative methods (Saunders et al., 2009). Thirdly, it provides high reliability and validity by using mathematical tools and statistical techniques. However, it has the disadvantages that, data collection is limited to what is observable. In addition, research may overlook social phenomena, since it is focusing on hypothesis testing rather than theory generating (Silverman, 2011).

7.2.3.3 Critical Realism

Realism is another epistemological position, which assumes that objects exist independent of human minds, and the natural scientific approach should be applied to develop knowledge and understanding of the world (Harrison and Reilly, 2011).

There is growing interest in multiple scientific disciplines in researching real problems from a philosophical position of critical realism (Mingers, 2006). Critical realism focuses on offering a robust research framework in order to gain a better understanding of the meanings provided by a variety of research methods. It offers attractive solutions to the research problems associated with both positivist and constructivist philosophies of science, particularly in areas focusing on social change (Pratschke, 2003).

Critical realists insist on the possibility of employing rival theories to develop their understanding of the reality (Olsen and Morgan, 2005). By identifying the gaps in a generative mechanism, an additional mechanism at a more fundamental level can be used to explain phenomena, including human behaviours and interactions. Generative mechanisms are often unobservable entities and processes, critical realists, however, believe that the hypotheses about these mechanisms can be evaluated by the investigation of observable measurements (Mingers, 2000). Thus, between the rival theories, the one which can explain a wider range of phenomena has higher explanatory power, or the rival theories need the assistance of that more fundamental theory to generate the largest explanatory power.

Traditionally, a number of benefits of employing critical realism in research are: firstly, it defends a realist ontology that reality is existing independently of our knowledge. It defends against positivism that would limit how reality can be empirically observed and measured (Ulrich, 2003). It also defends against the constructivism that would limit the reality to only human knowledge. Second of all, critical realism recognises an epistemological position that a human's reality learning process is always mediated by perceptual and theatrical lenses (Dobson, 2001). Thirdly, critical realism accepts different types of knowledge and requires a range of different research methodologies and methods to accommodate the learning processes towards those different types of knowledge (Byrne, 2004).

Critical realism was developed initially in the debates between empiricist and idealist views of science (Sayer, 2000). The starting point is to argue that science is a combination of both recording conjunctions of observable events and a human's view of objects and social structures (Olsen and Morgan, 2005). Critical realism, with its realist character, accepts that social phenomena are inherently different from material phenomena. However, social phenomena are still driven by the existence of mechanisms, by the recognition of the relativity of knowledge and the methodology that generate hypotheses to explain causal mechanisms (Ron, 2002).

The methodological implications of critical realism have led to a different understanding of concepts of reliability, validity and inference quality. Critical realism does not commit to a single research method (Sayer, 2000). A researcher should engage with different

approaches to enable communication between statistical descriptions of the population and deep understanding behind social phenomena in order to uncover mechanisms in reality (Mingers, 2006).

7.2.4 Research Approaches

Depending on how much the researcher understands and develops the research, two main research approaches could be utilised. They are the inductive approach for developing theory, and the deductive approach for testing the theory proposed by the researcher.

7.2.4.1 Inductive Approach and Qualitative Methods

An inductive approach accepts the philosophical position of subjectivism and interpretivism, which means the answers to those inductive research questions are only in the research object's mind (Harrison and Reilly, 2011). The researcher should not employ any prior theories to understand the data but properly generate new theory from what they observed (Gelo et al., 2008).

More specifically, from the point of view of the inductive approach, that understanding should be from that data or that understanding should be derived via new theory based upon new data, rather than via existing theory developed from earlier data (Leech and Onwuegbuzie, 2009). Qualitative methods serve this purpose the best. Qualitative methods place emphasis upon the depth of data, which gives a solid foundation for the construction and development of new theory (Bryman and Bell, 2007). Therefore, in-depth interviews and focus group observations are popular methods of inductive data collection.

7.2.4.2 Deductive Approach and Quantitative Method

The deductive method is aligned with the ontological position of objectivism and the epistemological position of positivism and realism. It seeks to quantify observations and test the theory developed by the researcher (Malhotra and Birks, 2007). Positivist and realist positions adopt objectivism and believe that knowledge exists independently outside a human's mind. They employ natural scientific methods, e.g. mathematical and statistical techniques, throughout the whole research (Sliverman, 2011). A researcher who embraces a deductive approach uses established a theory for generating propositions that are subsequently tested.

7.2.5 Research Strategy and Context

This thesis investigates both consumer behaviours when trying to make purchase decisions on mobile retail applications as well as consumer perceptions of using mobile retail applications. For the first part, it focuses on formulating constructs to represent all the elements in the proposed structural model, then uses statistical analysis techniques to determine their relationships. For the second part, it focuses on creating a hypothetical situation where participants perform their decision-making processes. This data is analysed using another statistical analytical method, survival analysis, to provide a deep understanding of the effect of using functions on a mobile retail application.

In order to make warranted inferences, this thesis took consideration of a number of research strategies, including ethnography, action research, survey research, case study research, archival/documentary research and experiment/simulation.

In the context of consumer behaviour research on mobile service channels, from a temporal perspective. This thesis chose to conduct a survey with a questionnaire that contains scale items that formulate constructs. These constructs represent key variables in the structural model. This variable-oriented strategy is used to produce statistical inferences capable of generating research outcomes to a much larger population. Secondly, this thesis also used Boots website data as the secondary data, to produce a crucial threshold on time dimension. Thus, for this purpose, a documentary research strategy is adopted. This is also a variable-oriented strategy based on data from a large population. Thirdly, when inviting participants to conduct decision-making processes on a mobile retail application, this thesis aims to create an environment to support this hypothetical setting, since participants are not actually purchasing anything from the website. A social practice simulation is utilised to facilitate survival data collection. Given that all the survival data, also, the behavioural data are quantified and traded as variables in the numeric form. Similar to the situations mentioned above, a variable-oriented research strategy was employed. Last but not least, since the secondary data are from the Boots website (and the decision-making process simulation was also conducted on the Boots website), this thesis is also conducting a case study on a single organisation's website. Despite the questionnaire items focusing on participant perceptions of their general usage of mobile service channels, which is not related to the Boots website, the other parts are both based on a single case scenario. Thus, a case-based strategy, where inferences are drawn from data that are generated in a single

case. In order to accomplish all the research objectives, both variable-oriented and case-based research strategies are used.

7.2.6 Justification of the Research Philosophy and Strategy

In the discussion of research methodology and methods, methodology embodies all the considerations regarding the researcher's understanding of the social phenomena that he/she is going to research. The term method refers to the specific data collection and analysis techniques required to answer all research questions and achieve the research objectives. Therefore, this section will explain and justify the adopted methodology and methods used in this thesis.

This section will suggest that the purpose of theory is to identify causation of observed events by identifying patterns in the empirical world and validating theoretical explanations of these observed patterns (Bryman and Bell, 2003). These empirical observations can indicate the underlying causation regarding how the user control factor influences customer perceived value in the context of mobile channel services. This thesis seeks to acquire behavioural data and to mathematically model the buying decision-making process on mobile applications for subsequent statistical analysis.

This thesis views reality from an ontological position of objectivism. That is, the data can be collected and analysed objectively to produce valid conclusions regarding the relationship between mobile retail application function usage and consumer decision-making process outcomes. Since a mobile retail application is an open platform where all parties and individuals share a common frame of reference (the physical time mechanism on mobile telecommunication networks), this thesis considers the interactive activities which occur on this public platform, the data collected with physical time marks attached, the employed statistical analysis technique and, finally, the theory this thesis can generate, are all part of external reality. Therefore, an objectivist ontological position is appropriate for this thesis.

As discussed in the literature review in chapter 2, section 2.6, this thesis begins with the understanding of three concepts of time: physical; social; and natural. Within the context of the consumer decision-making process, physical time, as the common frame of reference, and social time, as the individual frame of reference, are identified as the time dimensions

that this thesis designed to examine consumer behaviours on. The further discussion concludes that the physical time is part of the external reality, which is independent of consumer perceptions and knowledge. On the other hand, however, consumer perceptions of social time consumption is part of the internal reality that can be only perceived and understood by that specific consumer.

For the structural model testing part of this thesis, a questionnaire was used to collect data that could not be directly observed, including participant attitudes toward mobile retail applications and participant perceptions of time consumption on mobile retail applications, particularly when it is the social time consumption perception that is existing inside an individual participant's mind. This knowledge can only be learned with indirect observations. All data from the questionnaire are analysed with a number of statistical techniques, including Cronbach's Alpha test, Principle Component Analysis, Confirmatory Factor Analysis, SEM in AMOS and mediation testing in AMOS. The application of these statistical techniques ensures an acceptable level of reliability and validity of the related findings, and consequently ensures the findings can be applied to a much larger population.

Critical realism can help to resolve a number of philosophical problems in relation to the specification, assessment and interpretation of statistical models. Social scientists are increasingly aware of these issues (Olsen and Morgen, 2005; Mingers, 2006). It is therefore timely to reconsider how their concerns might be addressed within the framework of critical realism.

The attention to the most important issues raised by recent social scientists concentrates upon causal modelling approaches that use Structural Equation Modelling (Ulrich, 2003; Byrne, 2004). Debates concerning the relationship between statistics, theoretical models, structures and processes have particular significance for SEM practitioners. It doesn't mean that this thesis is going to privilege quantitative methods over qualitative methods. The choice of methodological approach should be dictated by the nature of the research problem rather than by the methodological preferences of the researcher.

From a critical realist's perspective, quantitative methods often have the issues of being worthless to reveal social mechanisms (Dobson, 2001), over simplistic by committing to reporting relationships between variables and misleading when trying to build knowledge

purely on numbers. The reason could be quantitative research fails to give adequate consideration to the complexity of social structures, which are part of reality (Malhotra and Birks, 2007; Tan, 2010). However, quantitative methods, statistical analysis in particular, could be compatible with critical realism, provided the statistical model has adequate explanatory power on theoretical hypotheses (Mingers, 2006).

Another issue is theories and concepts that are in linguistic form can be translated into mathematical form and vice versa, so that numeric variables can contain qualitative meaning about consumer behaviours, consumer attributes and understandings of particular events (Pratschke, 2003; Olsen and Morgan, 2005; Taylor et al., 2015). More specifically, when translating a theory that includes unobservable variables into a structural equation model, the validity of analysis results can be dependent when the assumptions made during this process have low sensitivity (Sayer, 2000; Ron, 2002). Lower assumption sensitivity can be achieved when providing those observable measurements higher social, spatial and temporal independence (Leech and Onwuegbuzie, 2009). Although the statistical structural models do not enhance the explanatory power of a theory, mathematical methods such as this can provide a higher level of theoretical clarity by testing possible explanations of social phenomena (Neuman, 2009). For example, in a structural model, a construct on the path between two variables represents an intermediate effect on the relationship between those two variables. With survival analysis physical time is measured. Both the survival analysis part and SEM part are justified on this basis.

Both inductive and deductive approaches are employed in three discrete phases of this thesis. Firstly, a major local retailer (Boots) provided secondary data for the purposes of analysis in this project. The data are produced by IBM Coremetrics and the datasets contain aggregate level data relating to consumer usage behaviour on the Boots website. This data is used to inductively develop a theory of average survival time on the Boots website (see section 5.4.1 for further detail). This outcome is used as the crucial temporal threshold for modifying survival data. Secondly, survival analysis is also used inductively to explore the relationships between mobile retail application function usages and the results of purchase decision-making processes. Finally, questionnaire data are used deductively to test the structural model by employing structural equation modelling in AMOS.

7.3. Research Methods and Instruments

As discussed in the research approach section, this thesis aims to investigate the relationship between the use-value of mobile retail applications and the time consumption of consumer purchase decision-making processes. The whole investigation is separated into two study elements. The first focuses on the practical perspective: customer perceived value is used as the research lens here. Consumers' behavioural data is used to measure all the key variables of decision-making processes, including all the functions and how many times those functions have been used during the process, the time consumption of the decision-making process and the final results of the process. Data is processed with survival analysis (argued via RO1 and analysed for RO2). Detailed information will be provided in following sections.

The second study focuses on testing a perceived value proposition model with a questionnaire. The development and discussion of the conceptual model are provided in Section 7.4.4. Survey data is analysed with validity testing and principle component analysis in SPSS and, confirmatory factor analysis and structural equation modelling in AMOS. The model is developed to satisfy RO3 and results of this study are analysed for RO4.

Combining both sets of results from these two studies, a number of suggestions are provided to the electronic retailing industry regarding mobile retail application design, which meets RO5.

The research design is demonstrated in Table 7.3. The relevant discussion regarding research objectives is provided before this in section 7.2.

| Research Objective | | Method | | Analysis | Outputs | |
		Data Collection	Research Instrument		Description	Location
RO1	To develop a time-related analytical approach for measuring and analysing consumers' behavioural data on mobile retail applications.	Theoretical discussion and development based on the literature		Interpretation of the literature/theory development	Model of consumer decision-making with respect to spacetime (for RO4)	Chapter 7
RO2	To explore the relationship between the usage, the time consumption and the results of consumer decision-making process using the method developed in RO1.	Data provided by Boots.com Division		Analysis of Boots web-site usage secondary data	Right-censoring data limit	Chapter 8
		Survey	Screen recording	Survival analysis	Coefficients related to mobile channel website function usage	Chapter 8
RO3	To develop a conceptual model as one perspective of understanding the predicted customer perceived value proposition of mobile service channels.	Theoretical discussion and development based on the literature		Interpretation of literature/theory development	1a. Setting of hypotheses for testing at RO2 1b. Development of conceptual model (for RO2) 1c. Review of trade-off relationships (for RO2)	Chapter 7
RO4	To test the conceptual model from RO3 for exploring the role of User Control in the final testing result – the structural model.	Survey	Questionnaire	Factor analysis	Provisional confirmation of latent constructs	Chapter 9
				Structural equation modelling (SEM) a). CFA b). Mediator testing	Statements regarding status of hypotheses	Chapter 9
RO5	To offer suggestions on mobile retail application design to enhance customer perceived value generation	Review and analysis of outputs, RO2 and RO4			Recommendations on mobile retail application design to enhance customer perceived value generation	Chapter 10

Table 7.3. Research Design

7.3.1 Survival Analysis

7.3.1.1 Philosophical Understanding of Consumer Decision-making Processes

In this section, based on the literature review of consumer decision-making processes and the spacetime philosophical understanding, this thesis speculates on the methodological application of a spacetime understanding on a decision-making process.

With the understanding of three time concepts in consumer research, and Einstein and Minkowski's work on spacetime (Lorentz et al., 1923; Lorentz et al., 1952; Saunders, 2002; Callender, 2010), this thesis marks an attempt to philosophically understand the phenomena of consumer decision-making processes on mobile retail applications. Offering insights regarding consumer behaviour on time dimension is also one of the academic contributions. More specifically, in this thesis a decision-making process is considered as a mental motion, or a combination of both cognitive process and an emotional process. Three different time concepts are all involved in this decision-making process. Physical time is the external length of a consumer decision-making process. It is the duration of how long the mobile networking infrastructure and the handheld mobile device is being used to conduct a decision-making process, and it is what this thesis can measure externally. The social time and natural time is combined representing a subject's time perception of a mobile application use.

This cannot be measured externally by the researcher, but it offers an indicator when decision-making reaches an ending point. The indicator is the velocity of a consumer's interaction, the actual behaviour of using different functions on a mobile retail application. The length is the beginning of a decision-making process, to the moment a consumer's velocity of processing and deliberating information becomes, or very close to, zero, which is the result of both cognitive and emotional process of receiving external forces during the decision-making process. Those external forces are the usage value of interacting with different parties involved in mobile retail applications. Their influence on the velocity could be either negative or positive. Note that the velocity is representing consumers' actual behaviour, not their ultimate evaluation of perceived value. Since with different consumers, the mental distance from a point of recognising wants and needs to a purchase decision varies, the measurement of velocity can shift the focus on the mental distance, to the time consumption and the velocity of a decision-making process.

Moreover, when setting up the frame of reference, Minkowski Spacetime diagram is useful to geometrically demonstrate the consumer decision-making process (See Figure 7.1).
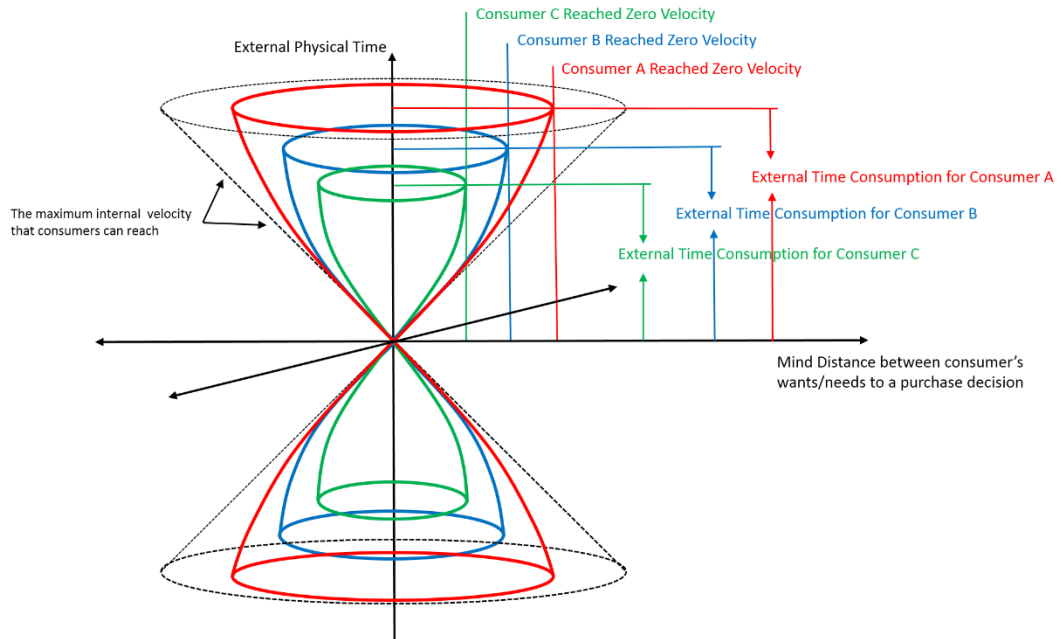
Figure 7.1 A geometrical demonstration of the consumer decision-making process with spacetime diagram

As an example, the spacetime diagram above geometrically demonstrates three consumer decision-making processes for consumer A, B and C. Similar to Minkowski's spacetime diagram, the light cone represents the maximum velocity in that frame of reference. The difference is, in Minkowski's theory, the maximum velocity is actually the speed of light. Since the speed of light is the maximum speed to any frame of reference in reality, this light cone of the speed of light represents the common frame of reference. In a consumer spacetime diagram, however, the maximum velocity light cone is representing an individual frame of reference. It is focusing on demonstrating the relative relationship between an individual's maximum velocity and the velocity at a point of physical time (Kidwell et al., 2008). For instance, three consumers have a different level of emotional intelligence and cognitive intelligence, which result in a different maximum capability to process information when they are trying to make decisions (Argan and Akyildiz, 2014; Cian et al., 2015). The three light cones (red, blue and green) represent their decision-making processes. As shown in the figure, consumer C reached zero velocity from his/her

maximum velocity first, followed by consumer B and finally consumer A. With the application of the consumer spacetime diagram, research can focus more on the information that was received and considered as the process during which this consumer's information processing velocity was dropping, rather than the quantity or the quality of the information that consumer needed to reach a decision: given that obtaining the latter measurements precisely is much more difficult than measuring the former variable accurately, the external length a decision-making process.

Another difference is, in Minkowski's spacetime diagram, that the time axis is part of the individual frame of reference. The time measurement is determined by the relative velocity of the moving system, and the observer inside this moving system can perceive his/her own perception of time. Further, in the consumer spacetime diagram the time axis is the common frame of reference, as it is the external, physical time consumption that is measured by an external mechanism that is being shared by different parties in the information exchange process (Schrift et al., 2011; Sela and Berger, 2012); for example, like a watch or an electronic timer.

Therefore, to adopt the consumer spacetime diagram in this marketing research, all frames of references need to be pre-determined and a frame transformation is required to make the spacetime diagram suitable to consumer behaviour research. In the original Minkowski Spacetime diagram (Figure 4.1), the common frame of reference is the speed of light, since it is the maximum speed of the external reality. The time axis is the internal frame of reference that can be only perceived by the observer that is involved in his/her moving system. In this marketing research, the common frame of reference is the external time measurement in reality, since all users and, hardware and software providers are sharing this reference frame.

The internal frame of reference is the maximum velocity the individual consumer is capable of processing in his/her decision-making process (Duhachek and Kelting, 2009). This maximum velocity is determined by the cognitive and emotional intelligence of a consumer, and it is considered not changeable during a single continuous decision-making process. Last but not least, consumers' wants and needs are their initial motivation to perform decision-making process, and customer perceived value is their reason to conduct various interactions with different parties on mobile retail applications.

Survival analysis is a statistical method for analysing data that contains key variables collected within a period of time and the occurrence of the event (Belot et al., 2010). The event is defined by the researcher, for instance, in medical research the event could be the death or recovery of a patient; in sociological research the event could be a marriage or divorce; and in business research the event could be the end of an online auction (Li et al., 2009) or adoption of new loyalty card (Demoulin and Zidda, 2009). Since this thesis is focusing on the consumer purchase decision-making process, the event refers to when a consumer reaches a decision at the end of a decision-making process. All the key variables are the software functions within a mobile retail application context that have been used during their purchase decision-making process.

7.3.1.2 Mathematical Understanding of Survival Analysis

In this thesis, survival analysis is used for examining the relationship between the value of variables, which are the functions used during the decision-making process, in terms of how likely they help a consumer to reach a decision after a certain amount of time (Park and Bradlow, 2005; Demoulin and Zidda, 2008).

To further explain how to build the bridge between survival time and variables, the hazard function is adopted:

$$h(t) = \frac{\text{Number of decision making processes reaching the beginning of interval time}}{\text{Number of decision making processes passing the interval width of time}}$$

This function can be used to interpret the risk of a decision-making process ending at a particular time point.

In order to describe the relationship between the values of variables, a parametric regression model is used to show the exponential distribution (Austin, 2012):

$$\log_e h_i(t) = \alpha + \beta_1 x_{i1} + \beta_2 x_{i2} + \cdots + \beta_k x_{ik}$$

Where ik is the indexes subjects, in this thesis, it represents different individual mobile application user;

$x_{i1},.......,x_{ik}$ are the values of the variables. In this thesis, they represent the functions that this particular user has used before the end of the data collection.

$\beta_1,.......,\beta_k$ are the coefficients or the parametric that shows how a specific function influences the final survival time, which is the mean output of this thesis.

The next step is using partial likelihood estimation of the Cox regression model to link back to the survival time (Crowther and Lambert, 2013), which can be observed from the data set. The Cox regression model is capable of simultaneously exploring the effects of multiple variables on the decision-making process result (Thiébaut and Bénichou, 2004). It is a widely adopted statistical technique for conducting survival analysis. Different from ordinary multiple regression, which can be used to investigate the relationship between a dependent variable and multiple independent variables, in Cox's methods of survival analysis, the dependent variable is the hazard function at a particular time point (Johnson et al., 2013).

Combining the survival time to the Cox regression function, the partial likelihood function is as follows:

$$\mathcal{L}_p = \prod_{i=1}^{K} \left[\frac{e^{\beta' \mathbf{x_i}}}{\sum_{j \in R(t_i)} e^{\beta' \mathbf{x_j}}} \right]^{\delta_i}$$

With corresponding log-likelihood function,

$$\log L_p = \sum_{i=1}^{K} \delta_i \left[\beta' \mathbf{x_i} - \log \sum_{j \in R(t_i)} e^{\beta' \mathbf{x_j}} \right]$$

where $R(t)$ includes those consumers who reach a decision at time t, when the purchase decision-making process was observed to have a result for consumer i, in other word, consumers for whom the decision-making process has not yet had a result or who have yet to be censored (Harrell, 2015).

δ is zero if the purchase decision-making process does not have a final result, (right-censored), and one if the decision-making process has a final conclusion (uncensored).

Finally, all the values of β will be given to interpret the importance of each function of a mobile retail application, in terms of increasing the probability that users can make decisions after a period of time (Austin, 2012).

7.3.1.3 Key Variables in Survival Data in the Context of Mobile e-tail Service Provision
As mentioned above, the research subject is consumers' purchase decision-making processes on mobile retail applications, which is the communicating platform for consumers to request and receive the information they need. When consumers are using mobile applications, the purpose could vary (Coelho and Henseler, 2012). However, in this thesis, as the data source, the user/consumer has been directed to make a decision of purchasing an item from one single product category.

More importantly, since this r thesis is focusing purely on the efficacy of the mobile service channels and not on the decision-making process of the consumer, all data should be captured within a single, discreet, online purchasing event. This is for two reasons: firstly, in a 'real-life' situation, consumers may well seek advice and guidance from sources other than the website when looking to make purchase decisions (Kim et al., 2012). For example, when a consumer is interested in one product and intends to seek out information about it, he/she may initiate the decision-making process on a mobile retail application, then have a discussion about the product with friends over several sessions, and finally reach the final decision of purchase later. In this hypothetical case, both mobile service channels and offline word-of-mouth channels contributed to the final decision. It would not be possible to rely on the consumer providing information on how much weight each communication channel holds.

Secondly, in the case above, it would be impossible to precisely capture the time consumption of that decision-making process. Without this crucial variable, survival analysis is not able to perform.

Therefore, the ideal data collection situation is that, all variables are captured in a single continuous decision-making process, so that consumers can focus on the website alone. All information must be received on one single mobile retail application and consumers need to clearly state the ultimate outcome of their decision-making event.

The outcomes of a visit to an e-tailing website is another vital variable. There are three different outcomes than can possibly arise on mobile service channels. The first kind would be 'a purchase decision', which is a decision to purchase a product. The second is 'a not purchase decision', which is a decision to clearly abandon the idea of buying anything in that particular product category during that particular event. This decision is also a natural decision based on the consumers' analysis of the information on mobile channels. Note that, in this case, received information is adequate to support the not purchase decision (for example, this product is clearly not what the consumer wants to buy). Therefore, very limited value is created for the company. The last kind is 'no decision reached'. The reason could be the lack of what that consumer believes is crucial information, or lack of the function that consumers can request the information they need. For instance, the consumer may want to look at the reviews from previous buyers but there are only two reviews or there is no 'review' button that consumers can tap on to obtain sufficient information. In this case, the consumer can still receive usage value from using mobile retail applications, but the usage value is not enough to support a decision to be made.

Last but not least, setting a right censoring limit will be necessary and that you will be using secondary data provided by Boots.com (the department responsible for the development and management of the Boots' retail website) to help achieve this. The right censoring limit will be discussed in great detail in section 6.3.

7.3.1.4 Screen Recording

In order to collect user' behavioural data on mobile retail applications, a screen recording platform was set up as the primary data collection instrument in this study.

An iPad was used to collect survival data. Participants were invited to use the iPad to visit the Boots website. Once they felt ready (they believed they were fully aware how to use all the functions on the Boots website to request and receive product information), they started to try to hypothetically make a purchase decision. After orally informing the researcher that they have completed one purchase decision-making process, they were asked to start the second one. Meanwhile, the researcher used a laptop to record all the screen actions on the iPad while the participants were engaged in their e-tailing activity. These two devices were wirelessly connected via a wireless network. 'AirServer' (www.airserver.com, 2015)

was used to mirror the iPad's screen on the laptop, whilst 'ScreenRecording' was used to video record the laptop screen.

By using the hardware and software simultaneously, all screen actions on the iPad were recorded onto the laptop in real time. These recordings captured both "survival time" (the length of the video) and "variables" (the functions that were used). When the participants were engaged in their decision-making process, they could choose from one of two researcher-determined product categories. They were also gently reminded that they could take as much as they wanted to make a decision. When they felt comfortable to end a decision-making process, they needed to tell the researcher what their decisions were, whether it was a 'purchase decision', 'a not purchase decision' or if they feel they were 'not able to make a decision'.

The screen recording data were subsequently manually converted, by the researcher, to fulfil the requirement of Survival Analysis in SPSS (See section 7.3.1.5).

7.3.1.5 Data Preparation for Survival Analysis
The screen recording data need to be processed before input into SPSS.

Firstly, the beginning and end of a decision-making process needed to be clearly identified, along with relevant outcomes. The beginning was the moment that the first function of the mobile retail application was used. The end was when participants told the researcher they were comfortable to end their decision-making process, and the researcher stopped the recording. The length of the video is the length of the decision-making process from beginning to end. The researcher was orally informed of the outcome, i.e. whether it was a purchasing decision, not purchasing decision, or that no decision could be made.

Additionally, the usage of the 9 key functions needs to be quantified from screen recording data. A demonstration of how those 9 functions can be considered to represent the constructs for consumer predicted value proposition will be provided, after those constructs are identified in later sections. It is also worth mentioning that the link between actual behavioural data and the development of the conceptual model are only theoretically linked. Due to ethical issues and financial considerations, participants were not making any financial transactions or providing sensitive personal information (bank account

information, credit/debit card information, delivery address, billing address, etc.) during data collection and all e-tailing events were purely simulated purchasing processes.

The video data was transferred to a hard-copy decision-making process Log (see Appendix D), with all functions recorded on the time axis. More specifically, a function is marked every time a participant uses it. Once data processing was complete, it counts how many times a function has been used in the whole decision-making process, or within a certain period of time relevant to the pursuit of the objectives of the research.

7.3.2 Structural Equation Modelling

Structural equation modelling (SEM) is frequently applied to assess new empirical theoretical proposals by marketing and business researchers (Henseler et al., 2009; Hwang et al., 2010; Hair et al., 2012). SEM is mainly employed for three purposes: path analysis, synthesis of variables and models, and estimating the parameters of a conceptual model (Reinartz et al., 2009). Therefore, SEM is a powerful research method for theory testing (Lopez et al., 2013). Although SEM can be used inductively for specifying a corresponding model, in this thesis, SEM is used solely for confirmatory modelling; in other words, testing the proposed conceptual model. A detailed discussion is provided in Section 9.5. Details of variables to be used in conducting the SEM are considered and shown below and hypotheses are set for testing relationships between them.

7.4 Hypotheses and Conceptual Model Development

7.4.1 Value Related Constructs Review

Customer perceived value has attracted significant attention from marketing academics and practitioners. Previous research classifies perceived value as a multidimensional construct, and this covers a range of problems, such as to identify the various dimensions of perceived value, the various antecedents of perceived value, and those mediators or moderators that affect the relationship between perceived value and other concepts. Table 7.4 highlights the various perceived value related variables (dimensions and antecedents) that have been developed and tested within academic literature on either electronic commerce research or mobile commerce research, the subject of this present thesis.

Author	Electronic Commerce Topic	Selected Constructs	Testing Results - Structural Model
Mirella Kleijnen, Ko de Ruyter, Martin Wetzels (2007)	Value creation in mobile service delivery and the moderating role of time consciousness	The authors develop a conceptual model that incorporates three benefits - Time Convenience, User Control and Service Compatibility - and two costs - Perceived Risks and Cognitive Effort - as antecedents of Perceived Value on the mobile service channel.	Time Convenience and User Control are positively related to Customer Perceived Value; Perceived Risks and Cognitive Effort are negatively impacting Value, whereas Service Compatibility has no effect.
Hee-Woong Kim, Hock Chuan Chan, Sumeet Gupta (2007)	Value-based Adoption of Mobile Internet	The authors develop a conceptual model including two benefits components – Usefulness and Enjoyment – and two Sacrifice components - Technicality and Perceived Fee – of Perceived Value.	Usefulness, Enjoyment and Technicality are positively related to Perceived Value, while Perceive Fee is negatively related to Perceived Value.
Heikki Karjaluoto, Chanaka Jayawardhena, Matti Leppaniemi, Minna Pihlström (2012)	How value and trust influence loyalty in wireless telecommunications industry	Function Value, Monetary Value, Emotional Value and Social Value are the four dimensions of consumers' Consumption Value. And Trust mediates the relationship between Perceived Value and Loyalty	Perceived Value and Loyalty are related, and their relationship is mediated by trust. Perceived Value and Trust are essential antecedents of Loyalty
Thomas Ritter, Achim Walter (2012)	The impact of relationship functions on customer-perceived relationship value	The Relationship Value is measured as perceived trade-off between benefits and sacrifice, two variables –Operation-related Relationship Functions and Change-related Relationship Functions - are antecedents of Customer Perceived Relationship Value; Customer Innovativeness is a mediator.	Usage of Operation-related Functions is positively related to Perceived Relationship Value, usage of Change-related Functions is negatively related to Relationship Value; and Customer Innovativeness is mediating the relationships above.
Dewi Tojib, Yelena Tsarenko (2012)	Post-adoption modelling of advanced mobile service use.	Three variables – Enjoyment, Ease of User and Time Convenience are proposed have positive relationships to Experiential Value, and Cognitive Evaluation produces mediation effect to those relationships.	Enjoyment, Ease of User and Time Convenience are positively related to Experiential Value

Young Hoon Kim, Dan J. Kim, Kathy Wachter (2013)	Mobile user engagement: engagement motivations, perceived value and satisfaction.	Utilitarian Perceived Value is identified as the motivation in Cognitive Stage and Affective Stage of user engagement, and Utilitarian Motivation, Social Motivation and Hedonic Motivation are influencing mobile users' evaluation of Utilitarian Perceived Value.	Utilitarian Motivations, Hedonic Motivation and Social Motivation are positively related to Perceived Value.
Roger Strom, Martin Vendel, John Bredican (2014)	A literature review on mobile marketing's value proposition for both consumers and retailers.	Mobile usage value is created by Independency of Time and Space, and Customised (on time) Service.	Consumers choose mobile channel service because of it deliver higher utilitarian value, such as efficiency, and time and location convenience.
Heikki Karjaluoto, Aarne Tollinen, Janne Pirttiniemi, Chanaka Jayawardhena (2014)	Behavioural intentions of B2B sales managers to user mobile customer relationship management system in their daily activities.	Perceived Reachability (capability to connect with others on the mobile channel) and Perceived Risk are linked to Mobile System Usage Intention.	Personal Innovativeness and Perceived Reachability have significant effects on Mobile Usage Intention
Ju-Young M.Kang, Jung Mee Mun, Kim K.P. Johnson (2015)	Downloading and usage intention toward mobile retail application	Time Convenience, Interactivity, Compatibility and Effort Expectancy are related to consumers' Affective Involvement and Cognitive Involvement, which is consequently related to Mobile Usage Intention.	Time Convenience, Compatibility and Effort Expectancy are the determinants of Cognitive Involvement.
Yongqing Yang, Yong Liu, Hongxiu Li, Benhai Yu (2015)	Understanding Perceived Risks in mobile payment acceptance	Five dimensions of risks are adopted to provide the rationales for the relationships between Perceived Risk and Perceived Value, they are Perceived Financial Risk, Perceived Privacy Risk, Perceived Performance Risk, Perceived Psychological Risk and Perceived Time Risk.	Information Asymmetry is the most important source of Perceived Risks, especially perceived Financial Risk in m-payment.
Kuan-Yu Lin, His-Peng Lu (2015)	Predicting mobile social network acceptance based on mobile value	The Utilitarian Value of mobile social network is affected by the benefits (Mobile Convenience and Service Compatibility) and cost (Security Risk and Cognitive Effort)	Utilitarian Value and Hedonic Value predict User Intention. The Utilitarian Value of mobile social network are positively affected by Mobile Convenience, Service Compatibility, and negatively affected by Security Risk and Cognitive Effort.

Table 7.4 Previous perceived value research with information on the concepts or variables related to perceived value.

Based on the review in Table 7.4, there are a number of constructs that have been tested in past research and their influence upon Customer Perceived Value have been supported. Previous research has provided a rich selection of constructs from which this thesis is going to choose several for developing a conceptual model to represent the value proposition on a mobile application platform.

When selecting the constructs for this model, this thesis uses three models regarding value co-creation. The first model is the servuction model by Eiglier and Langeard (1975). In this model, the direct interactions between the four parties (see also Grönroos, 2012) in a service process are demonstrated. These are interactions between physical resources and first party focal customers, between contact employees and focal customers, and between third party fellow customers and focal customers. Service value is co-created during the interaction between all parties. Therefore, when identifying appropriate constructs as the antecedents to deriving value, constructs should be able to represent the three interactions mentioned above.

The second model is Grönroos's (1978) interactive marketing model. This model identifies three categories of action variables that are directly interactive in value co-creation process. The categories are resources accessibility, interactive communication and customer participation (peer communication). When pairing Eiglier and Langeard's (1975) work with Grönroos's (1978), it is clear that the variable of resources accessibility can be used to represent the interaction between physical resources and focal customers, where interactive communication is representing the communication between contact employees and focal customers, and customer participation is the interaction between fellow customers and focal customers. This pairing result is also supported by Grönroos's (2012) value-creation model. The mobile retail application is a virtual service environment that contact employees are not present. However, they are represented by the virtual environment and this comprises two key elements – these are the application itself and, also, the internet. Further, fellow customers do not have a physical presence either, but they are represented by word-of-mouth through recommendations, etc. From the models discussed in this section, there is one further element to be considered, the physical element. In a virtual environment, though, the physical element is represented by the mobile device itself (smartphone, tablet). However, evaluating the impact of this is beyond the scope of the study.

The last model is Woodall's (2003) benefits and sacrifices category, which has been demonstrated in Figure 5.2. It suggests when the first party customers are involved in the direct interactions aiming at co-creating value, there are trade-offs to be considered by focal customers. It includes benefits (resources received from the interaction target) and sacrifices (resources invested by the focal customers). Therefore, this benefits-sacrifices pairing system should be taken as the third threshold for selecting constructs as antecedents to customers perceived value.

It is important to note that, as suggested by the second theoretical foundation of this thesis, the Theory of Planned Behaviours, User Control is playing a mediator role between Customer Perceived Value and its antecedents. Therefore, the construct of User Control is automatically involved in the conceptual model.

There are, therefore, three thresholds to be considered when determining variables to be used in the conceptual model. These are the antecedents identified in Table 7.5; the four parties of value co-creation, and the benefits and sacrifices that conjoin one to the other. Using these three thresholds, the three constructs as the antecedents to value are Electronic Risk, Usage Convenience and Electronic Word-of-Mouth. These have been established as relevant through a process of personal brainstorming and sense-making, and are the result of a matching process that takes all three thresholds as a co-creational web of interaction. First, Electronic Risk is representing the interaction between focal customers and the internet for the sake of seeking and justifying the accessibility to a service. Customers have risk perceptions towards mobile retail application, financial supporting systems and private information protections. The major sacrifice a focal customer needs to make is time spent on processing regarding this issue, and the benefit is mainly the trust in the physical service system. Second, Usage Convenience is representing the interaction between focal customers and the mobile application. It falls into the category of interactive communication variable. The main sacrifice is focal customers' time for processing information, and what they receive is information attributes regarding the service. Last, Electronic Word-of-Mouth is the interaction between focal customers and fellow customers. This is the only way that fellow customers can influence focal customers' decision-making processes. Useful information and the time for processing this information are the main benefit and sacrifice respectively.

The customer perceived value definition framework presented in Section 3.3 supports the selecting process the four co-creation parties (resource integrators) are shown in the conceptual framework at Figure 6.1. If a construct can pass all three thresholds, it will be included in the conceptual model in section 7.4.3.6.

7.4.2. Operational Definition of the Selected Constructs

The table (Table 7.5) below demonstrates the operational definitions of the constructs that are going to be included in the conceptual model of predicted customer perceived value of mobile retail applications. From a consumer perceived value point of view, there are perceived benefits and perceived sacrifices associated with each construct. This not only provides guidance when categorising all the functions on a mobile retail application (section 8.2), but also identifies one potential, and probably the most important measurement for this thesis, which is the sacrifice that shared with every construct in Customer Perceived Value proposition, the time consumption of processing information for a specific function. The use of this time measurement, from its help on identifying perceptual sacrifices to its meaning on perceived value proposition is discussed in section 7.4.3.6.

Within the framework that Grönroos (2012) developed (see Section 4.2.4), this thesis uses the four parties that are involved in the interactions on mobile service to identify a number of constructs. All the identified constructs are included in the conceptual model of perceived value proposition of mobile retail applications.

Construct	Operational Definition
Electronic Risk (Addresses interactions between Focal Customer and the internet) ***Benefits***: *Trust, Technical quality* ***Sacrifice***: *Time consumption for information processing, Psychological cost risk perception*	The negative psychological consequence that arises from the usage of mobile retail applications, including risk perceptions regarding the trustworthiness of information received from mobile applications, the performance of the application, financial insecurity and privacy violation.
Usage Convenience (Addresses interactions between Focal Customer and the application) ***Benefits***: *Information attributes, Convenience* ***Sacrifice***: *Time consumption for information processing, Cognitive effort*	The functionality that enables a consumer to collect product information (provided by the electronic retailer and the product manufacturers) anytime and anywhere they want. It is associated with ubiquity characteristic of mobile channel service.
Electronic Word-of-Mouth (Addresses interactions between the focal customer and fellow customers) ***Benefits***: *Information attributes Convenience* ***Sacrifice***: *Time consumption for information processing, Cognitive effort*	The functionality that enables a consumer to collect product information (provided by previous customers) anytime and anywhere they want.
User Control (Hypothesised as a Mediator)	As the key feature of information interaction when making a purchase decision on mobile applications, User Control is defined as the extent to which consumer can determine the timing, functionality, and sequence of a decision-making process.

Table 7.5 Operational definitions of the constructs in perceived value proposition

conceptual model

7.4.3 Hypotheses Development

7.4.3.1 Electronic Risk

As mentioned above, a customisation strategy decreases customer uncertainty and vulnerability, in order to reduce a customer's risk perception (Coulter and Coulter, 2002). Some empirical studies also find that the willingness of a company to offer a customised service builds trust (Koufaris and Hampton, 2004; Komiak and Benbasat, 2007). For building trust between customers and companies, the interaction between these two parties is crucial (Martelo et al., 2013).

Marketing managers are facing the challenge of understanding consumer risk in different academic and practical backgrounds. Moreover, it is particularly difficult and important in the electronic channel services context (Naquin and Paulson 2003). In the electronic marketing environment, a customer's risk perception of service providers is a topic that has interested many academics in recent years (Bart *et al.*, 2005; Cho, 2006; Gupta, Yadav and Varadarajan, 2009). Risk is widely considered to be the central relationship between customer and service providers (Harris and Goode, 2004). However, most prior research largely focuses on the fundamental issues, for instance, information privacy and financial security, and little are known about the process to build and underpin the trustworthiness perceptions of customers.

Electronic retailing refers to retailing activities which allow customers and organisations to exchange value electronically by using network or telecommunication technologies (Mukherjee and Nath, 2007). This means, except the actual products that are physically delivered to customers after the purchases are finalised, all other information and financial exchange activities are established without any physical interaction. Compared to traditional offline retailing, both the lack of physical presence of product and the lack of physical interaction between customers and organisations make risk an important determinant in online customer decision-making processes (Newholm et al., 2004). Therefore, the application of electronic network and telecommunication technologies pose new challenges to establish and maintain long-term relationships in retailing (Riivari, 2005).

Customers with different levels of risk perception in technology innovation use various performance measurements to evaluate the risks in electronic channel usage, for example,

speed, reliability, availability and order fulfilment (Lee and Turban, 2001). Therefore, customer perceptions of technological innovations could influence their perceived risk and further their behavioural intention (Mukherjee and Nath, 2007). Similar to other electronic channel services, the main reason for consumers' risk perception of using mobile services has been addressed to be the unclear allocation of responsibility for an unexpected result, such as a service failure or financial loss (Bahli and Benslimane, 2004). In many countries, prior permission is required before a mobile phone message is sent to customers (Leppaniemi and Karjaluoto, 2005). In addition, mobile services normally require a customer's personal demographic and behavioural information for providing a customised service to a specific customer. However, this could also lead to concerns relating to security and privacy issues (Ho and Kwok, 2003; Flavian and Guinaliu, 2006). Thus both financial and informational losses have been reported to be concerns of mobile channel users (Hourahine and Howard, 2004).

Other studies have reported that electronic services providers who offer their customer's highly accurate information with timely delivery could achieve a high level of trust (Brown and Pritchard, 2006). Scholars have examined risk in the business relationships context. Risk has been identified to be a key factor in building long-term relationships with customers and partners (Renner and Tyran, 2004). It is argued that high frequency of using a service can reduce risk perceptions of transactions (Umble et al., 2003). Recent studies have shown that risk has a negative influence on customer behaviours, such as higher customer loyalty (Agustin and Singh, 2005), more service usage (Maltz and Kohli, (1996) and a more interactive exchange relationship (Jap and Anderson, 2003).

Expectation-confirmation theory is adopted from the consumer behaviour literature (Bhattacherjee 2001; Dabholkar et al., 2000). This theory states that consumer satisfaction is determined by their comparison of post-purchase evaluation of specific services or products and pre-purchase expectations (Hwang et al., 2003). Therefore, if a customer's actual experience of using mobile services matches their expectations, more specifically, if a customer's received value of using mobile services matched their expectations, the result will be customer satisfaction and further development of trust.

Previous studies have also identified the factors that could influence consumer evaluation of service provider trustworthiness, for example reputation or brand name (Cho, 2006; Li

and Miniard, 2006). However, very little of the literature is related to mobile service providers because of the difficulties in measuring risk reliably (Welter and Kautonen, 2005). Therefore, the discussion leads to the following:

H1: First party focal consumers' Electronic Risk perception is negatively related to their Customer Perceived Value of using mobile retail applications.

7.4.3.2 Usage Convenience

From a customer perspective, the opportunities to use multi-channel services could mean more service outputs, usage convenience and time savings (Bitner et al. 2000). Meanwhile, organisations could benefit from service innovations, cost reductions and cross-increasing customer perceived value with different channels (Shih and Venkatesh, 2004). Birgelen, Jong and Ruyter (2006) report that electronic channels are able to perform better than traditional channels for more complex services, because electronic channels may provide higher communication efficiency. Furthermore, convenience value has been considered as a general motivation to adopt mobile services, due to the ease and speed of processing a service effectively and efficiently (Anderson and Srinivasan, 2003; Rintamaki et al., 2006). In Pihlstrom and Brush (2008)'s research, they also reported that mobile information service user behaviour is principally influenced by convenience value.

After significant changes in the marketplace through the introduction of internet channel services, the mobile channel is viewed as the next generation e-commerce (Turel and Yuan, 2006). Compared with traditional internet commerce services that require personal computers and laptops to access the internet, mobile devices provide more freedom for organisations and customers to perform tasks without the limitation of time and location (Liang et al, 2007). Therefore, the most important features of the mobile technology are mobility and portability, which allows a customer to access services ubiquitously through wireless networks and wireless devices (Jayawardhena et al, 2009). Similarly, Siau et al. (2001) have argued that the mobile channel contributes more economic value than other electronic channels because of its natural technology advantage of mobility. However, this technological advantage has to be performed with appropriate applications specifically designed for them, and these applications should be considered as the interfaces amongst customers and organisations.

Although literature regarding website attributions are relatively rich, very little has been done to explore the critical factors which influence the success or failure of a mobile service application (Liang et al., 2007). Existing studies argue that mobile devices provide highly efficient and timely service to consumers, which enable them to exchange information and process transactions (Balasubramanian, 2002). Shankar et al. (2003) further state that mobile services provide end users with a more economical channel for time-critical services than other channels. Moreover, the mobile service has been identified as a highly effective channel for time-saving both in B2C and B2B perspective (Newell and Lemon, 2001; Childers et al., 2001).

Furthermore, the fact that mobile services provide consumers with real-time accessibility to services has been frequently mentioned as one of the main benefits of using it (Hourahine and Howard, 2004). Especially in the retailing context, consumer perceptions of time-saving by specific time-critical services has a significantly positive impact on the attainment of services (Hourahine and Howard, 2004). Accordingly, the ubiquity advantage of mobile channel contributes to consumers' value perceptions by employing timely and efficient services as usage convenience. Thus, this review of literature leads to the following:

H2: Usage Convenience based on the functionality and product information provided by the service providers and the product manufacturers is positively related to Customer Perceived Value.

7.4.3.3 Electronic Word-of-Mouth

According to the viewpoints of perceived risk and trust issues in the last section, word-of-mouth has been widely recognised as a vital reducer of functional, financial, psychological and social risks (Mukherjee and Nath, 2007). Therefore, research suggests that electronic word-of-mouth generates greater credibility and relevance than the information provided by organisations (Hogan et al., 2004). Meanwhile, the communicators of word-of-mouth have more credibility as they are not seen to be interested in selling the products or services, and they provide their useful information in a personalised way (Mangold et al., 1999).

In the increasingly complex business world, consumers are more likely to make purchase decisions based on their perceived recommendation and endorsement rather than their own interactivity with the product and service provider (Smith et al., 2005). This phenomenon could be explained by the popularity of online information resources, such as blogs and social networks, which hugely impact upon consumer buying decision-making processes (Herring et al., 2005). Another study suggests that consumer attitudes refer to a global evaluation of specific products or services, rather than a single evaluation of a transaction between a customer and an organisation (Schlosser, 2003). This point of view suggests organisations should encourage customers to generate word-of-mouth communication even though this may include negative information (Liu, 2006; Godes and Mayzlin, 2004). Earlier researchers also have emphasised on using electronic channels on customer perceived value, loyalty and retention (Bendoly et al. 2005; Venkatesan, Kumar and Ravishanker, 2007). This thesis collectively reports a significant advantage in using electronic channels to communicate information with customers.

Previous research in the mobile service field is mainly focused upon mobile payment and banking transactions (Munnukka, 2005). However, with the recent development of mobile services, it provides a combination of information and entertainment services together to increase customer perceived value (De Marez and Verleye, 2004). Electronic channel word-of-mouth communication strategies combine information technology and electronic channel technology. Together, they can provide the prospect of overcoming consumer resistance with significantly low costs and fast delivery (Trusov, Bucklin and Pauwels, 2009). Therefore, specifically for the mobile service channel, customers receive more long-term value from it than through traditional marketing channels (Villanueva, Yoo and Hanssens, 2008).

Modern customers are more attentive to the information communication between private parties rather than the traditional way of passive receiving information from companies. This trend of customers creating their platform of exchanging usage information is taking the control power of communication away from companies (Nielsen, 2007). It suggests two main reasons that word-of-mouth has become a tool to influence the decision-making process. Firstly, word-of-mouth information is the direct product or service usage experience by the third party, it carries more credibility than the information from companies. Secondly, it offers another information source for the customer to decline the

role of advertising in the decision-making process (Godes et al., 2005). Research has been focusing on the number of customers that are involved in word-of-mouth communication, the frequency they receive it or the nature of the word-of-mouth communication (Kilby, 2007; Yang et al.,2012). Two important dimensions of word-of-mouth activity are volume and valence. Electronic word-of-mouth is arguably more influential than offline word-of-mouth, since it has the natural advantages of reaching a much larger number of potential customers in a much shorter time. Compared to offline word-of-mouth, electronic word-of-mouth differs in that it is not necessarily happening in real time, it could be written information (Berger and Iyengar, 2013), audio recorded or video recorded. Different forms of electronic word-of-mouth provide customers with better access to information (Huang et al., 2011).

There are only a few studies that have revealed the role of electronic word-of-mouth in the online decision-making process. A study by Park et al., (2007) reports that, since online reviews provide product information and usage experience, it can be used by both online customers and offline customers to lower the uncertainty of making a purchase. Moreover, other research suggests that the volume of electronic word-of-mouth is a more critical key to product sales than the relevance of the information (Wubben and Wangenheim, 2008). When potential customers are receiving electronic word-of-mouth information, several functions are provided by the information platform (online review websites of companies, third parties or social media websites) (Sridhar and Srinivasan, 2012). Rating functions show the general evaluation of the product, comments from review readers (other than the review writers) and the helpful votes (which is the rating system of the reviews) (Chen and Huang, 2013).

Early research reports that, in the online decision-making process, customers are twice as likely to purchase goods with positive reviews than the products that do not have any recommendations (Senecal and Nantel, 2004). This phenomenon can be explained as the information on electronic word-of-mouth can reduce the risks of making mistakes (Abrantes et al., 2013). Along with the finding that communication is arguably the most effective way to increase a customer's acceptance of a product or service, word-of-mouth communication is increasingly used in new product launch events (Peres et al., 2010). However, since word-of-mouth provides information regarding the usage experience of

third parties, the method to initiate a topic, or communicating process remains a challenge to marketing practitioners (Manchanda et al.,2008).

Derived from basic economic theory in which individuals try to maximise their benefits over costs (Iyengar et al., 2011), benefits are individual evaluations of utility to achieve a goal and costs are assessments of time and/or efforts devoted to achieving certain outcomes. A positive relationship of benefits and a negative relationship of costs with the motivation of reading online reviews can be established (López and Sicilia, 2013). Therefore:

H3: Electronic Word-of-Mouth information provided by the third party fellow consumers is positively related to the first party focal consumers' Customer Perceived Value.

7.4.3.4 User Control

A consumer's ultimate decision to purchase depends on the trade-offs between benefits and sacrifices (Zeithaml, 1998). The more perceived benefits exceed the perceived sacrifice, the more value consumers receive from their interactions with a company or other consumers (Chan et al., 2010).

User control is identified to be a critical feature of interactive technologies in the previous study (Hoffman and Novak, 1996). Besides the recent studies on electronic channel retailing, early research in environmental psychology indicates that, generally, people's perception of controlling the situation significantly increases their feelings of a positive experience (Keil et al., 2000). Furthermore, user control arguably leads consumers to increase their confidence about achieving the goal during the whole process of purchasing (Merisavo et al., 2007), because user control could be considered as a substitute for trust, and the trust beliefs have been reported to play a significantly important role in reducing consumer risk perception (Keil et al., 2000).

However, there is no generally accepted agreement of how user control influences the decision to adopt mobile service channels. Recent research suggests that user control has limited impact upon the adoption of mobile services (Karjaluoto and Alatalo, 2007). Based on this argument, several studies about customer empowerment may provide some insights from other perspectives.

Recently, it is reported that customers are empowered by having more information and choice through different service channels (Harrison, Waite and Hunter, 2006). From an economic perspective, empowerment is a benefit for customers because they perceive more value from the marketplace (Wathieu et al., 2002). Although organisations have listened closely to customers about what they need and want, control over what kind of products or services should be provided to customers is still reserved by organisations (Pitt et al., 2006). The use of the internet facilitates a shift in power from organisations to customers, which requires strong communication channels between customers and organisations (Ogawa and Piller, 2006). Other research demonstrates that customer empowerment strategies can provide important benefits beyond technological innovation outcomes. It plays a particularly important role in making customers develop closer relationships with specific products or services and therefore customers might be willing to make a purchase (Nambisan and Nambisan, 2008).

The electronic channel customer empowerment is a strategy that organisations give their customers a sense of control within the product selection and creation process, technically through a structure that allows the individual customer to interact and exchange their information (Fuchs, Prandelli, Schreier, 2010). From an economic perspective, empowerment is a benefit for customers because they gain more power to control the process of purchasing services. Therefore, customers perceive more value from marketing activities (Wathieu et al., 2002). They also find that empowerment gives a customer the perception of psychological ownership, which has a positive relationship to several variables, such as word-of-mouth, consumer enjoyment, and even willingness to defend products or services in public. Back to the context of mobile service channels, customers are mostly empowered by selecting the time and locations they prefer to process the service. Therefore, the question as to why User Control should be considered as a mediator that affects all factors related to adoption and usage intention become critical in this thesis.

7.4.3.5 Mediator Role of User Control

Within social sciences research, mediator variables specify how and why a relationship between independent variables and dependent variables occurs. The overall goal of this thesis is to understand the value derived by retail consumers using a mobile application, from the perspective of user control. The sources of value for retail consumers are many

and varied, but this thesis focuses specifically on 'user control'. The 'user control degree of a decision-making process influences how quickly and precisely users can receive the information for making decisions (Hoyer et al., 2010).

People usually have greater control over performing a behaviour than over achieving a goal, which implies measuring how people achieve the ultimate goal can be broken down to measuring the behaviours that people are performing into multiple behaviours. To predict people's behaviour, it requires measuring, not only the direct behaviours determinant, which is the intention; but rather, measuring both people's intention and their perceived control. Actual behavioural control is expected to moderate the relationship between intention and behaviour. When the actual control level is high, the effect of intention on behaviour is stronger, and vice versa. Therefore, behaviour research must take account of control when exploring the relationship between intention and behaviour, or exploring relationships between research contextual factors and the targeting behaviour.

However, it is difficult to measure actual behavioural control at the moment that the research sample is going to perform the behaviour based on his/her intention. In most cases, it lacks sound information about all the aspect of people's actual control, or how to precisely capture all the relevant factors. The only possible way of measuring the actual level of control is to use people's perceptual behavioural control over a behaviour as a relatively accurate reflection of their actual control (Madden, et al., 1992). Based on this argument, it is reported perceived behavioural control can be used to explain a large amount of behaviour (Cheung & Chan, 2000). That is, when people have control over performing a behaviour, they tend to act following their intentions. On the other hand, when people feel they do not have control over their behaviours, it is less likely they would act as they intended.

As Figure 7.2 shows below, in the theory of planned behaviours, control beliefs and perceived behavioural control together mediate the consideration process from background factors to behavioural intention. This thesis adopts this understanding and proposes user control as a mediator between the three information antecedents and customer perceived value. The usage value of mobile service channels can be mentally predicted and practically perceived, this thesis is addressing both the perspectives, and compares and contrasts results from both sides. The development of a conceptual model is based on one

of the theoretical foundations of this thesis, the Theory of Planned Behaviour (Ajzen, 1991). It is contributing to the conceptual model development in two particular ways. One is to suggest a suitable structure for the model, for example, numbers of dependent variables and independent variables, the possible existence of mediation variables or moderator variables. The other way is to suggest proper measurements for testing this conceptual model.

Details on testing this proposed conceptual model are provided in Chapter 9; the testing process and the testing result, which is the final structural model, are demonstrated in Chapter 9.
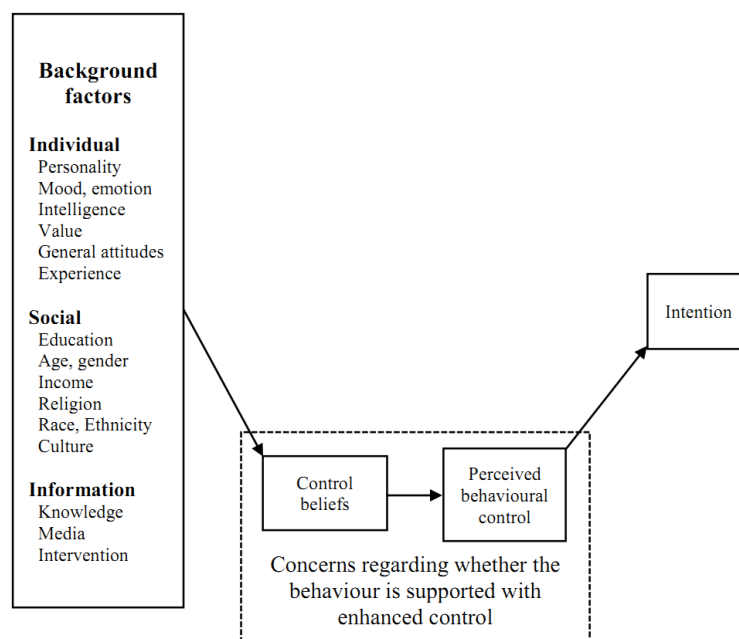
Figure 7.2 Control's mediation effect in the Theory of Planned Behaviour

H4: First party focal consumers' User Control is mediating the relationship between Electronic Risk and Customer Perceived Value.

H5: First party focal consumers' User Control is mediating the relationship between Usage Convenience and Customer Perceived Value.

H6: First party focal consumers' User Control is mediating the relationship between Electronic Word-of-Mouth and Customer Perceived Value.

7.4.3.6 Conceptual Model of Perceived Value Proposition

Figure 7.3 illustrates the conceptual model in which three antecedents that represent different information interactions on mobile retail applications, as well as three different trade-offs between perceived benefits and sacrifices to generate perceptual value to the consumer, mediated by User Control. Section 9.3 and Section 9.4 in Chapter 9 outlines the methods for testing the hypotheses.
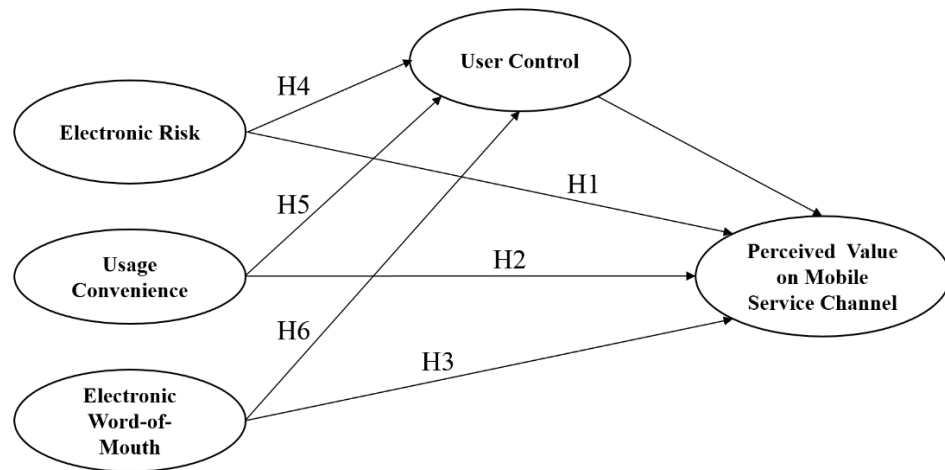
Figure 7.3 Six hypotheses within the proposed conceptual model of customer perceived value on mobile service channels

7.4.4 Questionnaire Survey

As discussed previously, the second part of this thesis is conducting a questionnaire survey. Methodologically, a survey is an appropriate research method within the framework of positivism and realism. It employs a deductive approach and is used to generate relatively large amounts of quantitative data. Questionnaires are one of the most common data collection methods when researching in the field of marketing (Neuman, 2009). Scale items within a questionnaire are capable of collecting precise numerical data, provided it is designed appropriately. All the data from the questionnaire are used for structural model testing.

7.4.5 Questionnaire Development

The questionnaire consists of 46 scale items, representing the five variables comprising the structural model. Four demographic questions (gender, age group, current study level, cultural background), two usage frequency questions (frequency of viewing information on mobile retail applications and frequency of making purchase decisions on mobile retail

applications), and one open question (comments provided by participants). For the main part, the 46 scale items use multi-item Likert scales, which are suitable for measuring latent consumer perceptions and understandings of concepts. More specifically, all scale items use a 5-point Likert scale, which is, in the order, "strongly agree", "agree" "Neither agree nor disagree" "disagree" and "strongly disagree".

In order to establish and verify the nature of the scale measurements to be used in this thesis, guidance was taken from Churchill's (1979) scale development procedure, Rossiter's (2011) C-OAR-SE scale development method (Construct definition; Object classification; Attribute classification; Rater identification; Scale formation; Enumeration) and Gilliam & Voss's (2013) six-step procedure for construct definition (write the preliminary definition; consult the literature and build the nomological network; assess the value added; refine the definition; expert judging process and adjust definition and iterate).

Firstly, a multi-item measurements technique is adopted for all five variables in the proposed conceptual framework. This technique diminishes the difficulties when using scale item/items to measure participant perceptions of the targeting construct (Diamantopoulos et al., 2008). Basically, with multiple scale items measuring one construct, it can ensure every dimension of the construct can be measured, differences between each dimension of the construct can be distinguished, differences between samples can be distinguished and, generally, it increases reliability and decreases measurement error (Salzberger and Koller, 2013).

Secondly, expert review is required to enhance content and construct validity (Rossiter, 2011). From the first point, every construct in the structural model has multiple scale items, which increase the complexity for participants to understand everything and, in addition, not be confused by any scale item (Diamantopoulos et al., 2008). The quality of a questionnaire design should be evaluated before the pilot study. Descriptions of the constructs, along with every scale item representing them, were reviewed by experts (for details see 7.4.9 further below).

Thirdly, a questionnaire should be tested in a pilot study in order to obtain feedback from the sample. After taking into consideration this feedback, the questionnaire can be

finalised. As a consequence of the above, both the reliability and validity of measures are expected to be good.

7.4.6 Scale Items of the Research Concepts

All measures have been developed using items appropriated from existing, validated scales adopted from recent marketing research (see Table 9.1, Table 9.2, Table 9.3, Table 9.4 and Table 9.5), which focus upon digital marketing using either internet channel services or mobile channel services. All testing objects and attributes assessed by the scale items in the questionnaire have been previously used in this research area.

The reasons that this thesis only adopts previously used scale items for developing the questionnaire are twofold. First, existing measures have been fully validated in previous research. The scale items were used to test exactly the same concepts in the scientific area that is very close to mobile channel services. For example, a scale item that asks about a consumer's perception of giving their financial information to an electronic retailer can be transferred from internet channel service research to this thesis. Because consumers understand that, basically, an e-retailer is storing their information on a server, whether sharing that information on a desktop or a mobile phone, it does not make a difference in terms of the e-retailer safety arrangement the financial transaction. However, what makes it different could be, if the mobile retail application permanently keeps that information for quick access (for the consumer, so that consumers do not have to type all the letters and numbers on a much smaller screen). The perception of financial insecurity may arise when consumers realise there are far more people who can access their smartphone than their desktop computer. For instance, there have been a few stories of when a child uses their parent's tablet to play a game and accidentally purchases lots of in-game items without realising it. Using the financial security example again, any difference in the results might highlight the difference between internet channel services and mobile channel services. Note that, there also could be other reasons for having different results, e.g. a different sampling strategy. This thesis takes this into consideration.

7.4.7 Validity and Reliability

Validity and reliability of the scale items are crucial for any questionnaire survey (Bach and Ghaoui, 2008). A questionnaire is generally used to collect information on attitudes, perceptions, opinions, behaviours and facts. As two of the most important perspectives

when evaluating questionnaire quality, validity and reliability concern two different sets of issues. Validity concerns issues such as, is the questionnaire measuring what it is intended to measure, can the scale items represent the construct and are the scale questions comprehensive enough, to the sample, to collect the information needed for the data analysis. On the other hand, reliability addresses issues regarding accuracy and the precision of the scale measurements and potential replicability. For this particular research, since interval scale is used for all scale items, internal consistency is used to evaluate reliability.

To address the reliability and validity issue, there are three major methods that this thesis has employed. First of all, as mentioned above, for ensuring the questionnaire measures what it intends to measure, all the scale items are adopted from existing research in the same or similar scientific area. When selecting those scale items, research where those scales were used have been thoroughly reviewed, including comparing the research content of the measurement, comparing the definition of the concepts they measure and examining the performance of those scales. Second of all, this thesis has invited a group of five experts to further review whether all constructs can be measured with the scales assigned to them. The detailed information regarding the expert review is provided in the following section. Last but not least, for the issue that the sample should be able to understand and answer all questions on the questionnaire, a pilot study was conducted to a relatively smaller population to test the questionnaire. Feedback from the pilot sample was used to improve the comprehensiveness of the questionnaire. The pilot study is discussed in greater detail in section 7.6.

Cronbach's Alpha is used for provisionally testing scale reliability. With both "Cronbach's Alpha" and "Cronbach's Alpha if item Deleted" figures, the reliability coefficient (alpha) should be greater than 0.7 (Tavakol and Dennick, 2011). The "Cronbach's Alpha if item Deleted" figures indicate any item that decreases the coefficient lower than 0.7. Those items are deleted until the reliability is acceptable.

7.4.8 Common Methods Bias

Common method variance, which is attributing to the measurement method rather than to the constructs the measures represent, is a potential problem in consumer perception and behavioural research. Method biases are one of the major sources of measurement error,

which sabotage the validity of the research findings on relationships between measured variables. This systematic issue is particularly serious because the explanations it provides is for other variables rather than the ones the research is measuring.

Bagozzi and Yi (1991) define a method (in method variance) as the form of measurement at different levels of abstraction. When the level of abstraction increases, method biases might become response biases. This systematic variance can have a serious influence on the data analysis result, yielding misleading findings. Method variance can impact both the strength of the bias and the direction of the relationships between variables, which can lead to both Type I and Type II errors. It is important to understand the sources of common methods biases since they produce strong influences to research conclusion mentioned above (see Figure 7.6).

In order to develop procedures for minimising method biases, researchers must understand that, during data collection processes, how those biases affect respondent behaviours (Tourangeau et al., 2000). Figure 7.7 shows the most commonly identified stages of response stages, which are comprehension, retrieval, judgment, response selection, and response reporting. In the first stage, respondents receive the questionnaire and try to understand both the contextual and conceptual backgrounds of the questions. In the next stage of retrieval, respondents employ a retrieval strategy that helps them to recall long-term memory for answering questions. Next, in the judgement stage, respondents are going to assess the completeness and accuracy of their memory. This is the stage where respondents decide what the answer is based on their own judgement.

Potential Cause	Definition
Common Rater effects	Refer to any artifactual covariance between the predictor and criterion variable produced by the fact that the respondent providing the measure of these variables is the same.
Consistency motif	Refers to the propensity for respondents to try to maintain consistency in their responses to questions.
Implicit theories (and illusory correlations)	Refer to respondents' beliefs about the covariation among particular traits, behaviours, and/or outcomes.
Social desirability	Refers to the tendency of some people to respond to items more as a result of their social acceptability than their true feelings.
Leniency biases	Refer to the propensity for respondents to attribute socially desirable traits, attitudes, and/or behaviours to someone they know and like than to someone they dislike.
Acquiescence biases (yea-saying and nay-saying)	Refer to the propensity for respondents to agree (or disagree) with questionnaire items independent of their content.
Mood state (positive or negative affectivity; positive or negative emotionality)	Refers to the propensity of respondents to view themselves and the world around them in generally negative terms (negative affectivity) or the propensity of respondents to view themselves and the world around them in generally positive terms (positive affectivity)
Transient mood state	Refers to the impact of relatively recent mood-inducing events to influence the manner in which respondents view themselves and the world around them.
Item characteristic effects	Refer to any artifactual covariance that is caused by the influence or interpretation that a respondent might ascribe to an item solely because of specific properties or characteristics the item possesses.
Item social desirability	Refer to the fact the items may be written in such a way as to reflect more socially desirable attitudes, behaviours, or perceptions.
Item demand characteristics	Refer to the fact that items may convey hidden clues as to how to respond to them.
Item ambiguity	Refer to the fact that items that are ambiguous allow respondents to respond to them systematically using their own heuristic or respond to them randomly.

Common scale formats	Refer to the artifactual covariation produced by the use of the same scale format (e.g., Likert scales, semantic differential scales, "faces" scales) on a questionnaire.
Common scale anchors	Refer to the repeated use of the same anchor points (e.g., extremely, always, never) on a questionnaire.
Positive and negative item wording	Refers to the fact that the use of positively (negatively) worded items may produce artifactual relationships on the questionnaire.
Item context effects	Refer to any influence or interpretation that a respondent might ascribe to an item solely because of its relation to the other items making up an instrument (Wainer &Kiely, 1987)
Item priming effects	Refer to the fact that the positioning of the predictor (or criterion) variable on the questionnaire can make hat variable more salient to the respondent and imply a causal relationship with other variables.
Item embeddedness	Refers to the fact the neutral items embedded in the context of either positively or negatively worded items will take on the evaluative properties of those items.
Context-induced mood	Refers to when the first questions (or set of questions) encountered on the questionnaire induces a mood for responding to the remainder of the questionnaire.
Scale length	Refers to the fact that if scales have fewer items, responses to previous items are more likely to be accessible in short-term memory and to be recalled when responding to other items.
Intermixing (or grouping) of items or constructs on the questionnaire	Refers to the fact that items from different constructs that are grouped together may decrease intraconstruct correlations and increase interconstruct correlations.
Measurement context effects	Refer to any artifactual covariation produced from the context in which the measures are obtained.
Predictor and criterion variables measured at the same point in time	Refers to the fact that measures of different constructs measured in the same location may produce artifactual covariance independent of the content of the constructs themselves.
Predictor and criterion variables measured in the same location	Refers to the fact that measures of different constructs measured in the same location may produce artifactual covariance independent of the content of the constructs themselves.
Predictor and criterion variables measured using the same medium	Refers to the fact that measures of different constructs measured with the same medium may produce artifactual covariance independent of the content of the constructs themselves.

Table 7.6 Summary of potential sources of common method biases
(Podsakoff, et al. 2003)

Their next task is, in the response selection stage, how they are going to answer as accurately as possible on the scales or options provided on the questionnaire. The last stage is the response reporting stage. In this stage, respondents record their final answers on the questionnaire and edit their answers for an acceptable level of consistency, acceptability, desirability and/or other criteria. During these five stages of responding to the questionnaire (Table 7.7), respondents might not be consistently highly conscious and deliberative. The whole process might happen automatically and, more importantly, fairly quickly during the data collection session. Thus, it requires the researcher to pay great attention to the data collection procedure and use statistical methods to control common method biases.

Stages of the response process	Activities involved in each stage	Potential methods biases
Comprehension	Attend to questions and instructions, represent a logical form of questions, identify information sources, and link key terms to relevant concepts.	Item ambiguity
Retrieval	Generate retrieval strategy and cures, retrieve specific and generic memories, and fill in missing details	Measurement context, question context, item embodies, item intermixing, scale size, priming effects, transient mood states, and item social desirability
Judgment	Assess completeness and accuracy of memories, draw inferences based on accessibility, inferences that fill in gaps of what is recalled, integrate material retrieved, and make estimate based on partial retrieval	Consistency motif (When it is an attempt to increase accuracy in the face of uncertainty), implicit theories, priming effects, item demand characteristics, and item context-induced mood state
Response selection	Map judgment onto response category	Common scale anchors and formats and items context-induced anchoring effects
Response reporting	Editing response for consistency, acceptability, or other criteria	Consistency motif (when it is an attempt to appear rational), leniency bias, acquiescence bias, demand characteristics, and social desirability

Table 7.7 How Common Methods Biases Influence the Question Response Process
(Podsakoff, et al. 2003)

This thesis employed both the primary ways to control for methods biases, the design of the study's procedures and the statistical controls (Podsakoff et al., 2003; 2012). In this section, it demonstrates a number of techniques that have been applied to the questionnaire design and data collection procedure. The statistical control discussion is provided in Section 9.3.1. Given it is not feasible to obtain measures of the independent variables and dependent variables from different sources. The four techniques used are: 1) proximal separation of measurement; 2) temporal separation of measurement; 3) Protecting respondent anonymity; and 4) Improving scale items.

First, using proximal separation of measurements has been reported to have indirect effectiveness in terms of controlling common methods bias (Tourangeau et al., 2000). This thesis position scale items of the same construct apart, separated the scale items of other constructs using the same formats. More specifically, the table (Table 7.8) below demonstrates how the scale items belong to the same construct are positioned in the questionnaire. Details regarding the scale items are provided in Figure 9.1 (Electronic Risk), Figure 9.2 (Usage Convenience), Figure 9.3 (Electronic Word-of-Mouth), Figure 9.4 (User Control) and Figure 9.5 (Customer Perceived Value). Note that, given the questionnaire has 46 scale items for measuring the five constructs in the proposed conceptual model, and 9 items of demographic questions, adding in more filler items would increase the length of the questionnaire and cause fatigue, decrease response rate (Podsakoff et al., 2003). It also did not apply Weijters et al. (2009)'s method that position measures of the same construct at least six items apart, since there are only five constructs in the conceptual model (see Figure 7.8).

Constructs	Positions of scale items in the questionnaire	Number of proximal separation applied
Electronic Risk	15, 16, 17, 18, 19, 20, 21 / 34 / 39, 40 / 44	3
Usage Convenience	01, 02, 03, 04 / 06, 07 / 13,14	2
Electronic Word-of-Mouth	05 / 09, 10, 11, 12 / 41	2
User Control	22, 23, 24 / 26, 27, 28 / 43 / 45, 46	3
Customer Perceived Value	08 / 25 / 29, 30, 31, 32, 33 / 35, 36, 37, 38 / 42	3

Table 7.8 Proximal separation arrangement of questionnaire scales items

Second, the temporal separation is managed by introducing a time lag between the measurements of the dependent variables and the independent variable. In a data collection session of this thesis, there are two sections that one participant needs to complete, they are two screen recordings of his/her two separate decision-making processes and a questionnaire survey. The researcher uses the screen recording to temporally separate the questionnaire measures. Since almost all the measures of the dependent variables are on the third and fourth page of the questionnaire, when a participant completed the second page, the researcher would invite him/her to do one/two screen recordings for creating a temporal separation.

Third, all the participants are guaranteed their response anonymity, which is clearly stated on the Participant Information Sheet (see Appendix A.) And last, all scale items have been improved to avoid vague concepts, keep the items specific and concise and avoid double-barrelled items (Tourangeau et al., 2000). The most important procedure for improving scale items is the expert review, which is discussed in the next section.

7.4.9 Expert Review

As mentioned in the previous section, the researcher contacted five experts with a great understanding of consumer behaviour, customer perceived value and electronic service channels. They were invited to evaluate all the scale items with the descriptions of the constructs they belong to, to ensure, not only the sales items have achieved content validity, but also they are substantively meaningful for testing the structural model, which is the value proposition of customer perceived value on mobile channel services.

All the expert reviewers were sent an email with all the information regarding the contractual model, the descriptions of all five constructs, and all the scale items with the construct that they belong to. The expert reviewers were asked to offer any suggestions or concerns regarding construct validity issues. After a two to four week reviewing period, all five experts sent back their suggestions via email to the researcher. Their suggestions comprising, firstly, request for clarification of construct definitions. Secondly, recommendations for improvement to the proposed structural model. Thirdly, suggestions for additional scale items. Fourthly, suggestions for removing scale items and finally, recommendations for improving the wording of scale items.

Eventually, before the pilot study of this research, 15 scale items were added to the questionnaire, and 18 scale items were reworded in order to enhance the validity of the questionnaire. All five experts are lecturers and researchers in UK universities and have expertise across the disciplines of consumer research, health and safety research, and advanced statistical techniques. Reviewer feedback was taken into consideration when preparing the questionnaire for the final stage of data collection.

7.5 Research Design and Data Collection

In this thesis, data is collected from both primary and secondary sources. Secondary data analysis offers a guideline for general data analysis and primary data collection. The background information from the secondary data offers deep insights into the matters that the researcher should pay attention to in primary data collection. Primary data is the new data that the researcher collects for the current research project. As mentioned before, the primary data collection was separated into two parts: 1. screen recording of decision-making processes; and 2. a questionnaire for testing the proposed structural model.

Mainly, quantitative methods are employed in the three phases of the research. A summary of the research activity is given immediately below. Firstly, a major local retailer (Boots) offered their secondary data to this project. The data are produced by IBM Coremetrics and were used to analyse customer usage of Boots mobile website. The dataset from Boots is not at an individual level but aggregated to protect consumer identities. Boots follows stringent data protection laws. No individuals can be identified via the data and there is no link that can be made between the Boots data and the sample used by the researcher. Frequency analysis and Analysis of Variance were used to verify the key indicators (mobile website functions) of elements in the proposed structural model. These indicators were used in the Survival Analysis in the next phase of this thesis.

Secondly, approximately 217 students (both undergraduate and postgraduate) of the university were recruited to participate in the primary data collection phase. They were invited to use Boots mobile website to demonstrate two full consumer decision-making processes on a mobile platform (iPad).

Thirdly, after the video recording, all participants were invited to complete a questionnaire containing 46 scale items. Relevant scales represent the latent variables in the proposed

structural model. Data from the questionnaires were processed using Structural Equation Modelling to test the proposed structural model.

7.5.1 Boots' Website

Boots The Chemists is the UK's leading retailer of health and beauty products. It was established in 1849 by John Boots. Later, Jesse Boot (son of John Boots) ran the family herbal medicine shop in Nottingham in 1860. In 1883, this family shop became Boot and Co. Ltd, then Boots Pure Drug Company Ltd. in 1888. In 1920, Boots was sold to an American company, United Drug Company. In 1933, John Boots' grandson, the Baron Trent bought the company back.

Boots was awarded the Queen's Award for Technical Achievement for the development of the drug, Ibuprofen in 1987. In 2006, a merger with Alliance UniChem was announced and the new group became Alliance Boots plc. In 2007, Alliance Boots was purchased by Kohlberg Kravis Roberts and Stefano Pessina. The company became private, which was the first instance of an FTSE100 company being bought by a private equity firm. In 2008, the group headquarters were moved to Zug, Switzerland due to financial considerations.

In 2012, the United States' largest drugstore chain, Walgreens purchased a 45% stake in Alliance Boots. In 2014, Walgreens confirmed that the remaining 55% stake had been bought, which completed their merger to form a new holding company, Walgreen Boots Alliance Inc. (Walgreens Boots Alliance, 2016).

As the leading company in UK health and beauty products, Boots has over 60,000 employees, more than 2,500 stores, around 640 Boots Opticians practices, and over 480 Boots Hearingcare locations. Their strategy includes: a) local pharmacy, healthcare-focused community stores which aim to work with other local healthcare providers to keep local communities healthy; b) health and beauty, convenience and high-street store, which offer a wide range of products including all Boots leading brands; c) flagship store, which provides their widest healthcare offering, including extensive pharmacy services, Boots Opticians practices and their biggest range of premium beauty and exclusive brands; and d) travel and airport stores, to meet travelling customers last minute needs. Over 90% of the UK population is within 10 minutes of a Boots store, and over 15 million of their customers are active Boots Advantage Card members. With regards to electronic retailing,

there are 11 million visits per month to the Boots website, and the Boots mobile application has achieved 2 million downloads (Boots UK, 2016).

The Boots website is providing the research context for this thesis. The design of the Boots website and, more importantly, the identification of function usage on the Boots website is provided in chapter 8.

7.5.2 Boots Secondary Data

In order to conduct research that provides practically relevant conclusions regarding the mobile service channel, the quality of the dataset is crucial, in terms of providing an aggregated but clear overview of actual electronic channel usage, and more importantly, revealing the potential when analysing the primary data (mainly, the screen recording) and secondary data together. The supervisory team established contact with Boots' Marketing team, who are particularly focused on digital marketing. After a few meetings, the Boots Marketing team showed interest in participating in this research and provided access to their IBM Coremetrics database. With Boots' association, this thesis is able to process the data collected on the Boots mobile website with the outcomes from analysing their usage data.

The purpose of combining primary data of screen recording and the Boots website secondary data, is, firstly, to identify the typical length of the actual buying decision-making process on Boots' mobile website, and subsequently to modify the primary data to be as close to the actual Boots consumer data as possible.

Boots Coremetrics dataset provides four sets of crucial data. They are, only on the product category level: the average times the consumers were viewing product information collectively, and individually; and the average amount of time over which consumers are using those functions. Using the data from the top 20 popular product categories on the Boots website, in the month of February 2014, there were 1,534,729 page view sessions of the product listing page and 1,240,341 view sessions of the category page. The time that all Boots customers spent on those two kinds of pages in that month are 230,938,687.6 seconds and 27,484,116 seconds respectively. Therefore, in a single decision-making process on Boots.com, the calculating results show, on average, a single customer spent 150.48 seconds viewing product listing pages and consume 22.16 seconds viewing product

category pages, which gives in total 172.64 seconds per decision-making process. Note that, from the secondary data, it does not show the results of those customers decision-making processes.

7.5.3 Data Collected from the Sample

Based on the discussion of the research objectives and conceptual framework in Chapter 6, there are two sets of primary data that are required to achieve the analytical outcomes. Table 7.9 demonstrates the details regarding research objective 2 and research objective 4.

For pursuing research objective 2, basically, it analyses the actual decision-making behaviours of the participants. As mentioned in the conceptual framework, three are three measurements for examining customer perceived value on mobile retail applications. They are the 'Actual Information' that is processed in a decision-making process, the 'Actual Time' that is spent to conduct this decision-making process, and finally, the 'Decision Making Outcomes'.

In order to collect the primary data, participants were invited to perform their decision-making process on Boots.com. The screen recording method records everything that happens on the screen, which includes which buttons the participants tapped, what information was being viewed at any specific point of time during a decision-making process and the duration of each decision-making process. When participants feel comfortable, they orally inform the researcher the result of each of their decision-making processes. The result could be 'to buy the product that he/she picked from a product category', 'not to buy any product from a product category' or 'a decision was not made after spending some time on this issue'.

In order to pursue research objective 4, the conceptual model of predicted value proposition needs to be tested, and to result in a structural model. According to the conceptual framework, all measurements in this regard are based on participant 'Past Experience'. Using this 'Past Experience', participants are predicting what information would positively or negatively contribute to their decision-making process, how would they '(User) Control' the decision-making and the 'Predicted probability' of reaching a decision. The decision is either 'to buy' or 'not to buy'. A 'No Decision' result is considered as a failure of a decision-making process.

In order to collect the data on how the participants predict the usage value derived from the mobile service channel, each needs to complete a questionnaire, where all the constructs involved in the conceptual model have multiple scale items to represent them.

Research Objective		Method		Analysis	Measurement
		Data Collection	**Research Instrument**		
RO2	To explore the relationship between the usage, the time consumption and the results of the consumer decision-making process using the method developed in RO1.	Data provided by Boots.com Division		Analysis of Boots web-site usage secondary data	Top 20 most-viewed web pages on Boots.com to calculate the average time consumption to make a single purchase decision on Boots.com
		Survey	Screen recording	Survival analysis	1. From the beginning to the end of a decision-making session, all the functions that had been used, with time marks assigned to them. For example, from 00:01:00 to 00:01:30, the participant read a product review; then from 00:01:31 to 00:02:04, the participant checked out 5 related products. 2. The length of the decision-making process. For example, a participant conducted two separate decision-making processes for this thesis, the first one took 350 seconds, and the second one took 420 seconds. 3. The results of the decision-making processes. Participants orally inform the researcher the result of each of the two decision-making process. The result could be 'to buy', 'not to buy' or 'no decision was reached'.
RO4	To test the conceptual model from RO3 for exploring the role of User Control in the final testing result – the structural model.	Survey	Questionnaire	Factor analysis SEM a). CFA b). Mediator testing	Each participant completed one copy of the questionnaire, which contained 46 Likert scale questions regarding the constructs identified (see section 7.4) and 5 demographic questions.

Table 7.9 Measurements and primary data that were collected for Research Objective 2 and Research Objective 4.

The sampling techniques used in this thesis is a combination of convenience sampling and judgemental sampling (Bryman and Bell, 2007). Convenience sampling refers to a sampling procedure based on the relatively easy accessibility of the sample. Judgemental sampling is the technique where the researcher decides who to include based on the researcher's knowledge and professional judgement. For this thesis, students of Nottingham Trent University were decided to be the sample due to the easy access. Undergraduate students are further selected, since the undergraduate population has a lower percentage of international students and higher percentages of home students. Thus, this may enhance the chance of recruiting a homogeneous sample. They are also 'digital natives', meaning e-tailing and the use of mobile technology are likely to be familiar and well–practised contexts, particularly they are allowed to search information about the product categories that they are familiar with, on a website that provides similar functions compared to other major e-tailers. When beginning the fieldwork, given English native speakers were preferable, and for applying the principle of judgmental sampling, the researcher made the initial judgement of the language skill of the potential participants, e.g. overhearing conversations with a British accent. Additionally, on the questionnaire, Question 50 asks about the participant's cultural background. If the participant chose any cultural background where English is the native language, they were included in the sample. If the participant chose any non-English language cultural background, they were politely asked to provide more information regarding which country they received their previous education (e.g. middle school, high school, A-level). Only the participants that had more than five years education in English language were included, otherwise their data were excluded from this thesis.

Regarding the sample size issue, according to Peduzzi et al. (1995), when applying Cox proportional regression analysis in survival analysis studies the minimum number of cases to include is the number of independent variables multiplied by 10, then divided by the proportions of positive cases (positive case is the case where an expected event has occurred). If the resulting number is less than 100, the study should increase the sample size to 100 minimum (Long, 1997). In this thesis, the usage of the functions on Boots'.com mobile website are considered as the independent variables in Cox regression. There are nine functions (see Figure 7.11, the first nine variables are the independent variables). The proportion of positive cases which means, in this thesis, that the

participants reached either a 'to buy' decision or a 'not to buy' decision, is 74.4% (see Table 8.9). Therefore, the minimum sample size for survival analysis is approximately 121 ($9 \times 10 \div 74.4\% = 120.97$).

For the structural equation modelling analysis, the ratio of sample size to the number of the free parameters in a conceptual model should be 5 (minimum) to 10 (optimum) according to Davcik (2014). Given this thesis proposed a conceptual model that has 14 parameters, the optimum sample size for performing structural equation modelling is 140 ($14 \times 10 = 140$).

This thesis collected 434 cases for Cox regression analysis and 217 questionnaires for conceptual model testing. Both exceed the minimum sample size. Larger samples are taken that increase likely representativeness given a homogeneous sample is not practical. Such sample sizes are also credible to other researchers and make data more amenable if between groups testing is required.

7.5.4 Sampling Rationale

Since this thesis seeks to relate to both behaviour and attitude regarding mobile retail application usage in the context of retailing for a particular and relevant market segment, it is not possible to identify and question all the consumers involved in this social phenomenon. Therefore, non-probability sampling is engaged to select a representative group of relatively typical consumers as the sample of this thesis (Quinlan, 2011).

Another issue to be addressed is the filtering criteria (Saunders, et al., 2007), for recruiting potential participants who could and would contribute to this project. Given the nature of the social phenomenon this thesis is focusing on and how sensitive the data on time dimension is, the inclusion criteria are that participants must have prior experiences of using mobile retail applications, and be capable of using functions on mobile retail applications, for example, tapping on the iPad screen to use appropriate functions, and switching between different pages. On the other hand, since the questionnaire contains 46 scale items that require a specific level of understanding, and they must have a basic knowledge of the information provided on mobile retail applications to conduct their purchase decision-making processes. The filtering criteria are that respondents must have a good level of English language skill, (for example, being English native speaker, or having

more than five years education in English language), and having a working familiarity with the product categories used for the simulated purchasing events (or scenarios).

The sampling techniques used in this thesis is a combination of convenience sampling and judgemental sampling (Bryman and Bell, 2007). Convenience sampling refers to a sampling procedure based on the relatively easy accessibility of sample. Judgemental sampling is the technique where the researcher decides who to include based on the researcher's knowledge and professional judgement. For this thesis, students of Nottingham Trent University were decided to be the sample due to the easy access. Undergraduate students are further selected, since the undergraduate population has a lower percentage of international student and higher percentages of home students. Thus, this may enhance the chance of recruiting homogeneous sample. They are also 'digital natives', meaning e-tailing and the use of mobile technology are likely to be familiar and well–practised contexts, particularly they are allowed to search information about the product categories that they are familiar with, on a website that provides similar functions compared to other major e-tailers. When proceeding the fieldwork, given English native speaker is preferable, and for applying the principle of judgmental sampling, the researcher made the initial judgement of language skill of the potential participants, for example, overhearing a conversation with a British accent. Additionally, on the questionnaire, the question No. 50 is asking participant's cultural background. If the participant chose any cultural background that English is native language, they were included in the sample. If the participant chose any non-English language cultural background, they were politely asked to provide more information regarding which country they had their previous education (for example, middle school, high school, A-level). Only the participants that had more than five years education in the English language were included, otherwise their data were excluded from this thesis.

7.5.5 Data Collecting Procedure

As mentioned above, for achieving research objective 2, which is 'To explore the relationship between the usage, the time consumption and the results of consumer decision-making processes', primary behavioural data were required. This was analysed using survival analysis, which is highly sensitive to temporal data. Therefore, the biggest challenge is to manage screen recording sessions in the way that ensures all the time

consumed is contributing to the current decision-making process, in terms of searching, receiving and processing information.

Another reason that participants should dedicate the whole duration to the actual information processing is that this thesis is also interested in observing information overload phenomena in decision-making. As mentioned previously, information overload happens when people's short-term memory is fully occupied, and there are two ways to release short-term memory capacity. One is to transmit information from short-term memory to long-term memory, the other is to simply discard information from short-term memory. Therefore, the participant needs to be temporally isolated from other information sources to avoid his/her short-term memory being occupied by the information from other sources. They can transmit information back and forth between their short- and long-term memory or 'forget' information from their short-term memory to the best ability that they can, which is exactly how rational decision makers use their cognitive intelligence and emotional intelligence.

In terms of isolating participants from other information sources, there is one information source that would be difficult to manage, which is the participant's own long-term memory. The aim is not to completely block their long-term memory, which is blocking all the background factors. According to the Theory of Planned Behaviour, if all background factors are blocked, no decision can be made. This thesis identifies two factors that would hugely impact the outcomes of decision-making. Firstly, all the information regarding the price of the product that participants are targeting. For example, when a product is at a price that participant needs to spend a significant amount of time making financial arrangements, it would impact all three key measurements for survival analysis. The decision-making process would be lengthened for considering finances rather than the information of the actual product. The background factors that are involved in this decision-making process, (e.g. financial factors) are beyond the scope of this thesis; and finally, it would be possible the personal financial factors are dominating the ultimate outcome of a decision.

The second factor that should be 'half blocked' is a participant's previous experience of purchasing a specific product, in other words, repeat buying. In this case, the majority of the information is recalled from a participant's own long-term memory to his/her short-

term memory, and all the information displayed on the screen becomes less relevant to the decision-making process. The information this thesis does require its participants to recall is a basic understanding of one or two product categories. This basic understanding, or capability of rationally processing relevant information would be a realistic reflection of real life.

Based on the discussion above, participants were briefed prior to the screen recording session. There are five points that would enhance the validity and reliability of data collection. Firstly, all participants were given the research information sheet during recruitment, and they were given up to half an hour to ask the researcher any questions regarding the research. Secondly, all participants were informed that they were not actually buying any product during the screen recording session or the researcher was not going to buy any product for them. Therefore, their personal financial situation was not relevant to the two decision-making processes that they were offering. They were also asked to ignore any price promotion on Boots.com. Thirdly, all participants were given time to identify one or two product categories for their decision-making. They were clearly briefed that they needed to choose product categories about which they had a basic understanding. It was also clearly suggested that they should not conduct repeat buying at this time. Fourthly, when they were making the two purchase decisions, they needed to temporarily block themselves from other information sources. E.g. they could not search product information using any service interface outside Boots.com. Last but not least, they were briefed that they needed to provide the results of both the decision-making processes. More importantly, they needed to characterise these results into one of the three categories, which were 'to buy', 'not to buy' or 'no decision'. Where participants were having difficulty in reaching a clear outcome, the researcher urged them to make it clear. For example, a small number of participants were making statements such as 'This product is really nice, but I really want to have a look at the store'. The researcher would ask them to choose between 'not to buy' and 'no decision' based on the information they processed when using the mobile retail application.

7.5.6 Field Access

A total of 217 undergraduate students from Nottingham Trent University were recruited in the public areas in four buildings of the city campus of Nottingham Trent University. The four buildings were Boots library, the Chaucer building, the Newton building and the

Student Union building. Each of the participants was invited to provide two consecutive purchase decision-making processes on the Boots mobile website and complete the questionnaire. The nature and purpose of the research were explained in each case and data collection was only progressed when respondents had willingly signed a participant consent form. The database includes 434 screen recorded decision-making processes and 217 questionnaires.

7.6 Limitation to Research Design

Although the research objectives can be met successfully with the current research design, there are four theoretical and methodological limitations of this project that should be discussed. Limitations include:

First, this thesis uses velocity rather than speed to consider, describe and measure consumer decision-making processes. It also views information as external forces that impact the direction of the decision-making process (see section 2.6.2) (Ranaweera and Jayawardhena, 2014). However, with the current research design, measuring the direction change of a decision-making process after the participant received a piece of information is not manageable. Firstly, it is not possible to know whether the information provided has a positive or negative informational effect, and additionally, this effect may change its own direction in time when impacting the ultimate decision. If the direction of information impact could be measured, results could be provided with more micro level observation and with a higher level of research validity.

Second, during the survival data collection phase (see section 5.4.3), participants were not actually purchasing any product on the Boots website. The absence of the factor of price could potentially change the length of a participant's decision-making process (survival time) or change the usages of the mobile retail application (e.g. a participant may use fewer functions when there are financial considerations), which ultimately changes the results of survival analysis (Lee et al., 2014). Another issue is the research participants were not actually buying products in the data collection session, therefore, all the functions related to financial security were not used at all (Aydinli et al., 2014).

Third, this thesis develops a structural model to represent the customer perceived value proposition on a mobile service channel (see section 5.3.2.5). Three independent variables

(Electronic Risks, Usage Convenience and Electronic word-of-mouth) are identified to represent three parties involved in value co-creation on this service channel. However, theoretically, there are other variables which could also represent one of those three parties. For instance, Usefulness (Kim, et al, 2007) could replace or join Usage Convenience to represent the second party, service provider; or Enjoyment (Kim, et al., 2007; Tojib and Tsarenko, 2012; Tao et al., 2015) could replace or join Electronic risks to represent the first party consumer. Theoretically choosing more appropriate constructs or practically including more independent variables may further enhance the validity of this thesis.

Last but not least, when conducting a research project, the researcher needs to carefully identify the target population. This thesis uses undergraduate student data to produce all the inferences on the marketing activity (Espinosa and Ortinau, 2015). Although this thesis has justified the use of student data (see section 5.4.2), as the only criteria is the participant needs to have certain level of English language skills, it does negatively impact the generalisability and heterogeneity when applying this research's contributions to the electronic retailing industry in a wider context (Baker et al., 2010; Thomas, 2011; Pham, 2013).

The recognition of these limitations could enhance the research design in this marketing area. Further discussion is provided alongside the recommendations for further research in section 9.4.

7.7 Pilot Study

A pilot study was conducted before the final survey was administered. As mentioned, the purpose of the pilot study was to test, firstly for survival analysis, the working order of all hardware and software and data processing and analysing of screen recording video data; and secondly the validity issues of the questionnaire.

7.7.1 Pilot Study Data Collection

The pilot study consisted of 16 data collection sessions. The respondents were all postgraduate students from the Nottingham Business School, Nottingham Law School or the School of Social Science (all Nottingham Trent University). All participants were invited to offer feedback on the data collection practices. The feedback from them resulted

in a few reflections on the pilot study. Three main reflections are summarised in the later section (see Section 7.7.3 below).

In the pilot study, all participants were approached prior to the commencement of the fieldwork and given a Participant Information Sheet (see Appendix A) explaining: the purpose of the study; what their participation would involve; their rights with respect to non-participation; and if they subsequently decide not to contribute. They were asked to sign a written consent form (see Appendix B) including permission to video record their usage data on the Boots mobile platform, to collect the questionnaire they completed. No deception or covert observation of the participants was intended.

All respondents had prior experience of using mobile retail applications. As few of them reported using the Boots' mobilised websites regularly, they were given sufficient time to familiarise with the design and functionality on the iPad, till they felt comfortable beginning their decision-making processes. After the screen recording session, all 16 participants also completed a questionnaire.

7.7.2 Screen Recording Data Analysing

This section introduces preliminary findings from the pilot study. The data analysis is mainly focusing on applying survival analysis on the screen recording data, which provides insights on the different roles of the functions of mobile retail applications. Questionnaires were evaluated for ease of use/understanding only.

7.7.2.1 Basic Data Description

For the pilot study, 31 decision-making processes were recorded from the iPad to provide the initial database. Data from each of the 31 videos were examined three times to ensure all functions that had been used in that process were correctly and precisely recorded. Eleven process variables were identified from the recording, which is shown in the following table (Table 7.10).

Descriptive Statistics

	N	Minimum	Maximum	Mean
survival_time	31	40	960	330.16
purchase_decision	31	0	1	.90
related_product_1	31	4	135	44.19
product_review_2	31	0	18	3.48
review_rating_3	31	0	91	27.87
product_description_4	31	0	24	4.13
delivery_information_5	31	0	6	.55
product_pictures_6	31	0	4	.39
product_sorting_7	31	0	4	.74
review_sorting_8	31	0	2	.06
product_listing_9	31	0	18	4.06
Valid N (listwise)	31			

Table 7.10 SPSS descriptive statistics of the screen recording data

Table 7.11 shows the basic description of screen recording data. The shortest and longest decision-making processes observed were 40 seconds and 960 seconds, respectively. The average time spent on a single decision-making process was roughly 330 seconds. The five most frequently used functions were, from high to low: related information in a category; review ratings of products in a category; product description; product listing; and product review.

NO.	Code Name in SPSS	Related Element in the Conceptual Model	Description
1	related_product_1	Usage Convenience	The number of the products in the same or related category was quickly viewed by the participant.
2	product_review_2	Electronic Word-of-Mouth	The number of the product reviews were read by the participant.
3	review_rating_3	Electronic Word-of-Mouth	The review rating is the overall score of the product (for example, 4/5 star) based on the review from previous customers.
4	product_description_4	Usage Convenience	The number of product information provided by the manufacturers.
5	delivery_information_5	Usage Convenience	The number of delivery information provided by Boots.
6	product_pictures_6	Usage Convenience	The number of product pictures was viewed by the participant. The default picture is not counted.
7	product_sorting_7	User Control	The number of times that product sorting function was used by the participant, for example, list products in a category with the order of price from high to low, or bestseller first, etc.
8	review_sorting_8	User Control	The number of times that review sorting function was used by the participant, for example, list reviews of a product with the order of most recent review first, or highest rating review first, etc.
9	product_listing_9	User Control	The number of times that product listing function was used, for example, show next page of products in this category.
10	survival_time	Customer Perceived Value	The length of the decision-making process.
11	purchase_decision	Customer Perceived Value	At the end of decision-making process, whether there is a purchase decision, not purchase decision was made, or no decision could be made.

Table 7.11 Screen recording data description

7.7.2.2 Survival Analysis on the Collected Data

Results from applying survival analysis to all 31 recorded buying decision-making processes are shown in Table 7.12. From the table, the Cox regression model includes 9 time- independent variables. Three variables are statistically significant at p=0.05 level, which are function No.2 product review, function No.4 product description and function No.9 product listing, reaching the statistical significance of 0.003, 0.018 and 0.0.1, respectively. More specifically, for function No.2, it shows that for every time a consumer views a product review, he/she has a 25.2% ([1-0.748]*100%) decreased probability to make a decision at the end of his/her decision-making process. Similarly, every time a consumer uses function No.4 or function No.9, his/her probability of reaching a decision decreases by 18.7% and 28.6%.

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)	95.0% CI for Exp(B)	
							Lower	Upper
related_product_1	-.023	.020	1.263	1	.261	.978	.940	1.017
product_review_2	-.290	.098	8.689	1	.003	.748	.617	.907
review_rating_3	.015	.025	.380	1	.538	1.015	.967	1.066
product_description_4	-.207	.087	5.623	1	.018	.813	.685	.965
delivery_information_5	-.152	.155	.953	1	.329	.859	.634	1.165
product_pictures_6	-.078	.242	.104	1	.748	.925	.576	1.486
product_sorting_7	.125	.233	.285	1	.594	1.133	.717	1.790
review_sorting_8	-1.470	.816	3.245	1	.072	.230	.046	1.138
product_listing_9	-.337	.099	11.575	1	.001	.714	.588	.867

Table 7.12 SPSS survival analysis on recorded decision-making processes

7.7.3 Reflection on the Pilot Study

Reflection on data collection revealed a few points regarding the two research instruments. First of all, there were a few sessions where the researcher's laptop and iPad experienced connecting problems. Several times of rebooting the laptop and iPad were required to re-establish the connection. Second, since some of the respondents were not regular users of the Boots mobilised website (and were unfamiliar with Boots product categories), it was determined that a list of the most popular product categories on Boots would help them start the buying decision-making process at the beginning. Last but not least, a few questions on the questionnaire needed to be reframed in order to let respondents, who were not familiar with marketing concepts, correctly and precisely understand what those questions were about.

The reflections above were used to improve the data collection methods and research instruments used in the empirical elements of this research study.

7.8 Ethical Consideration

Since confidentiality is the main ethical issue in this thesis, there are a few points that assure no individual or their data can be identified by anyone other than the researcher.

The dataset from Boots is not at the individual level but is aggregated to protect consumer identities and Boots follows stringent data protection laws. No individuals can be identified via the data and there is no link that can be made between the Boots data and the sample used by the researcher. Any usage of secondary data will comply with the University's research ethical protocols, as well as the non-disclosure agreement with Boots, which the researcher signed. The screen recordings and the completed questionnaires were handled only by the researcher, in line with data protection principles and the approved research protocol. Hard copies of research notes were kept in locked filing cabinets, and electronic files were kept on password protected computers which were not accessible to any other university staff member. At the end of the study, in line with usual practice, all the video recordings and questionnaires will be destroyed and the relevant files will be erased from the researcher's university computer and personal computer. All relevant details were submitted to the university's Committee on Research Ethics (CREC) and formal ethical approval was given on 26/07/2014.

7.9 Summary

It is shown throughout this research methodology section that the nature of social phenomena influences the methodological approach and vice versa. This project investigates consumer behaviour on mobile channel services. Designing research that can take into consideration as many of the issues surrounding this newly and quickly developing platform is complicated. Therefore, the adoption of the appropriate research philosophy, research approach and research method are crucial, in terms of providing meaningful outcomes with solid validity and reliability.

This thesis holds the critical realism position and sees the consumer purchase decision-making process from two perspectives. On the one hand, when using mobile retail applications on mobile devices, the information that the consumer receives is basically quantifiable. Since the research design is guided by the proposed structural model and

literature reviews, bridging the research concepts and indicators of all conceptual variables is achieved, which makes the objectivist, realist, deductive approach the primary design.

On the other hand, also mentioned in the literature review and conceptual framework develop section, emotional intelligence plays a great part when consumers engage purchase decision-making processes in their mind. The process that digests information from mobile retail platforms is directly linked to one of the most important variables, time consumption. Because, no matter how different consumers emotional intelligence levels are, how different their cognitive intelligence levels (knowledge about the product category they choose) are, as long as they use a function, receive information and process information, it will influence the ultimate time consumption of the purchase decision-making process. Therefore, identifying a research method that is able to analyse time variables along with other variables becomes the way this project appreciates the importance of the consumer's mind in this project, and thus the reason adopting realism as the epistemological position rather than either positivism or interpretivism. Consequently, a deductive approach and quantitative methods are selected.

Given that this thesis is a variable-oriented study, the data collection methods selected must be able to measure all the variables. Both survival analysis and the questionnaire were chosen for this reason. Screen recording and the questionnaire are both capable of building a massive database for those two methods, respectively. Note that, works that process data for those analytical methods are required, which are demonstrated in the next chapter, following the analysis and interpretation of the results.

Chapter 8 Result 1 – Screen Recording & Survival Analysis

8.1 Introduction

Data analysis and results presentation is a process of analysing, manipulating and interpreting data to obtain materials for meeting research objectives. Due to the originality of the research, and, as mentioned in the methodology section, the data analysis of this thesis is separated into two parts, which are survival analysis on screen recording data and structural equation modelling on questionnaire survey data.

Two different data analysis techniques are designed to provide empirical results from two different perspectives. In this chapter, it employs survival analysis with a range of specific data processing and modifying techniques, to demonstrate, mainly, the importance of the functions in a mobile retail application, in terms of assisting consumers making their purchase decisions. Data analysis and results on questionnaire survey are presented in the next chapter. The survival analysis is more focusing on the actual consumer behaviour data. It aims to quantify the actual usages of the research participants', and more importantly, also try to quantify the decision-making process in participants' minds by including two vital variables, which are time consumption and final results of the decision-making process.

This chapter begins with a general overview of the data source population, demographic figures are provided. Then, the screen recording data, as a raw data, is processed to clearly address all measurements and variables that are required for performing survival analysis.

The next step is conducting the survival analysis on both the real-time consumer purchase decision-making process data and modified decision-making process data. The difference between these two is that, the results from Boots' secondary data are utilised to modify the natural decision-making processes, to obtain the modified decision-making process data. Discussion regarding those two sets of survival analysis is provided in great details in the earlier section. 5.3 Characteristics of research sample

8.2 Data Processing and Basic Results on Demographic Analysis

As mention previously, the research data were collected from 217 undergraduate students of Nottingham Trent University. Whereas the data is collected individually in a session of 10 to 20 minutes, depending on the length of the participants' decision-making processes, the database is analysed and interpreted on an aggregated level. This is so as to obtain an approximation of population behaviour.

The raw data collected in the screen recording session is the video footages of the on-screen consumer purchase decision-making process on iPad. These video footages need to be processed for survival analysis for which three steps are required. The first step is counting all the functions that were used on a time axis. More specifically, it needs to record, on a chart, that what functions had been used in each minute of a decision-making process, and how many times that function was used in those minutes. The second step is to identify the length of the decision-making processes, which is, also, the length of the screen recording. The final step is to mark the final result of each decision-making process. The possible results include 'a purchase decision', 'a not purchase decision' and 'non-decision can be made' at the end of the decision-making process.

The database of survival analysis includes 11 variables, which are listed in the table below (Table 8.1).

8.2.1 Overview on Sample Demographics

In order to determine how, or whether the purchase decision-making processes from the research participants are influenced by their individual characteristics, mainly, their demographic characteristics, several questions are included in the questionnaire survey (see Appendix. C). In marketing literature, a number of variables have been reported to have an influence on consumer behaviour, such as gender, age, the level of education and cultural background. Other factors, for example, variables regarding their previous experience of using mobile retail applications, could also be used to better understanding consumers' current states of utilising mobile retail applications. Therefore, in this section, data from six demographic questions are analysed to demonstrate an overview of the characteristics of the research sample.

Number	Code Name in SPSS	Description
1	related_product_1	The number of the products in the same or related category was quickly viewed by the participant.
2	product_review_2	The number of the product reviews were read by the participant.
3	review_rating_3	The review rating is the overall score of the product (for example, 4/5 star) based on the review from previous customers.
4	product_description_4	The number of product information provided by the manufacturers.
5	delivery_information_5	The number of delivery information provided by Boots.
6	product_pictures_6	The number of product pictures was viewed by the participant. The default picture is not counted.
7	product_sorting_7	The number of times that product sorting function was used by the participant, for example, list products in a category with the order of price from high to low, or bestseller first, etc.
8	review_sorting_8	The number of times that review sorting function was used by the participant, for example, list reviews of a product with the order of most recent review first, or highest rating review first, etc.
9	product_listing_9	The number of times that product listing function was used, for example, show next page of products in this category.
10	survival_time	The length of the decision-making process
11	purchase_decision	At the end of the decision-making process, whether there is a purchase decision, not purchase decision was made, or no decision could be made.

Table 8.1 11 variables in survival analysis

First of all, Table 8.2 revealed that nearly 55% of the participants are female students of Nottingham Trent University and other 45% are male. The unbalance of gender is due to, on one hand, the higher, but only slightly, rejection rate when recruiting male participants, they were less interested in popular product categories on Boots' mobilised website. On the other hand, Female students show great interesting in shopping cosmetic and fragment products. When casually chatting with participants throughout the recruiting process, normally, it is more likely that female participants have been 'regular customers' of Boots, whereas male participants often claim that they 'have been Boots before' or 'know their website'. Overall, according to the "Patterns and Trends in UK High Education" report in 2014, the percentage of female students in the UK is 57.5%, which is very close to the figure of this thesis's sample.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	122	56.2	56.2	56.2
	Male	95	43.8	43.8	100.0
	Total	217	100.0	100.0	

Table 8.2. Gender of research participants

Second, in Table 8.3 shows almost half of the participants are final year undergraduate students, and others are nearly equally distributed into the undergraduate level 1 and level 2 groups. This may be caused by that final year students showed more interest participating this thesis. Some of the final year students mentioned that they were doing their final year research project, taking part of this thesis was a way of knowing how others conduct a research project.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Undergraduate-level 1	58	26.7	26.7	26.7
	Undergraduate-level 2	57	26.3	26.3	53.0
	Undergraduate-level 3	102	47.0	47.0	100.0
	Total	217	100.0	100.0	

Table 8.3. Current study educational level of research participants

Third, Table 8.4 shows that more than 70% of the participants are in the age group of 20-25, others are all in the group of under 20. This is an expecting result, given that, nearly one-third of undergraduate students in the UK are under 24 years old, and final year undergraduate students are taking half the weight of the sample.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 20	60	27.6	27.6	27.6
	20-25	156	71.9	71.9	99.5
	26-30	1	.5	.5	100.0
	Total	217	100.0	100.0	

Table 8.4. Age of research participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Central America and the Caribbean	5	2.3	2.3	2.3
	Europe	17	7.8	7.8	10.1
	Middle East, North Africa, and Greater Arabia	5	2.3	2.3	12.4
	North America	3	1.4	1.4	13.8
	South America	1	.5	.5	14.3
	South Asia	7	3.2	3.2	17.5
	Sub-Saharan Africa	3	1.4	1.4	18.9
	United Kingdom	176	81.1	81.1	100.0
	Total	217	100.0	100.0	

Table 8.5. Cultural background of research participants

Finally, 81% of participants have the British background (see Table 8.5). Participants from other cultural backgrounds, such as Europe, North America, and South Asia are also fluent English speakers, which, in total, gives the percentage of fluent English speakers of 93.5%. As discussed previously, the language skill of participants is vital to this thesis, insufficient of language skills may lengthen their decision-making processes. In the next section of this chapter, the survival time, which is the length of participant's decision-making process, is highlighted with its methodological and practical contributions to the final outcomes of this thesis. As the table shows, when recruiting participants, this thesis successfully managed to minimise the impact of language skills.

The next two measurements are demonstrating participants' previous experiences of using or making a purchase decision on mobile retail applications. Table 8.6 shows that more than 34% and 38.5% of participants characterise their usage of mobile retail applications as very often and often, respectively. Only 2.3% of participant stated they have never purposefully view product or service information on mobile retail applications before the data collection, but they were familiar with the user environment on typical mobile retail applications, such as Boots' mobilised website.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Ofter	75	34.6	34.6	34.6
	Often	84	38.7	38.7	73.3
	Sometimes	53	24.4	24.4	97.7
	Never	5	2.3	2.3	100.0
	Total	217	100.0	100.0	

Table 8.6. Frequency of research participants to view information
on mobile retail applications

This ensures most of the participants are familiar with the mobile application environment, so that they can use any necessary functions when they want to. In Table 8.7, nearly half (53.5%) of participants claim they very often/often make purchase decisions on mobile retail applications, which is lower than the total percentage (73.3%) of participants who very often/often purposefully use mobile retail applications. Also, only 6.0% of participants never made purchase decisions on mobile applications. Given in the data collection session, participants were not actually purchasing any product on the data collection tool (iPad), participants were asked only orally inform the researcher the results of their decision-making process, the lack of experience of making a purchase decision on mobile retail applications has no negative effects on those participants' data.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Ofter	41	18.9	18.9	18.9
	Often	75	34.6	34.6	53.5
	Sometimes	88	40.6	40.6	94.0
	Never	13	6.0	6.0	100.0
	Total	217	100.0	100.0	

Table 8.7. Frequency of research participants to make consumer purchase decisions
on mobile retail applications

8.2.2 Survival Time

In general, in a research that employs survival analysis, the most important issue is to measure survival time. Firstly, in the case that the target event occurred before the end of

data collection period, survival time is from the beginning of data collection until the moment that target events occurred. Secondly, in the case that target event did not happen before the end of data collection session, survival time is the length of the whole data collection period. Under such situation, the researcher would not be able to know whether or when the target event is going to happen. Thus, survival time is a right censored data. Lastly, in the case that before the target event happened, and also before the end of data collection period, the research subject left the research and no observation could be made afterwards. This sort of situation also offers right censoring data, and the survival time is how long the subject was observed. Survival analysis, unlike ordinary regression analysis, is capable of analysing information from both censored data and uncensored observations, in order to estimate the importance of variables that have impacts on the occurrence of the target event.

For this thesis, a methodological innovation is applied on survival data collection. All 217 participants in 434 purchase decision were not given a fixed period of time to make their decision on mobile retail applications. They were spending time as long as they naturally needed in two seperate decision-making process on mobile channels to offer their behavioural data. In the case that participants could clearly state that they have reached either 'a purchase decision' or 'a not purchase decision', these data are determined as censored data. For the case that participants could not decide after using a mobile retail application for a period, those are uncensored data, or right censoring data, since the target event, which is a decision, could not be reached. Note that, when participants claimed that they could not decide of buying a product, they meant that no matter how long their decision-making process could last on Boots' mobilised website, the lack of crucial information or vital functions made them not be able to reach a decision. These statements can also be interpreted as participants could not reach decisions even if the data collection period is infinite. And when participants claimed they could not decide, their cases can be considered as they were leaving this thesis without the target event happened.

Therefore, the data collection period for this study is set as infinite. For participants who could reach either 'a purchase decision' or 'a not purchase decision', the survival time is from the starting points of their decision-making processes on mobile retail applications to the moment they claimed that they have decided. For participants who claimed that they

could not decide, the survival time was also the length of their decision-making processes, since that was how long they had been observed.

This thesis also employees a method to modified survival time variable, which will be discussed later in section 8.4.

Results relating to survival time are shown in Table 8.8 below. The 217 participants provided 434 decision-making processes to analyse. The average survival time was 136 seconds, and the standard deviation was 70 seconds. The longest survival time recorded was 550 seconds, and the shortest, 40 seconds." Further application of secondary data that modifies the survival time will be discussed later.

	N	Minimum	Maximum	Mean	Std. Deviation
survival time	434	40	550	135.82	70.093
Valid N (listwise)	434				

Table 8.8 Descriptive statistics of the length of the consumer purchase decision-making processes (survival time)

8.2.3 Purchase Decision

The variable of the purchase decision is the ultimate outcome of the participant's purchase decision-making processes. In the data collection sessions, after using a mobile retail application for a single decision-making process for one product in a single product category, participants can stop the screen recording in three ways. Firstly, they reached a purchase decision when they have sufficient information about a product. Secondly, they naturally reached a decision of not purchase. In this situation, participants clearly realise that none of the product meets their expectation. To reach this conclusion, the information on mobile retail applications should also be adequate. And thirdly, after spending some time on a decision-making process, without vital information that missed on the mobile application, they could not make a decision on either purchase or not purchase.

In this section, both purchase decisions and not purchase decisions are characterised as 'decision has been made' to represent the usage value of mobile retail applications. In survival analysis data set, they are recorded as the 'expecting event happened'. Whereas 'cannot make a decision' is the situation that usage value is not adequate to complete a full

decision-making process. This is the 'expecting event did not happen' data in survival analysis, also known as the right censored data.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	111	25.6	25.6	25.6
	decision has been made	323	74.4	74.4	100.0
	Total	434	100.0	100.0	

Table 8.9. Statistics of purchase decision

As Table 8.9 shows, in the total 434 decision-making processes, nearly three-fourth have reached a decision. In section 8.4, both purchase decision and not purchase decision are used to represent usage value for consumers. In section 8.5, only those purchase decisions are used to represent value for electronic retailers. Detailed results are provided and discussed in those two sections.

8.2.4 Related Product

Related product is the function that shows a cluster of brief information about one product. As shown in Figure 8.1, in the green square, normally, it includes one picture of the product, a very brief description under the picture and the price of the product. With this function, a consumer can choose either to view detailed information about one single product, or to view more related product information.
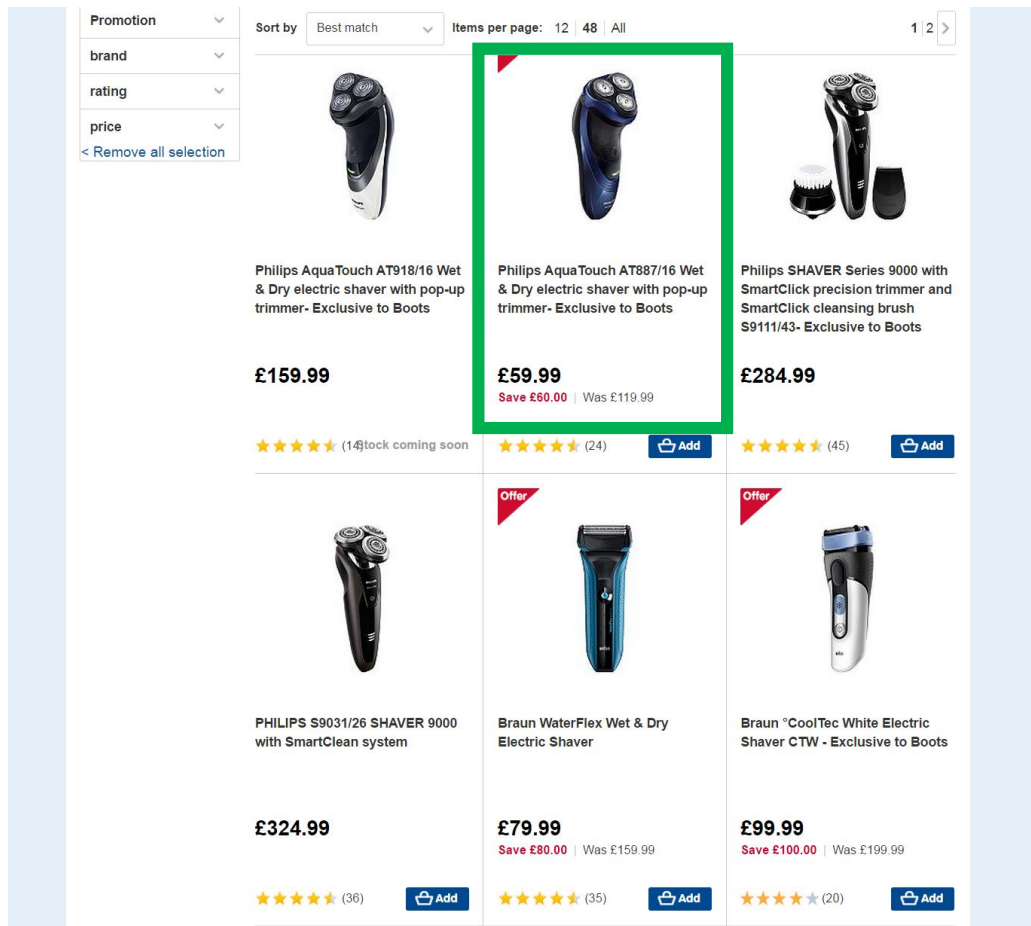
Figure 8.1 Related product function on Boots' mobilised website

As the portal to the individual product page, the number of how many these information clusters have been viewed are recorded as how many times the 'related product' function has been used. In the screen recording footage, this function is counted when the participant scrolled down with a reasonable speed. It was not counted when they spent less than half a second on three products. On average, each participant used 19 times of this function.

8.2.5 Product Review

The 'product review' function is where a consumer can read previous consumers reviews regarding the product. In Figure 8.2 below, the green square highlights an example of product review on Boots' mobilised website. In the green square, there is a rating of the product, a title of the customer's review, the narrative review and the response from Boots. Note that the retailer, Boots in this case, normally only respond to negative reviews.
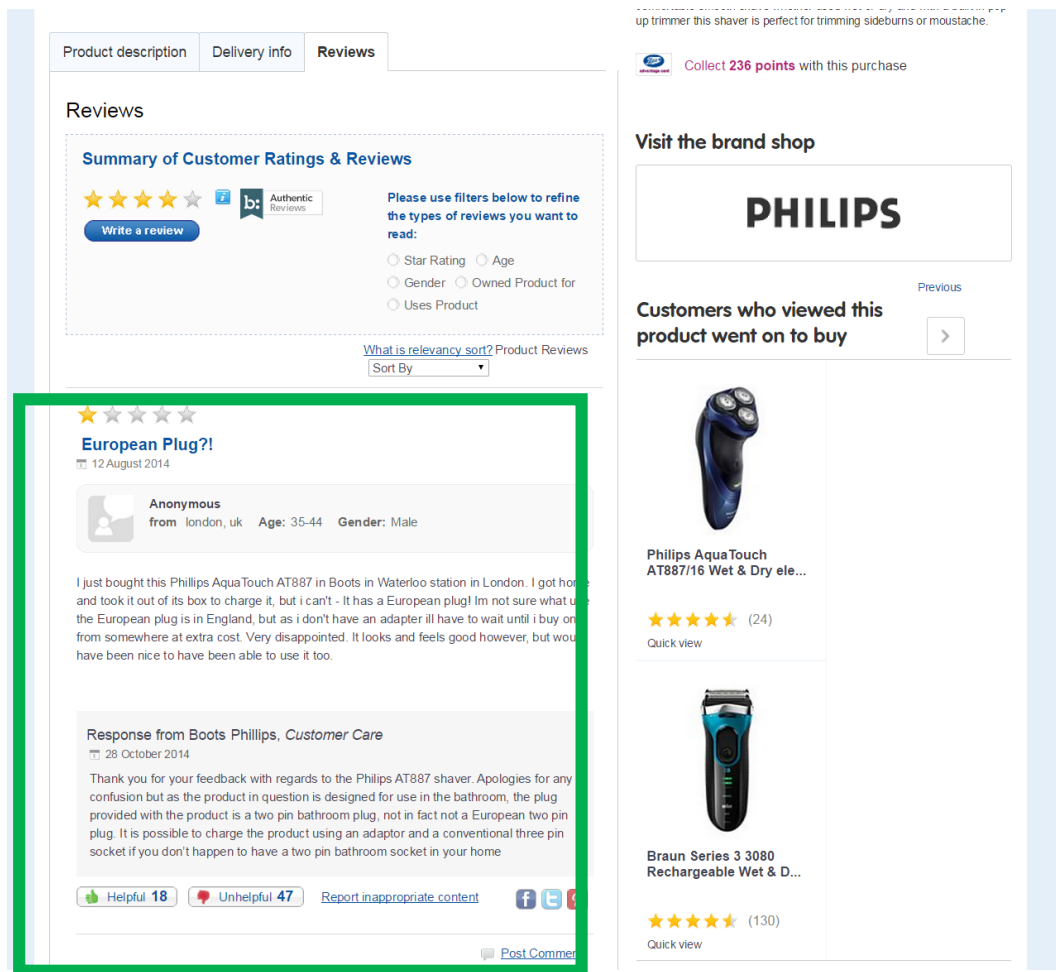
Figure 8.2 An example of product review on Boots' mobilised website

When counting the number of reviews that participants read when making a purchase decision, any review that is shorter than eight lines are counted as one usage of product review function. If the review is longer than eight lines, which means that participant was spending significantly longer time on that particular review, it would be counted as once every eight lines. For instance, if the review is 12 lines long on the screen, and from the footage, that participant read all 12 lines, the product review functions were considered being used for twice.

On average (see Table 8.10), the product review function was used 1.41 times per decision-making process. Over 60% of participants did not consider any product review in their decision-making process. For the rest 40% of participants who read reviews, most of them (88.2%, 149 out of 169) read no more than 6 reviews.

product_review_2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	265	61.1	61.1	61.1
	1	30	6.9	6.9	68.0
	2	32	7.4	7.4	75.3
	3	52	12.0	12.0	87.3
	4	13	3.0	3.0	90.3
	5	4	.9	.9	91.2
	6	18	4.1	4.1	95.4
	7	7	1.6	1.6	97.0
	8	4	.9	.9	97.9
	9	2	.5	.5	98.4
	10	4	.9	.9	99.3
	11	1	.2	.2	99.5
	15	1	.2	.2	99.8
	18	1	.2	.2	100.0
	Total	434	100.0	100.0	

Table 8.10 Usage of product review function in database

8.2.6 Review Rating

The review rating function refers to the overall review rating of one product, which can be seen on the product listing page. Although in the example blow (Figure 8.3), the review rating (in green square) is parts of the key information of one product, which is all in one area. That information is used differently, and from different sources. For example, consumers could use review sorting function, which will be mentioned in section 8.2.10, to highlight the products with higher review ratings. More importantly, the source of review rating is previous customers, and other information (picture, brief description and price) is the retailer. Different sources of information represent different parties involved in information interaction, which is crucial in this thesis. Therefore, this thesis takes that information into consideration separately.
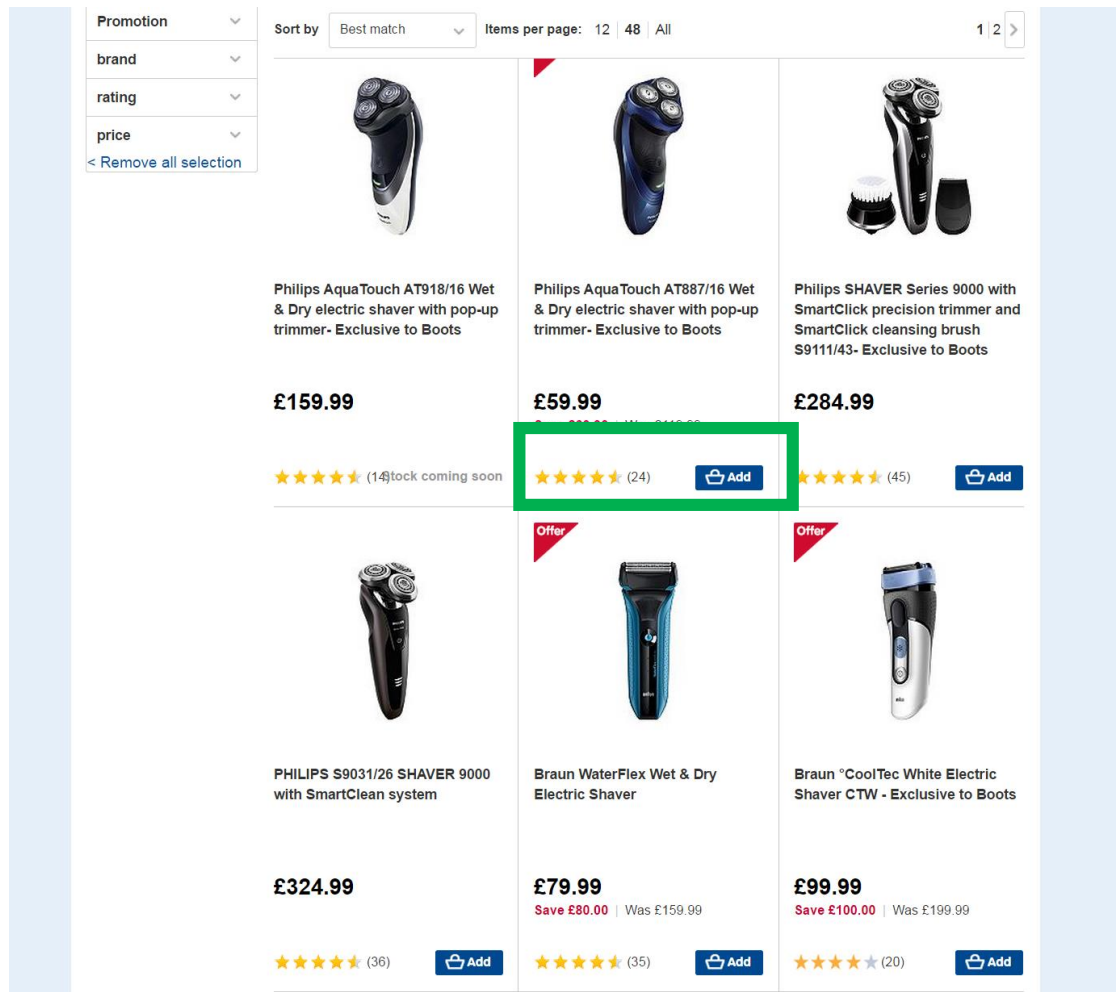
Figure 8.3 Example of review rating function on Boots' mobilised website

When counting the usage of review rating function, similar to counting the function of the related product, every review rating that has been looked at with a reasonable speed is counted as one time of usage. Each time that participant opens a product listing page, on each of the pages, all items that have not had a review rating is counted as one. Because their review ratings are incomparable to others. Averagely, 16 review rating is being viewed by the participant.

8.2.7 Product Description
The product description information on Boots' mobilised website is provided by the manufacturer of that product. The Figure 8.4 shows a typical example of product description on Boots' mobilised website.

Figure 8.4 An example of product description on Boots' mobilised website

Normally, it contains crucial information, such as instruction, key feathers and ingredients. When counting the usage of this function, the length of the information needs to be taken into consideration. Similar to the 'product review' function, every eight lines of information that have been read by the participant is considered as one usage of the 'product description' function. For instance, if the participant read the information within the green area in Figure 8.4, it would be counted as three usages of product review function, since there are approximately 25 lines of information.

In Table 8.11, it shows, in all 434 decision-making process, nearly one-third of the participants (31.1%) did not read any product decryption information, and almost half of them (48.2%) of them chose to read 1 or two units (8 lines) of information in their

decision-making process. Only 3.5% of them read more than 6 units of the product description.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	135	31.1	31.1	31.1
	1	124	28.6	28.6	59.7
	2	85	19.6	19.6	79.3
	3	41	9.4	9.4	88.7
	4	19	4.4	4.4	93.1
	5	13	3.0	3.0	96.1
	6	6	1.4	1.4	97.5
	7	2	.5	.5	97.9
	8	3	.7	.7	98.6
	9	2	.5	.5	99.1
	10	1	.2	.2	99.3
	11	2	.5	.5	99.8
	12	1	.2	.2	100.0
	Total	434	100.0	100.0	

Table 8.11 Descriptive statistics of 'product description' usage.

8.2.8 Delivery Information

On Boots' mobilised website, the 'delivery information' is next to the 'product description' function. As the example shows below, in the green square in Figure 8.5, it provides a set of delivery options, with delivery charge and details. When counting the usage of this function, the 'eight lines' role is also applied. In all 434 decision-making process, nearly 90% (87.8%) of the participants never attempted to read any of that delivery option. The reason could be that all participants were aware they were not actually purchasing any products in the screen recording sessions. Therefore, that delivery information might be less relevant to the participants. This is one of the practical limitation this thesis encountered, along with the missing of 'private personal information' and 'financial information' function usage. That limitation will be discussed in the later section of this thesis.
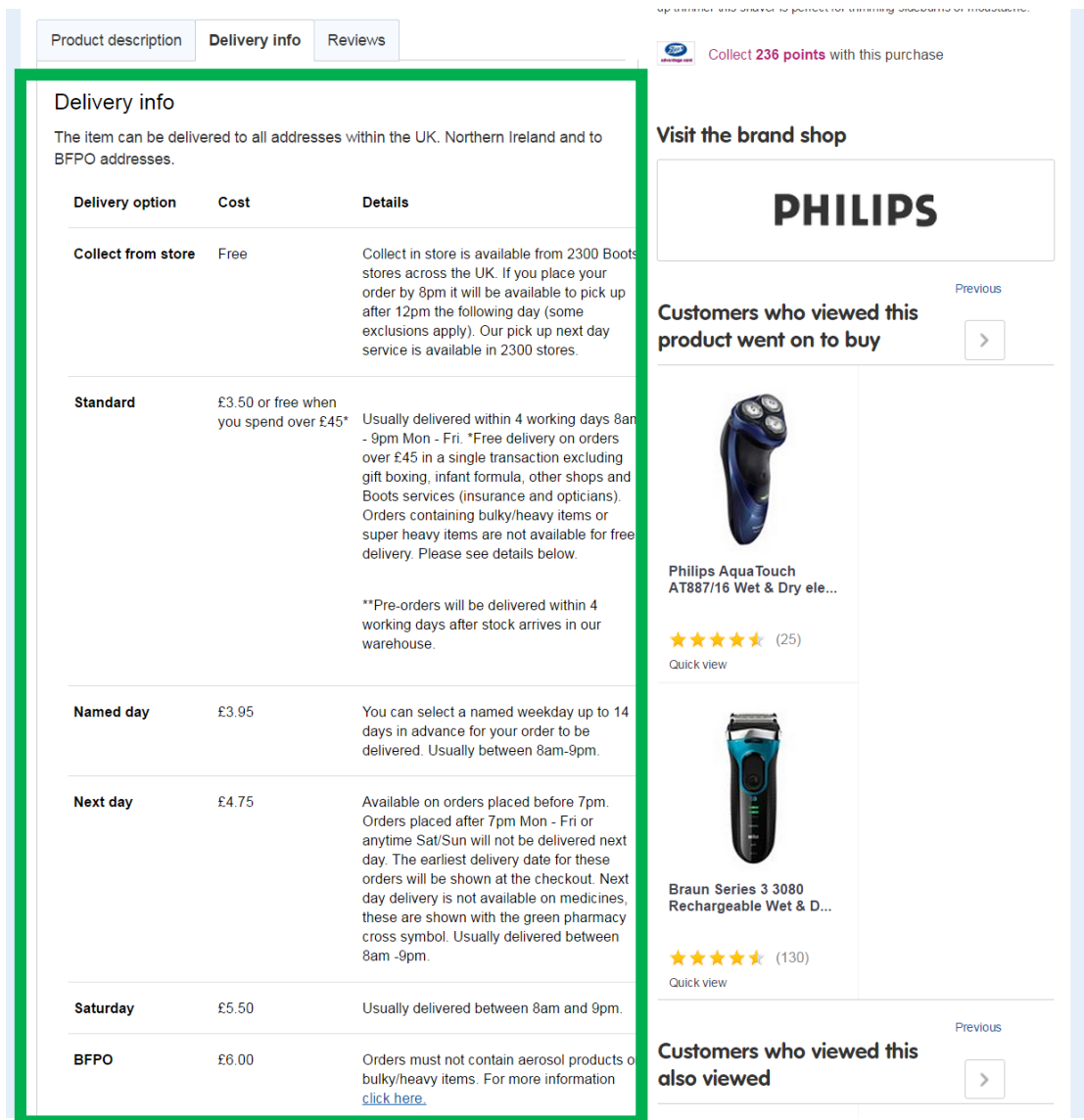
Figure 8.5 Example of delivery information function on Boots' mobilised website

8.2.9 Product Pictures

Different from the picture on the product listing page (see section 8.2.4), the 'product pictures' function refers to the pictures on the product page. More specifically, as Figure 8.6 shows, the product picture function does not include the default picture, which, in the example, the first picture of the five. The default picture shows up when a consumer chooses to view the detailed information of one product, regardless whether the user requires this information or not. Therefore, this thesis counts the usage of product picture function (see Table 8.12) only when the participants deliberately tap on the pictures other than the default picture. In the example below, if the participants tapped on all five picture,

it would be recorded as the product pictures function was used for four times in a decision-making process.

Figure 8.6 An example of product picture function on Boots' mobilised website.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	236	54.4	54.4	54.4
	1	131	30.2	30.2	84.6
	2	40	9.2	9.2	93.8
	3	12	2.8	2.8	96.5
	4	7	1.6	1.6	98.2
	6	6	1.4	1.4	99.5
	8	1	.2	.2	99.8
	10	1	.2	.2	100.0
	Total	434	100.0	100.0	

Table 8.12 Usage frequency of product picture function

8.2.10 Product Sorting

As mentioned in the conceptual framework section, User Control is proposed as the mediator in the conceptual framework. And, in the survival analysis, product sorting is one of the representations of 'user control' variables. Unlike those previously discussed functions, this function does not provide any previously unrevealed information on the screen, it is only used to organise the order of 'related product' and 'review rating' information on the screen. As the example below (Figure 8.7) shows, in the green square, it gives five options of the orders of showing products on the screen. From the screen recording data of 434 decision-making process, 73.5% of the participants never used this function in their decision-making processes, and 16.1% of them only used once. Compare to this function, the participants were willing to use the 'product listing' more often, which will be discussed in section 8.2.12.
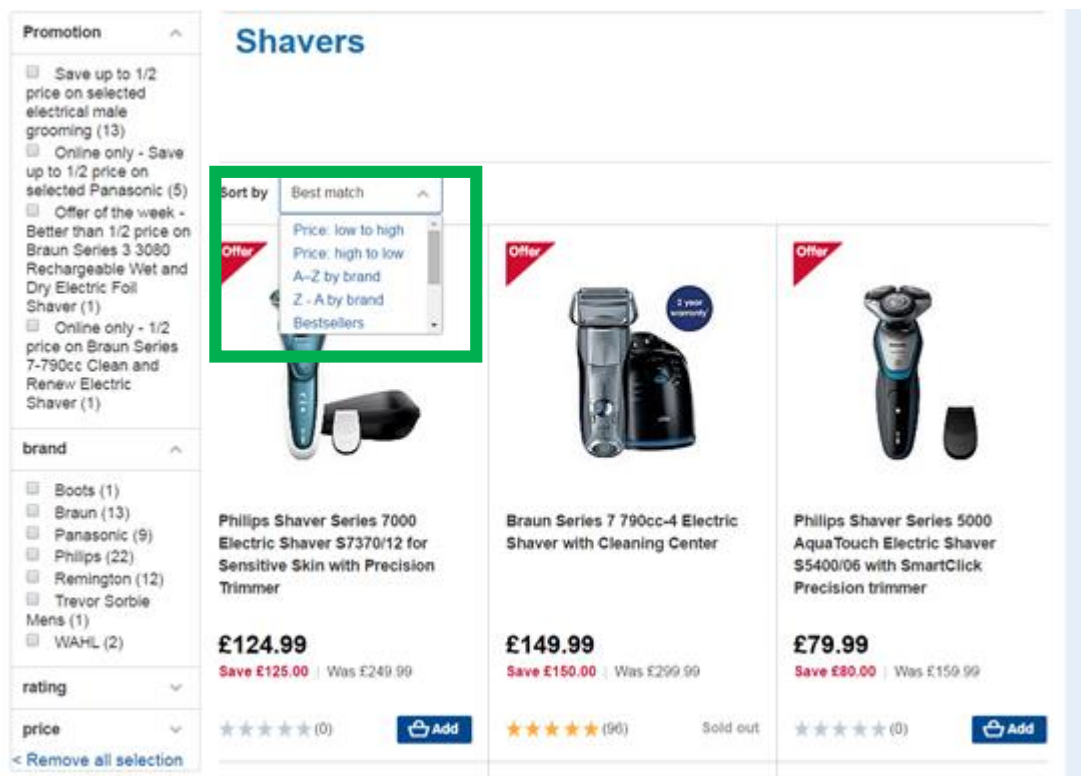
Figure 8.7 Example of product sorting function on Boots' mobilised website

8.2.11 Review Sorting

Review sorting function is the second function that represents the mediator of User Control. As the example (Figure 8.8) shows below, it gives a set of options of organising the order of reviews. With this function, consumers can quickly access what they believe the most helpful reviews. In this thesis, this function is the least used function in screen recording, it was only used once every 5 decision-making processes.
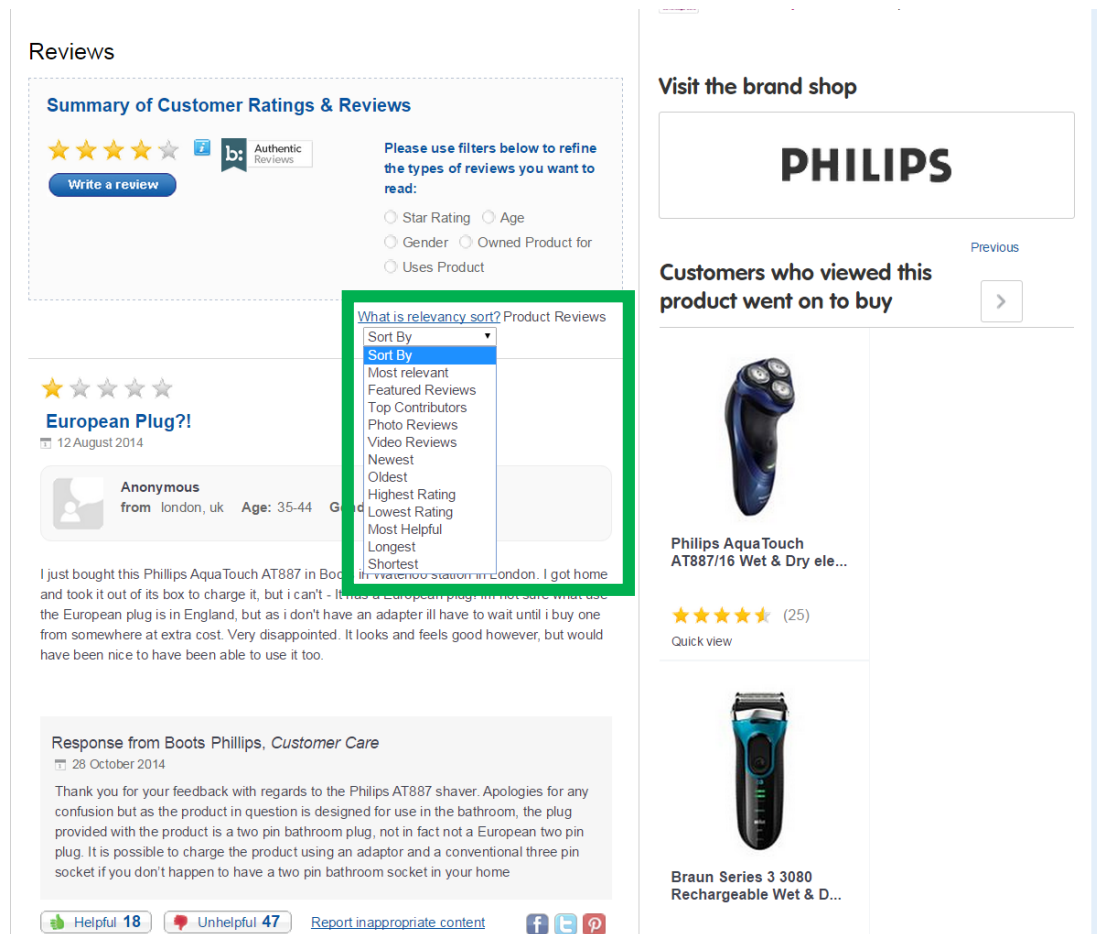
Figure 8.8 An example of the review sorting function on Boots' mobilised website.

8.2.12 Product Listing

Product listing function is the last function that represents User Control mediator. The participants have two accesses of this function. As the example (Figure 8.9) shows below, one is through the product sub-category buttons, another one is using the options, normally on the left side of the screen. Since in the screen recording session, participants have chosen the product category, those options enable the participants to change the displayed

products within the product category. In this way, participants can control the order of the information supporting their decision-making processes. On average, participants used 3 times of product listing function in each of their decision-making processes. One-third of the participants used twice of this function, followed by 3 usages (23%) and 1 usage (20%) in the Table 8.13 below.

Figure 8.9 An example of the product listing function usage.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1	87	20.0	20.0	20.0
	2	144	33.2	33.2	53.2
	3	100	23.0	23.0	76.3
	4	40	9.2	9.2	85.5
	5	26	6.0	6.0	91.5
	6	18	4.1	4.1	95.6
	7	3	.7	.7	96.3
	8	2	.5	.5	96.8
	9	6	1.4	1.4	98.2
	10	2	.5	.5	98.6
	11	1	.2	.2	98.8
	12	2	.5	.5	99.3
	16	1	.2	.2	99.5
	17	1	.2	.2	99.8
	98	1	.2	.2	100.0
	Total	434	100.0	100.0	

Table 8.13 Statistics of the product listing function usage.

8.3 Boots' Website Secondary Data Analysis.

Boots' website marketing team has been supporting this thesis with providing their consumers' usage data. The behavioural data are on the aggregated level, and are analysed to provide insights on the average time consumption of Boots' customers visiting the website.

Given that, based on Boots' data, this thesis is only able to accurately calculate average time consumption on a single decision-making process. And switching product category means either the previous decision-making process has reached to an end, or the current decision-making process is interfered by other information interaction, which would significantly impact the length of the ongoing one. This would hugely undermine the validity of survival analysis. Therefore, the primary data collection on mobilised website usage is limited to one product category. Participants are clearly advised not to jump between different product categories, otherwise their data will be excluded from this thesis.

As Table 8.14 and Table 8.15 show below, Boots' secondary data provide crucial information on a) total page view times in the month of February, 2014, b) on average, how many times that one single user, within one decision-making process, viewed that page, c) the average, how much time Boots' customers spent on viewing information on the page in that particular product category, and finally d), how many the website page was viewed by their customer.

Since dataset b) and c) are provided as an average value, the most appropriate way of analysing consumers' usage is also, calculating the average time the spent on a single decision-making process. This value comprised two parts, including the average time one single decision-making process spent on listing page, where consumers generally view product category information, and the average time one single decision-making process spent on the category page, where consumers view information on a single product. Those two parts are the compulsory actions for consumer decision-making process on Boots' website.

Using the data from the top 20 popular product categories on Boots' website, in a single decision-making process on Boots'.com, the calculating results shows, averagely, a single customer spent 150.48 seconds on view product listing pages and consume 22.16 seconds for view product category pages, which gives in total 172.64 seconds per decision-making process. The figure of 172.64 seconds is approximated to 3 minutes for later data analysis. This 3 minutes time mark is utilised to modify this thesis's primary data, in order provide a rational right-censoring point so that Survival Analysis can be applied effectively.

	Page Name (Listing Page)	Page Views	Page Views / Session	Average Time On Page (seconds)	Total View Time/Session (seconds)	Total View Time (seconds)
1	All Fragrance for Her	288,247	5.77	31	178.87	51,558,740.89
2	All Fragrance for Him	175,672	5.32	34	180.88	31,775,551.36
3	Foundation	152,817	4.63	30	138.9	21,226,281.3
4	Women's Glasses	104,324	7.26	21	152.46	15,905,237.04
5	Lipstick	69,732	4	28	112	7,809,984
6	Mascara	66,875	4.41	31	136.71	9,142,481.25
7	Moisturisers	66,038	4.64	34	157.76	10,418,154.88
8	Bottles & Bags	64,197	4.91	35	171.85	11,032,254.45
9	Shampoo	57,673	4.85	30	145.5	8,391,421.5
10	Brow Liners	57,288	4.54	30	136.2	7,802,625.6
11	Eye shadows	54,095	4.95	28	138.6	7,497,567
12	Cleaners and Toners	51,222	4.51	33	148.83	7,623,370.26
13	Electric Toothbrushes	50,532	2.96	43	127.28	6,431,712.96
14	Nail Polish	50,335	4.35	28	121.8	6,130,803
15	Concealer	45,166	3.96	30	118.8	5,365,720.8
16	Blusher	39,941	4.56	29	132.24	5,281,797.84
17	Men's Glasses	38,010	6.63	22	145.86	5,544,138.6
18	Face Brushes	37,193	3.94	31	122.14	4,542,753.02
19	Gel Nail	33,075	3.68	28	103.04	3,408,048
20	Clear Skin	32,297	3.8	33	125.4	4,050,043.8
	Sum	1,534,729				230,938,687.6
Average time spent per listing pages: 150.48 second						

Table 8.14 Boots' customers average time consumption on listing pages

	Page Name (Category Page)	Page Views	Page Views / Session	Average Time On Page (seconds)	Total View Time/Session (seconds)	Total View Time (second)
1	Make-up	194,238	1.64	12	19.68	3,822,603.84
2	Face	88,328	1.68	11	18.48	1,632,301.44
3	Skincare	82,188	1.6	16	25.6	2,104,012.8
4	Fragrance for Her	80,901	1.41	15	21.15	1,711,056.15
5	Health Shop	78,160	1.56	18	28.08	2,194,732.8
6	Baby	73,866	1.61	22	35.42	2,616,333.72
7	Beauty	69,946	1.41	18	25.38	1,775,229.48
8	Hair	66,268	1.49	12	17.88	1,184,871.84
9	Mini Club	58,119	1.69	10	16.9	982,211.1
10	Fragrance for Him	56,576	1.47	15	22.05	1,247,500.8
11	Eyes	49,844	1.54	11	16.94	844,357.36
12	Baby Feeding	47,461	1.58	14	22.12	1,049,837.32
13	Hair Styling	43,613	1.73	14	24.22	1,056,306.86
14	Men's Toiletries	39,026	2.22	15	33.3	1,299,565.8
15	Colorants	38,727	1.53	12	18.36	711,027.72
16	Nappies	37,297	1.58	12	18.96	707,151.12
17	Soap	37,180	1.82	13	23.66	879,678.8
18	Nails	35,662	1.62	12	19.44	693,269.28
19	Lips	32,921	1.53	9	13.77	453,322.17
20	Premium Beauty	30,020	1.44	12	17.28	518,745.6
	Sum	1,240,341				27,484,116
Average time spent per category pages: 22.16 second						

Table 8.15 Boots' customers average time consumption on category pages

8.4 Survival Analysis for Making Decision

In the previous section, the decision-making processes collected by this thesis have been quantified. The usages of nine key functions have been counted and input into SPSS database, along with the length and results of those decision-making processes. All the data are located in the time dimension, which means every variable in the datasets has a time mark with it. Given that, from Boots' secondary data, also the actual behavioural data of Boots' mobilised website users, three minutes is the mean length of their single decision-making processes. Therefore, two most important time marks on the time dimension are identified, they are, from the beginning of a decision-making process, three minutes and an infinite amount of time. These two time marks are representing the ordinary decision-making processes, and natural decision-making process. A detailed discussion is provided later in this section.

Given these two time marks, data can be separated into two parts, things happened before three minutes mark, and things happened after three minutes mark. For instance, according to the secondary data analysis, functions used in the first three minutes of a decision-making process is different from the same function used after the first three minutes. And in a single decision-making process, the result can be also different before and after three minutes time mark.

As mentioned in the methodology section, one of the advantages of utilising survival analysis is, that it is capable of dealing with right censoring data, which are the datasets that the expecting event did not happen before the end of data collection. In this particular research, it is crucial to use this advantage to provide a deep understanding of consumers' decision-making process on mobile retail applications.

More specifically, in the data collection session, participants were required to clearly report the final results of their decision-making processes. When they were reporting their results, without any boundaries of the length of their decision-making processes, there were three different results they could possibly achieve. They are a purchase decision, a not purchase decision, and no decision could be made regardless how much time they would spend on their decision-making processes on Boots' mobilised website. The third kind of result, that no decision can be made, is one of the fundamental assumptions that this thesis is built on.

The assumption is, that the participants are capable of knowing they would not reach a decision if the information source is solely Boots' mobilised website, and, even if they can spend an infinite amount of time on this retail application. With its fundamental assumption, this thesis can consider the 'no decision can be made' results as the right censoring data, without asking participants to spend a significant amount of time on their decision-making processes. This is the first source of right censoring data, which is at some points (of time that spend on decision-making process), the participant's decision realises the expecting event (either purchase decision or not purchase decision) will never happen.

The second right censoring data source is the modification of decision-making process with the assistance of Boots' secondary data. With the time mark, the results of any decision-making process longer than three minutes became modifiable. More specifically, if survival analysis only takes into account the first three minutes of those decision-making processes, those processes that reached a decision within three minutes remain same, and all other processes become the right censoring 'no decision can be made' decisions, given there was actually no decision was achieved by the three minutes time mark.

Therefore, all the decision-making process collected can be analysed without or with modification. Without the modification of Boots' secondary data, it has only one source of right censoring data, which is the 'no decision can be made' processes. With the modification, it has two sources of right censoring data, which are the 'no decision can be made' process, and any decision-making process that lasted beyond three minutes time mark. This method or classification standard starts from consumers' point of view, highlights the usage value of mobile retail applications, that is, defining the 'expecting event', in survival analysis, as a decision can be made. A final decision, regardless whether it is a purchase decision or not purchase decision, is considered as the indicator of customer perceived value.

The right censoring data are decided on the combination of two dimensions, time and results. The method of using different time mark on time dimension has been discussed above. Next, this thesis is going to adopt a different understanding of value and discuss the usage value of mobile retail applications from a company's perspective (Martelo et al., 2013). Previous method start from a consumers' point of view, highlights the usage value of mobile retail applications, which is using mobile retail applications to make a decision.

However, for companies, the most valuable results of consumers' decision-making processes are the purchase decisions, given those purchase decisions are strengthening the relationship between consumers and companies, and bringing what companies rely on to stay in the business, the actual sales figure and profits.

In order to fulfil this purpose, this thesis uses 'not purchase' decision as the second source of right censoring data. In this situation, the 'expecting event' is redefined as 'purchase decision' rather than 'decision' in the previous discussion. Both 'not purchase decision' and 'decision cannot be made' processes are providing right censoring data. After the 'expecting event' being redefined, the time marks of three minutes can be utilised again to modify datasets.

In the following sections of this chapter, the decision-making processes database is going to be analysed by survival analysis. The structure is shown in Table 8.16, four sub-sections are addressing the issues when interpreting each of the two dimensions in two different ways. Cox' regression is used to indicate the importance of each function, in terms of impacting the likelihood of the 'expecting event' happened.

Two dimensions of survival data		Time dimension	
		Three minutes time mark is not used	Three minutes time mark is used
Right censoring data sources	Processes without a final decision	8.4.1 Survival analysis on natural processes for making decisions.	8.4.2 Survival analysis on modified processes for making decisions.
	Processes without final decisions & processes with 'not purchase' decisions	8.5.1 Survival analysis on natural processes for making purchase decisions.	8.5.2 Survival analysis on modified processes for making purchase decisions.

Table 8.16 Structure of survival analysis in this chapter.

8.4.1 Survival Analysis on Natural Processes for Making Decision
In this section, two analysis is performed on the unmodified 434 decision-making processes on Boots' mobilised website. All decision-making process remain natural in this section, which means all decision-making processes are naturally ended by the participants, when they felt comfortable to report that they had reached one of the three results (purchase decision, not-purchase decision and no decision can be made). And the

'no decision can be made' process is the only right censoring data source. All survival data from the screen recording are fully recorded and utilised, without applying any time constraint on them.

The table below (Table 8.17) shows the results of analysing all 434 natural decision-making process collectively. Six of nine functions have achieved statistical significance ($p<0.05$), to provide meaningful results to this thesis.

First, none of the six functions have their Exp(B) coefficient larger than one, which means every function that they have used in their decision-making processes are basically lowers their chance to reach a decision. The more they use any of those functions, the less likely they can reach decisions (either a purchase or a not purchase decision). Another important issue that needs to be taken into consideration is, whether there is a relationship between the length and the result of those decision-making processes. The results of ANOVA analysis ($p=0.095$) accept the null hypotheses that there is no relationship between those variables. Therefore, this thesis confirms the likelihood of reaching a decision solely depends on the usage of the functions on mobile retail applications, and time consumption has no direct impacts on the final result.

Second, this thesis interprets this analysis result as it puts all the functions in an order of usefulness, in terms of assisting decision-making, rather than trying to suggest which functions should be removed or added to the mobile retail application. For instance, in the Table 8.17, functions of the related product and product listing are the most basic functions of any mobile retail application. Those two functions are inevitably used by every consumer. What their coefficients show is that consumers are overwhelmed by the quantity of product information. The richness of product selection, or, if interpret this phenomenon from another perspective, the lack of those determinant key information that consumers can access at the early stage of their decision-making processes, is challenging any electronic retailer. On the other hand, another four functions, product review, product description, delivery information and product pictures, could be optional for consumers, given consumers are capable of making decisions without using any them. Therefore, when comparing their coefficients, the two groups of function, optional functions and default functions (related product, review rating and product listing) needs to be considered separately.

Finally, the results in Table 8.17 shows that, for the default functions, related product and product listing have achieved statistical significance, which is 0.013 and 0.000 respectively. For related product function, it shows every time a consumer uses this function, he/she has 2.4% less chance to reach a decision. For product listing function, its impact is stronger compared to related product function. Every time that a consumer uses product listing function, the probability he/she reaches a decision decreases by 24.4%.

For the optional functions, four of them have achieved statistical significance. They are product review (p=0.000), product description (p=0.000), delivery information (p=0.005) and product picture (p=0.003). Putting these four functions in the order of assisting consumer decision-making process, the most useful one is product pictures (exp(b)=0.870), followed by product review (exp(b)=0.823), product description (exp(b)=0.741) and delivery information (exp(b)=0.740), which is the least helpful function in the optional function group.

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.028	.009	9.756	1	.002	.973
product_review_2	-.195	.027	52.403	1	.000	.823
review_rating_3	-.008	.009	.675	1	.411	.992
product_description_4	-.300	.035	73.960	1	.000	.741
delivery_information_5	-.301	.107	7.909	1	.005	.740
product_pictures_6	-.139	.046	8.937	1	.003	.870
product_sorting_7	-.081	.059	1.887	1	.170	.922
review_sorting_8	-.193	.151	1.634	1	.201	.824
product_listing_9	-.196	.029	45.738	1	.000	.822

Table 8.17 Survival analysis results on 434 natural processes of making a decision.

Next, since from Boots' secondary data, the normal length of the decision-making process on Boots' mobilised website is three minutes, all 434natural decision-making process are divided into two groups, which are decision-making processes that are shorter than 3 minutes, and longer than 3 minutes. Both groups' datasets are analysed with survival analysis, the results are used to compare the user behaviour between groups to highlight any different usages. Table 8.18 and Table 8.19 show that, in all 434 natural decision-making processes recorded by this thesis, there are 329 processes that are shorter than three minutes (refers to 329 group), and the rest 105 processes are shorter than three minutes

(refers to 105 group). In the 329 group, more than 90% (90.3%) of processes have reached a decision, whereas in the 105 group, also almost 90% (89.5%) of the processes reached a decision.

Function usage wise, in the 329 group (see Figure 8.27), only one default function, product listing achieved statistical significance (p=0.000), with the coefficient value of 0.8168. Three optional functions are reported significantly impact the final results, they are product review (p=0.000, exp(b)=0.865), product description (p=0.000, exp(b)=0.709) and product sorting (p=0.021, exp(b)=0.819). In the 105 group (Figure 8.26), similar to the 329 group, product listing is the only default function that achieved statistical significance (p=0.010, exp(b)=0.894). Only two optional functions have their statistical significance, which are product review (p=0.01, exp(b)=0.873) and product description (p=0.002, exp(b)=0.879).

Purchase_decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	32	9.7	9.7	9.7
	decision has been made	297	90.3	90.3	100.0
	Total	329	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.013	.014	.917	1	.338	.987
product_review_2	-.145	.035	17.186	1	.000	.865
review_rating_3	-.016	.015	1.070	1	.301	.985
product_description_4	-.344	.058	34.882	1	.000	.709
delivery_information_5	-.259	.140	3.418	1	.064	.772
product_pictures_6	-.156	.070	4.973	1	.026	.856
product_sorting_7	-.200	.087	5.317	1	.021	.819
review_sorting_8	.005	.179	.001	1	.979	1.005
product_listing_9	-.204	.044	21.185	1	.000	.816

Table 8.18 Results of 329 decision-making processes that are shorter than 3 minutes

Purchase_decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	11	10.5	10.5	10.5
	decision has been made	94	89.5	89.5	100.0
	Total	105	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.011	.012	.914	1	.339	.989
product_review_2	-.136	.040	11.235	1	.001	.873
review_rating_3	-.011	.013	.791	1	.374	.989
product_description_4	-.129	.042	9.223	1	.002	.879
delivery_information_5	.153	.156	.971	1	.325	1.166
product_pictures_6	.013	.060	.045	1	.832	1.013
product_sorting_7	.060	.090	.450	1	.502	1.062
review_sorting_8	-.386	.248	2.428	1	.119	.680
product_listing_9	-.112	.044	6.647	1	.010	.894

Table 8.19 Results of 105 decision-making processes that are longer than 3 minutes

Compare the results of these two groups, the most interesting difference between them is the product sorting function. First of all, this function is highlighted only in the group of the relatively shorter decision-making process, which means this function is more important in shorter decision-making processes than in the longer ones. Second of all, this function is representing the mediator in the proposed conceptual framework, User Control. Therefore, this functions also theoretically indicate the importance of user control, in terms of helping consumers to achieve a decision is a relatively shorter decision-making process.

8.4.2 Survival Analysis on Modified Processes for Making Decision
As mentioned previously, when applying modification on survival data, only the usage data before the three minutes time mark are taken into survival analysis. All functions that were used after three minutes are redundant for making the dataset close to the real world data of actual Boots' consumers. As Table 8.20 shows, seven of nine functions have achieved statistical significance. Only review rating and review sorting functions have no significant influence on the final results of the decision-making process. Compare the results of Table 8.21 and Table 8.22, the relationships in both default function group and optional function group remain the same. The main difference between them is, very

similar to the results of 329 group in the previous section, that product sorting function, again, becomes significant in the decision-making processes restricted to three minutes time mark.

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.032	.014	5.259	1	.022	.968
product_review_2	-.187	.035	29.294	1	.000	.830
review_rating_3	-.016	.015	1.150	1	.284	.984
product_description_4	-.449	.054	70.012	1	.000	.638
delivery_information_5	-.396	.146	7.330	1	.007	.673
product_pictures_6	-.156	.063	6.248	1	.012	.855
product_sorting_7	-.218	.081	7.294	1	.007	.804
review_sorting_8	-.197	.188	1.108	1	.293	.821
product_listing_9	-.264	.040	43.439	1	.000	.768

Table 8.20 Results of 434 modified decision-making processes

8.5 Survival Analysis for Making Purchase Decision

In this section, the 'expecting event' is defined as, only the purchase decision, rather than both purchase decision and not purchase decision in the previous section. Since the definition of a key variable is changed, all analysis from the previous section is performed again on the survival data.

8.5.1 Survival Analysis on Natural Processes for Making Purchase Decision

In the 434 natural decision-making processes, 58.5% of them have reached a decision of purchasing. Compare to Table 8.21, exactly same six functions have achieved statistical significance on the level of 0.05. While the value of the coefficient of related product, product review, product description, delivery information and product pictures functions are very close between these two tables, the value of product listing coefficient has dropped by 0.098, which means, when the product listing function is used less, a decision of purchasing is more achievable. Given that product listing function is an indicator of User Control mediator, the less usage of this function basically means consumer needs to use this function to control the quantity of product information (related product information and review rating information) in their decision-making process

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	75	22.8	22.8	22.8
	decision has been made	254	77.2	77.2	100.0
	Total	329	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.003	.013	.043	1	.836	.997
product_review_2	-.158	.037	18.472	1	.000	.854
review_rating_3	-.024	.015	2.644	1	.104	.976
product_description_4	-.393	.064	37.375	1	.000	.675
delivery_information_5	-.217	.144	2.257	1	.133	.805
product_pictures_6	-.196	.078	6.309	1	.012	.822
product_sorting_7	-.251	.093	7.228	1	.007	.778
review_sorting_8	-.065	.202	.102	1	.749	.937
product_listing_9	-.375	.054	48.926	1	.000	.688

Table 8.21 Results of 434 natural decision-making processes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	75	22.8	22.8	22.8
	decision has been made	254	77.2	77.2	100.0
	Total	329	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.003	.013	.043	1	.836	.997
product_review_2	-.158	.037	18.472	1	.000	.854
review_rating_3	-.024	.015	2.644	1	.104	.976
product_description_4	-.393	.064	37.375	1	.000	.675
delivery_information_5	-.217	.144	2.257	1	.133	.805
product_pictures_6	-.196	.078	6.309	1	.012	.822
product_sorting_7	-.251	.093	7.228	1	.007	.778
review_sorting_8	-.065	.202	.102	1	.749	.937
product_listing_9	-.375	.054	48.926	1	.000	.688

Table 8.22 Results of 329 decision-making processes shorter than 3 minutes

Table 8.22 and Table 8.23 show the results when dividing all the decision-making processes into two groups of shorter or longer than three minutes. Compare to Table 8.18, which consider both purchase decision and not purchase decision as usage value, the value of product listing function coefficient decreased by 0.128 (0.816-0.688), which indicates the importance of control the quantity of information.

Purchase_decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	36	34.3	34.3	34.3
	decision has been made	69	65.7	65.7	100.0
	Total	105	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.009	.014	.465	1	.495	.991
product_review_2	-.147	.048	9.375	1	.002	.863
review_rating_3	-.009	.015	.333	1	.564	.991
product_description_4	-.101	.047	4.673	1	.031	.904
delivery_information_5	.289	.169	2.948	1	.086	1.336
product_pictures_6	.050	.065	.601	1	.438	1.051
product_sorting_7	.042	.105	.163	1	.687	1.043
review_sorting_8	-.283	.269	1.109	1	.292	.754
product_listing_9	-.125	.050	6.253	1	.012	.882

Table 8.23 Results of 105 decision-making processes longer than 3 minutes

8.5.2 Survival Analysis on Modified Processes for Making Purchase Decision
Table 8.24 shows, with the three minutes modification, only 58.5% of decision-making processes reached a purchase decision. And from the survival analysis, again, the value of product listing function coefficient becomes much smaller when compared to the difference between Table 8.20 and Table 8.24.

Purchase_decision

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	cannot make a decision	180	41.5	41.5	41.5
	decision has been made	254	58.5	58.5	100.0
	Total	434	100.0	100.0	

Variables in the Equation

	B	SE	Wald	df	Sig.	Exp(B)
related_product_1	-.022	.014	2.250	1	.134	.979
product_review_2	-.192	.037	27.547	1	.000	.825
review_rating_3	-.023	.015	2.211	1	.137	.977
product_description_4	-.478	.059	66.544	1	.000	.620
delivery_information_5	-.350	.153	5.263	1	.022	.704
product_pictures_6	-.188	.071	7.037	1	.008	.829
product_sorting_7	-.248	.087	8.066	1	.005	.780
review_sorting_8	-.320	.212	2.273	1	.132	.726
product_listing_9	-.407	.050	67.738	1	.000	.665

Table 8.24 Results of 434 modified decision-making processes

Chapter 9 Result 2 – Questionnaire Survey and Structural Equation Modelling

9.1 Introduction

In this chapter, the data analysis is focusing on the theoretical test of the supporting conceptual model (see Figure 9.1). The result presented in this chapter is providing information that helps address the research objective 4 – 'to test the conceptual model for exploring the role of User Control in the final testing result – the structural model'. For testing the conceptual model, results are used to confirm/reject the hypotheses 1 to 6.
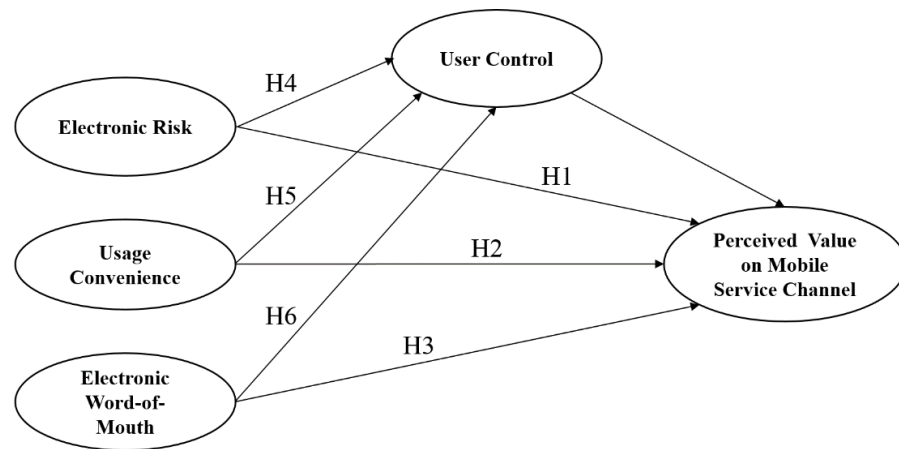
Figure 9.1 Proposed conceptual model of Customer Perceived Value
on mobile service channels

As discussed in the methodology section, the analysis of questionnaire data requires consideration of reliability, validity, analytical technique identification and justification, data manipulation and results in interpretation. All the processes regarding those issues are addressed in five steps: firstly, selection of scales and re-validation via expert review. Secondly, descriptive statistics (for example, frequencies, means and percentages) provides an overview of results derived from the scale items in the questionnaire. Thirdly, all five constructs are processed with two analyses in SPSS, which are Cronbach's alpha test and principle component analysis. They assure the reliability and validity by selecting appropriate scale items to move into the final stage of conceptual framework testing. Fourthly, in this stage of analysing selected scale items with Structural Equation Modelling in AMOS, Confirmatory factor analysis is used to achieve an acceptable model fit, which means to assess whether the proposed measurement scale items are statistically the attributes of the latent construct that they belong to. Then, a regression analysis is

performed on the final model to test the relationships between three independent variables and the dependent variable. Finally, also on the final model, a regression analysis is used to confirm/reject the hypothesis that User Control is playing a mediator role in the mobile value proposition.

As the data analysis process presented above, the results demonstration begins with the psychometric overview of scale items.

9.2. Overview of Scale Items

In the questionnaire, forty-six scale items are used to reflect five constructs, which are representing the five elements in the conceptual model. As mentioned before, those five elements include three independent variables, Electronic Risk, Usage Convenience and Electronic Word-of-Mouth, which are also representing the three different parties that are involved in the interaction with mobile retail applications; Customer Perceived Value is the dependent variable; and User Control is proposed as the mediator in the value proposition. All scale items are selected from existing marketing research and literature that in the digital marketing area, and have been tested providing acceptable reliability and validity in previous fieldwork. For further theoretically validating the scale items, they are also reviewed by five experts in related research domains. Before the data collection, the questionnaire is also tested in the pilot study of this thesis, reflection from the pilot study has been taken into account when finalising the questionnaire. In this section, five constructs with their attributes are demonstrated with basic descriptive statistics to give an overview of the questionnaire database.

9.2.1 Electronic Risk

Electronic Risk is representing the focal consumer involved in the interaction on mobile channel service. The focal consumers have the intention of making purchase decisions on mobile retail applications, and they are familiar with the functions of mobile applications. From the first party consumers' point of view, their decision-making processes are the source of their experience of using mobile retail applications, within the decision-making process, they also need to interact with themselves. This self-interaction could be considered on time dimension. For example, when a first party consumer is going to use a function on mobile retail applications, he/she is expecting certain outcomes base on his/her previous experience of this particular function. After they use that function, he/she will

compare the current outcome with his/her earlier expectation. Therefore, using the expectation as a link, the first party consumers are conducting an interaction between the past and current experiences, in terms of whether mobile retail applications can perform properly to fulfil their tasks of making a decision, and whether their financial information and private information are safely transmitted on mobile retail applications.

The results shown in Table 9.1 indicated that the participants do not hold a strong opinion on any of the Electronic Risk items. Among the eleven items, the item of Electronic Risk 03, shows that the participants have relatively strong concerns (Mean=1.22, SD=0.798) regarding the visual design of a mobile retail application. This might be ascribed to the fact that mobile retail applications are inevitably suffered from the relatively small screen size of mobile devices. As mentioned before, high resolution screen to increase information density could improve the overall usage experiences of mobile retail applications. However, a few tasks that are commonly used on electronic channels, for example, the internet channel, could cause inconvenience on a smaller screen. For instance, when selecting from two (or more) products on the internet channel, consumers can compare two product side by side on a larger screen (for example, the screen of a desktop or laptop) with key information displayed in a table. On the mobile channel, consumers might have to enlarge the fonts and tap the screen for a few time to read full information.

On the other hand, when considering the security of financial information and private information, participants show confidence to inputting and transmitting crucial information on mobile retail applications. This may be caused by the recent developments of, both hardware and software. For instance, the popularity of the fingerprint scanner might strengthen consumers' confidence of storing their financial and private information on retail applications, also on the applications for other purposes (for example, financial information for using Apple Pay, which is Apple's digital wallet service).

Variable number	Item number	Questionnaire item	Mean	Std. Deviation
Electronic Risk 01	15	Using mobile retail applications makes me worry about whether the mobile application will perform well enough to fulfil my expectation (Lee, 2009).	2.89	1.066
Electronic Risk 02	16	There is a chance that there will not be enough or good enough information for me to make my decision on mobile applications (Faroughian et al., 2012).	2.62	1.016
Electronic Risk 03	17	I feel confident the visual design of mobile application can help me to accomplish the tasks I have in mind (Lee, 2009).	1.22	0.798
Electronic Risk 04	18	Using mobile channel transaction causes me to be concerned about my financial information security (credit/debit card, bank account information) (Faroughian et al., 2012).	2.82	1.269
Electronic Risk 05	19	In general, it would be more risky to quickly make a purchase decision on mobile application (Okazaki et al., 2012)	2.57	1.161
Electronic Risk 06	20	Using mobile retail applications would be more likely to expose my private information (delivery information, purchase history, wishlist) to unauthorised persons (Lee, 2009).	2.55	1.088
Electronic Risk 07	21	There would be too much uncertainty associated with giving personal information on mobile applications (Okazaki et al., 2012).	3.01	1.045
Electronic Risk 08	34	The benefits I received from making decisions on mobile application worth the risks I take (Broekhuizen et al., 2009).	1.53	0.948
Electronic Risk 09	39	As I consider using mobile applications to make shopping decision, I worry about whether the application will really perform as well as it is supposed to (Kim, et al., 2009).	2.58	1.002
Electronic Risk 10	40	If I were to use mobile applications, I become concerned for how well its visual design can help me to make my shopping decision (Broekhuizen et al., 2009).	2.57	0.984
Electronic Risk 11	44	The layout (visual design) of mobile application could slow down my buying decisions (Kim, et al., 2009).	2.33	1.147

Table 9.1 Overview of the scale items regarding Electronic Risk

9.2.2 Usage Convenience

Representing the second party that is involved in the interaction on mobile channel service, the variable of Usage Convenience is defined as and functions that designed by the company to provide information to the consumers. More specifically, it means the infrastructure of the mobile retail application, which is where all the information embedded. AS mentioned in the Survival Analysis section, for instance, the product information function is design by the electronic retailer, and all the information contained within this function is provided by the manufacturer of the product. By providing this function, consumers do not have to go to the product manufacturer's website to read all the precise information about one product. Without leaving the mobile retail application, consumers can access the information they need from the manufacturer.

On the other hand, for the functions of product review, although this function is also designed and provided by the electronic retailer, the usage of it is largely decided by the first party and the third party consumer, rather than the second party electronic retailer. For example, for one particular product, if there is no review ever left by any of the third party consumers, the focal consumer, who is going through his/her decision-making process is never going to use the actual product review function, since there is no interaction between focal consumer and other parties. The empty page of product review makes the function itself meaningless. Therefore, in the questionnaire, all scale items regarding the independent variable of Usage Convenience are focusing on the functionality of mobile retail applications, rather than the quality of the information it provides, or the previous experience the participants had. Basically, these scale items below are asking participants' opinions on whether, normally, the mobile retail application has the functions they need to support their decision-making process. Whether the actual design (for example, colour, font size) can make them confident to go through their decision-making process, or the quantity or quality of the third party information (for example, product review, review rating) is irrelevant to the questions in this section.

Variable number	Item number	Questionnaire item	Mean	Std. Deviation
Usage Convenience 01	01	Mobile retail applications (with access to the internet) enable me to receive information (e.g. pictures, reviews and feedbacks) of a product anytime and anywhere I want (Kim, et al., 2010).	1.51	0.578
Usage Convenience 02	02	Using mobile retail applications is a convenient way to make a purchase decision (Tojib and Tsarenko, 2012).	1.76	0.785
Usage Convenience 03	03	Using mobile retail applications makes my shopping decisions less time consuming (Tojib and Tsarenko, 2012).	2.15	1.005
Usage Convenience 04	04	Using mobile retail applications helps me manage my time better (Atkins and Kim, 2012).	2.42	1.030
Usage Convenience 05	06	I spend my time efficiently when I make my purchase decision on mobile applications (Kim, et al., 2010).	2.65	0.999
Usage Convenience 06	07	I quickly get what I want to know when making purchase decisions on mobile applications (Kim, et al., 2010).	2.20	0.914
Usage Convenience 07	13	Using mobile retail applications is not a more convenient way to receive information for making shopping decisions (Atkins and Kim, 2012).	2.94	1.078
Usage Convenience 08	14	Using mobile retail applications allows me to access word-of-mouth information (e.g. reviews from others) more easily (Atkins and Kim, 2012).	2.15	0.848

Table 9.2 Overview of the scale items regarding Usage Convenience

Table 9.2 shows an overview of the scale items regarding Usage Convenience variable in the questionnaire. With the measurements of eight scale item, two results have been highlighted. They are Usage Convenience 01 (Mean=1.51, SD=0.578) and Usage Convenience 02 (Mean=1.76, SD=0.785), which shows a high level agreement on that mobile retail applications offers flexibility, with its various functions, for the consumers to conduct decision-making processes. However, with the descriptive statistics of other scale items, participants show less agreement on using mobile retail applications can save time for them, or using mobile retail applications is a more efficient way of spending their time. In contrast to these two different sets of results, it suggests that, from consumers' perspective, the Usage Convenience (consumers can get their decision-making processes started when their intentions initiate) and the time saving in total, rather at a specific stage of the decision-making processes on mobile service channels should be considered separately. It is indicated that, with the results above, mobile retail applications are believed providing strong supports at the early stage of the decision-making process, consumers do not have to spend a certain amount of time connecting or attaching the information sources they need. However, after the early stage, until the end of the decision-making process, and when consumers calculate the total time consumption of their decision-making process, mobile retail applications do not show strong advantages over other service channels.

9.2.3 Electronic Word-of-Mouth

The last one of the three parties that are involved in mobile channel service interaction is the three party consumers. They are the previous customers of the electronic retailer, and their previous consumptions enable them to get involved in other consumers' decision-making processes. For instance, once a consumer purchases a product from the website, he/she can use the product review function to leave their review or feedbacks on the website for others to view. The first party consumer can get access to that information by reading reviews in product review function, or by comparing the overall review rating by using the review rating function.

Variable number	Item number	Questionnaire item	Mean	Std. Deviation
Electronic Word-of-Mouth 01	05	Using mobile retail applications offers more opportunities to receive product information from different resources (e.g. reviews from third parties) (Puccinelli et al., 2009).	1.89	0.873
Electronic Word-of-Mouth 02	09	Using mobile retail applications encourages me to share more experiences (reviews and feedback) of a product with others (Puccinelli et al., 2009).	2.64	1.089
Electronic Word-of-Mouth 03	10	Using mobile retail applications enables me to read more review and feedbacks (of a product) from other users (Gummerus, 2012).	1.89	0.889
Electronic Word-of-Mouth 04	11	Through word-of-mouth communication (read and leave reviews of product) on mobile retail applications, I have increased my knowledge of the product quickly (Puccinelli et al., 2009).	2.06	0.880
Electronic Word-of-Mouth 05	12	Recommendations reported through mobile retail applications help me make my decision easier (Gummerus, 2012).	2.06	0.826
Electronic Word-of-Mouth 06	41	Negative comments reported through mobile retail applications help me make my shopping decisions more easily (Gummerus, 2012).	1.93	0.887

Table 9.3 Overview of the scale items regarding electronic word-of-mouth

Compare to the results of the first two independent variables, participants are holding positive opinions on every measurement in the construct of Electronic Word-of-Mouth. The third party consumers, as the source of word-of-mouth information, plays important role in the focal consumers' decision-making processes (see Table 9.3). Their contribution includes a variety of information sources (scale item number: 05, 10), quality of the information (scale item number: 12, 41) and increasing usage of word-of-mouth information (scale item number: 10, 11). However, when considering contribute to the word-of-mouth information, participants, as the focal consumers, show relatively low level (Mean=2.64) of enthusiasm of interacting as the third party consumers. The common situation that the number of the reviews and feedbacks are much less than the number of the customers who actually have bought the product match this results.

9.2.4 User Control

User Control is proposed as the mediator in the conceptual model. It represents the extent to which consumer can control the information interactions with different parties, and consequently the whole value generation process on mobile retail applications. The specific ways for the consumers to control interactions are including control the time consumption of decision-making process, control the usage (order, frequency) of different functions on mobile retail applications, and control the location of conducting decision-making process. It worth to mention here, that control the location could be considered as a geographic way of controlling time, for instance, if a consumer is uncomfortable using a mobile retail application at one location, after he/she moves to another acceptable location, he/she continues the previous decision-making process, this consumer actually insert the time for changing spatial coordinate into that decision-making process, and in resulting more time consumption. Therefore, time and space could be related when identifying proper measurements of the decision-making process itself and consumers' perception of controlling decision-making process.

Variable number	Item number	Questionnaire item	Mean	Std. Deviation
User Control 01	22	Using mobile retail applications makes my shopping decisions more manageable (start, pause or end the process anytime and anywhere I want) (Kleijnen et al., 2009).	2.12	0.876
User Control 02	23	Using mobile retail applications enables me to make my decision (of purchasing or not purchasing) more often (Mohd-Any et al., 2014).	2.18	0.830
User Control 03	24	Using mobile retail applications enables me to make my decision (of purchasing or not purchasing) more quickly (Bradley and Beverley, 2012)	2.37	0.963
User Control 04	26	I enjoy having control over my own shopping decisions on mobile applications (Mohd-Any et al., 2014).	1.91	0.678
User Control 05	27	Using mobile retail applications makes me able to control the **time** of my information searching, receiving and sharing (communicating with different information resources anytime I want) (Bradley and Beverley, 2012).	2.16	0.891
User Control 06	28	Using mobile retail applications makes me able to control the **location** of my information searching, receiving and sharing (communicating with different information resources anywhere I want) (Mohd-Any et al., 2014).	2.15	0.853
User Control 07	43	Using mobile retail applications means I am less reliant on other information sources (e.g. internet channel, face-to-face communication with other people) to make my purchase decisions (Bradley and Beverley, 2012).	2.83	1.076
User Control 08	45	Using mobile retail applications allows me to make my purchase decision the way I like (Kleijnen et al., 2009).	2.17	0.813
User Control 09	46	Using mobile retail applications (with access to the internet) enables me to shop anytime, and anywhere, I want (Kleijnen et al., 2009).	1.57	0.678

Table 9.4 Overview of the scale items regarding User Control

The results from Table 9.4 highlight a few points. First, scale item 46 provides the strongest results when asking participants their feelings of being able to shop anytime and anywhere they want (Mean=1.57, SD=0.678). This could be considered as the result of the natural advantage of mobile channel service, which significantly lowers the temporal and spatial barriers for the consumer to access the information they need. Compare to other service channels, the difference in terms of controlling the time and space of conducting service is prominent and highly recognised. Second, from the results of Item 22, 27, 28, 45, participants appear satisfied with the way they control service process on mobile retail applications (Means are in the range between 2.12 to 2.17). Finally, scale item 43 shows participants are neutral when considering their reliance on different service channels. This item is directly related to the quantity and quality of the information from different sources. It reveals that, the popularity of mobile channel service cannot be explained by the quantity or quality of the information, but, as other items show, by its higher user control level.

9.2.5 Customer Perceived Value

Customer perceived value is one of the central concepts in this thesis. As the sole dependent variable, and a complex concept to measure, twelve scale items are assigned to cover different perspective of participants' different value perceptions. Higher decision-making efficiency (Item 08, 25, 29, 31, 32), higher engagement on mobile channel service (Item 30, 38), and positive impact on lifestyle (Item 33, 35, 36, 37, 42) are the three perspectives the true usage value could rely on.

Variable number	Item number	Questionnaire item	Mean	Std. Deviation
Customer Perceived Value 01	08	I use less information to make my shopping decisions on mobile application than other service channels (e.g. Internet channel, face-to-face channel) (Lin et al., 2011).	2.83	1.054
Customer Perceived Value 02	25	Using mobile retail applications does not increase the number of products I take into consideration.	3.00	1.156
Customer Perceived Value 03	29	I use more information to make my shopping decisions on mobile application than other service channels (e.g. Internet channel, face-to-face channel) (Mathwick et al., 2010).	2.51	1.112
Customer Perceived Value 04	30	I would like to use mobile retail applications as much as I can in my decision making process (Bridges and Florsheim, 2008)	2.45	0.955
Customer Perceived Value 05	31	Using mobile retail applications allows me to make my decision (purchasing/not purchasing) more frequently (Lin et al., 2011).	2.30	0.868
Customer Perceived Value 06	32	Using mobile retail applications makes me exchange information with others (leaving feedbacks and reviews, sharing experiences) more readily (Bridges and Florsheim, 2008).	2.54	1.102
Customer Perceived Value 07	33	Using mobile retail applications impacts my decision making process more than other service channels (e.g. Internet channel, face-to-face channel) (Carlson, 2010)	2.74	1.032
Customer Perceived Value 08	35	I can live a more flexible lifestyle when I shop using a mobile application (Carlson, 2010).	2.14	0.919
Customer Perceived Value 09	36	Using mobile retail applications means I have more control over the way I live my life (Carlson, 2010).	2.66	1.050
Customer Perceived Value 10	37	Being able to use mobile retail applications for shopping is a distinct advantage for me (Lin et al., 2011).	2.08	0.907
Customer Perceived Value 11	38	The positives of using mobile applications always outweigh the negatives (Bridges and Florsheim, 2008).	2.45	0.986
Customer Perceived Value 12	42	Using mobile applications on making purchase decisions has no impact on my lifestyle (Mathwick et al., 2010).	2.81	1.029

Table 9.5 Overview of the scale items regarding Customer Perceived Value

Table 9.5 shows the overview of the scale items on Customer Perceived Value construct. Participants have a more positive response on the lifestyle items than on the decision-making efficiency and consumer engagement items.

9.3 Reliability and Validity Test in SPSS

In this section, three tests in SPSS are presented. First, common methods bias test is conducted. Then, for analysing latent variables with multiple scale items as the measurements of a construct, reliability and validity are the important issues. For the reliability testing, Cronbach's Alpha test is used. For the validity test, principle component analysis is used to, both, reduce the number of scale items that need to move to the next phase of Structural Equation Modelling, and to validate all five constructs with the best scale item to reflect them.

9.3.1 Common Methods Bias Testing

As the commonly shared issues for survey study, common method bias can occur with self-reported data (Podsakoff et al., 2003, 2012). Using the recommendations for controlling for common method variance in different research settings (Podsakoff et al., 2003) (Figure 9.2) as a decision tree, this thesis is in situation 7.

When developing the questionnaire used by this thesis, several procedural precautions are taken. For example, in the "Participant Information Sheet" and on the questionnaire itself, all participants are guaranteed full anonymity. The ambiguity of questionnaire items has been significantly reduced by the expert review and the pilot study. Scale items that are measuring different constructs are mixed up in the questionnaire.

A series of measures that evaluate common methods bias has been undertaken with Harman's (1967) one-factor test. This reveals that the greatest variance explained by one factor was 18.342%, indicating that common methods bias was unlikely to contaminate the result.

Yes   Can the predictor and criterion variables be obtained from different sources?   No

Yes   Can the predictor and criterion variables be measured in different contexts?   No

Yes   Can the source(s) of the method bias be identified?   No   Yes   Can the source(s) of the method bias be identified?   No

Can the method bias(es) be validly measured?   Can the methods bias(es) be validly measured ?

Yes   No   Yes   No

Situation 1	Situation 2	Situation 3	Situation 4	Situation 5	Situation 6	Situation 7
Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.	Use all procedural remedies related to questionnaire design.
Obtain the measures of the predictor and criterion variables from different sources.	Separate measurement of Predictor and criterion variables temporally, psychologically, and /or proximally.	Separate measurement of Predictor and criterion variables temporally, psychologically, and /or proximally.	Separate measurement of Predictor and criterion variables temporally, psychologically, and /or proximally.	Separate measurement of Predictor and criterion variables psychologically and guarantee response anonymity.	Separate measurement of Predictor and criterion variables psychologically and guarantee response anonymity.	Separate measurement of Predictor and criterion variables psychologically and guarantee response anonymity.
	Single-specific-method-factor approach.	Single-common-method-factor approach.	Single-common-method-factor approach.	Single-specific-method-facto approach.	Single-common-method-facto approach.	Single-common-method-facto approach.
	Multiple-0specific-method-factors approach.	Multiple-common-method-factors approach.		Multiple-specific-method-factors approach.	Multiple-common-method-factors approach.	

Figure 9.2 Recommendations for controlling for common method variance in different research settings (Podsakoff, 2003)

9.3.2 Cronbach's Alpha Test

Cronbach's alpha increases the intercorrelation among the scale items within their construct. As the indicator of internal consistency, this test produces its test score, alpha, which has its commonly acceptable standards when evaluating the reliability of construct. This thesis is aiming to achieve the acceptable alpha score of larger than 0.7 (Tavakol and Dennick, 2011).

The figure below (see Table 9.6) shows, every construct has achieved their acceptable alpha, which is larger than 0.7. In order to achieve this results, two scale items in two

different constructs need to be eliminated, which are Usage Convenience 07 and Customer Perceived Value 01. Since all latent constructs have acceptable reliability, they are ready to move into the first step of validity test.

Construct	Cronbach's Alpha based on standardised items	Number of items
Electronic Risk	0.709	7
Usage Convenience	0.730	6
Electronic Word-of-Mouth	0.754	11
User Control	0.773	9
Customer Perceived Value	0.745	11

Table 9.6 Cronbach's Alpha test results

9.3.3 Principle Component Analysis

Principle Component analysis is a statistical procedure to exploratory observed data, and consequently produce test scores to every scale item within their latent constructs. These scores are used to identify any necessary changes to the latent constructs, for example, identifying the scale items that need to be excluded from the construct for achieving higher validity and suggesting a better combination of scale items to reflect constructs, in terms of providing higher validity and internal consistency.

In the pattern matrix below (see Table 9.7), the results have suggested, firstly the scale item of Usage Convenience 02 should be moved from its original construct to Customer Perceived Value construct, given it has factor loading close to 0.6 with other Customer Perceived Value items. Secondly, although User Control item 02 provides loading score less than 0.6, it has no strong loading (≥ 0.3) on other constructs, it will be included in its original construct and move to the next step. Finally, it identifies the scale items, for every construct.

Pattern Matrix^a

	Component				
	1	2	3	4	5
Customer perceived Value 04	.691	.117	.074	.108	-.122
Customer perceived Value 05	.775	.073	.027	-.106	.118
Customer perceived Value 08	.665	-.182	-.035	-.025	.183
Customer perceived Value 09	.645	.001	-.018	.005	.089
Usage Convenience 02	.591	-.149	.090	.176	-.084
Electronic Risk 04	-.033	.827	-.028	.015	-.061
Electronic Risk 05	.014	.760	.070	-.091	.084
Electronic Risk 06	.164	.784	.064	-.025	-.115
Electronic Risk 07	-.165	.780	-.111	.089	.070
Electronic Word-of-Mouth 01	.116	-.047	.637	.108	-.093
Electronic Word-of-Mouth 03	-.028	.044	.777	-.059	-.020
Electronic Word-of-Mouth 04	-.074	-.040	.767	-.034	.131
Electronic Word-of-Mouth 05	.050	.043	.678	.066	.080
Usage Convenience 03	.170	-.022	-.064	.725	.016
Usage Convenience 04	-.042	.044	.058	.803	.125
Usage Convenience 05	-.076	-.030	.044	.777	-.036
User Control 02	.251	.098	-.089	.114	.508
User Control 04	.068	-.103	.080	.053	.747
User Control 05	-.056	-.002	.121	.003	.802

Table 9.7 Principle Component Analysis result on questionnaire items

Most of the scale items identified in the factor loading analysis, have also achieved acceptable communalities (larger than 0.5) (Bach and Ghaoui, 2008), only the item of customer User Control 02 only has the score of 0.428 (see Table 9.8). However, since in the confirmatory factor analysis, the validity and consistency were checked again, and for giving the analysis in AMOS more flexibility, this item is kept as the results.

Communalities

	Initial	Extraction
Customer perceived Value 04	1.000	.529
Customer perceived Value 05	1.000	.629
Customer perceived Value 08	1.000	.582
Customer perceived Value 09	1.000	.457
Usage Convenience 02	1.000	.501
Electronic Risk 04	1.000	.702
Electronic Risk 05	1.000	.595
Electronic Risk 06	1.000	.642
Electronic Risk 07	1.000	.649
Electronic Word-of-Mouth 01	1.000	.488
Electronic Word-of-Mouth 03	1.000	.571
Electronic Word-of-Mouth 04	1.000	.612
Electronic Word-of-Mouth 05	1.000	.536
Usage Convenience 03	1.000	.628
Usage Convenience 04	1.000	.691
Usage Convenience 05	1.000	.582
User Control 02	1.000	.428
User Control 04	1.000	.676
User Control 05	1.000	.670

Table 9.8 Communalities test results

9.4 Structural Equation Modelling

The results presented in this section are related to two research objectives, which are number 3, 'To develop a conceptual model as one perspective of understanding the perceived value proposition on mobile service channels; and number four, 'To test the conceptual model from RO3 for exploring the role of User Control in the final testing result – the structural model.'. As mentioned in previous chapters (chapter 1, 3, 4), this thesis adopts the theory of planned behaviour as one of its theoretical foundations, and proposes a newly developed conceptual model in chapter 7, and consequently to test it to result in a structural model in this chapter.

To conduct a full investigation of the conceptual model, the factors are chosen to represent the relationship between the three parties' involvements in mobile channel service value creation and the final outcomes of customer perceived value should be identified. Before

these relationships are investigated to confirm the theoretical proposition, all five constructs ('Electronic Risk', 'Usage Convenience', 'Electronic Word-of-Mouth', 'User Control' and 'Customer Perceived Value') need to be tested, after the Cronbach' Alpha test and Principle Component Analysis, in Confirmatory Factor Analysis. CFA provides the methods to confirm that conceptual model is robust with acceptable validity (Bagozzi, 2007).

Structural Equation Modelling has been increasingly applied in marketing research (Iacobucci, 2010), since it allows researchers to analyse data both quantitatively, to test theories and qualitatively, to explore a path for formulating a theory (Miles and Shevlin, 2007). In this thesis, SEM is purely used as a quantitative research tool to test the conceptual model. In order to observe whether two factors, or more than two when adding mediator in, are in a causal relationship, SEM is employed to conduct a series of regression analysis.

In the coming section of this chapter, CFA and SEM is conducted to investigate the relationships between the independent variables ('Electronic Risk', 'Usage Convenience', 'Electronic Word-of-Mouth') and dependent variables ('Customer Perceived Value').

9.4.1 Justification of SEM methods

Structural models in marketing research are statistical specification and estimation of data to generalise or test theories of consumer behaviour (Chintagunta et al., 2006). Structural modelling is used to explain consumer behaviours and to predict their behaviour in the future. This technique enables the researcher to assess complex relationships between structural coefficients (Hair et al., 2010).

There are two streams of SEM methods in research practice, which are covariance-based SEM (covariance structure analysis, latent variable analysis) and variance-based SEM (component-based SEM) (Henseler et al., 2009). Covariance-based SEM can be used to explain the relationships between indicators and constructs, and to confirm the theoretical rationale behind the conceptual model. Whereas Variance-based SEM is used to predict the relationship between constructs.

From a theoretical point of view, covariance-based SEM is considered as a confirmatory method that is strictly theory driven. One the other hand, variance-based SEM is a data driven method and tends to provide a new theoretical understanding of the researched phenomenon.

Given, in this thesis, the conceptual model is developed on the theoretical foundation of the Theory of Planned Behaviour, and the testing process is for confirming the hypotheses developed earlier, the covariance-based SEM is chosen.

The figure below (Table 9.9) demonstrates detail information regarding these two types of SEM methods.

	TOPIC	SEM	
		COVARIANCE (CBSEM)	**VARIANCE (VBSEM)**
Theory	Theory background	strictly theory driven	based on theory, but data driven
	Relation to the theory	confirmatory	predictive
	Research orientation	parameter	prediction
Model specification	Type of the latent measures (constructs)	reflective indicators (*and* formative, if identified by reflective)	reflective and/or formative indicators
	Latent variables	factors	components
	Model parameters	factor means	component weights
	Type of study	psychometric analysis (attitudes, purchase intention, etc.)	drivers of success, organizational constructs (market / service / consumer orientation, sales force, employees, etc.)
	Structure of unobservables	indeterminate	determinate
	Reliability measures	Cronbach's α (and / or Guttman's λ and GLB)	a) Cohen's f^2 b) ρ_c indicator or Cronbach's α, Guttman's λ and GLB (for the reflective models only)
	Input data	covariance / correlation matrix	individual-level raw data
Sample	Sample size	ratio of sample size to free model parameters – minimum 5 observations to 1 free parameter, optimum is 10	a) Ten observations multiplied with the construct that has highest number of indicators b) The endogenous construct with the largest number of exogenous constructs, multiplied with ten observations
	Data distribution assumption	identical distribution	"soft" modeling , identical distribution is not assumed
Goodness-of-fit	Assessment of the model fit	a) Overall (absolute) fit measures b) Comparative (incremental) fit measures c) Model parsimony	a) Model predictiveness (coefficient of determination, Q^2 predictive relevance and average variance extracted – AVE) b) Stability of estimates, applying the resampling procedures (jack-knifing and bootstrapping).
	Residual co/variance	residual covariances are minimized for optimal parameter fit	residual variances are minimized to obtain optimal prediction
	Software	LISREL, AMOS, etc.	SmartPLS, SPSS (PLS module), etc.

Table 9.9 Information Regarding Covariance-Based SEM and Variance-Based SEM (Davcik, 2014)

9.4.2 Confirmatory Factor Analysis

Based on the results of both Cronbach' Alpha and Principle Component Analysis, when formulating construct in AMOS, only the scale items that filter with Principle Component Analysis are included, and the scale items of Usage Convenience 02 is allocated in the construct of Customer Perceived Value (see section 9.3.3) (see Figure 9.3 and Table 9.10).

All five constructs are estimated collectively by AMOS to achieve a good fit. A few measurements of model fit provided by AMOS are used to evaluate the final model before moving to SEM analysis. They are, low chi-square relative to degrees of freedom with an insignificant p-value (CMIN/DF), p-value of model, Normed fit index (NFI), goodness-of-fit index (GFI), Comparative fit index (CFI), root mean square error of approximation (RMSEA), adjusted goodness-of-fit index (AGFI) and Tucker-Lewis coefficient (TLI).
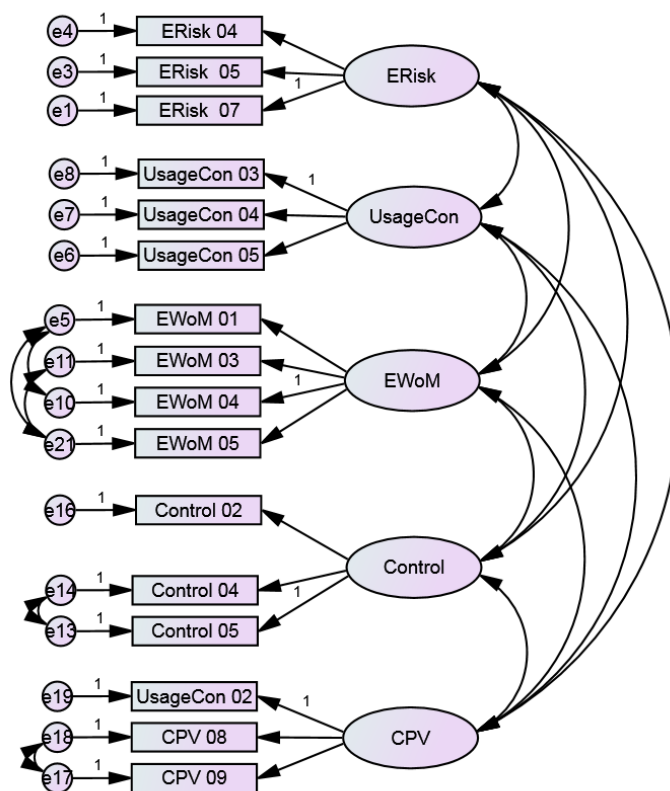

Figure 9.3 Confirmatory Factor Analysis results, acceptable model fit achieved

Fit Index	Acceptable Threshold Levels	Model Fit Value	Model Fit Results
CMIN/DF	Good fit: values less than 1 Acceptable fit: values between 1 and 2	1.012	Acceptable fit
p	Values greater than 0.05	0.448	Acceptable fit
NFI	Good fit: values greater than 0.95 Acceptable fit: values greater than 0.90	0.899	Close to acceptable fit
GFI	Good fit: Values greater than 0.95 Acceptable fit: values greater than 0.90	0.952	Good fit
CFI	Good fit: Values greater than 0.95 Acceptable fit: values greater than 0.90	0.999	Good fit
RMSEA	Good fit: values equal to 0 Acceptable fit: values less than 0.06	0.008	Acceptable fit
AGFI	Good fit: Values greater than 0.95 Acceptable fit: values greater than 0.90	0.926	Acceptable fit
TLI	Good fit: Values greater than 0.95 Acceptable fit: values greater than 0.90	0.998	Good fit

Table 9.10 Confirmatory Factor Analysis model fit indices,

their thresholds and results (Yuan, 2005; Bagozzi, 2007; Miles and Shevlin, 2007;

Iacobucci, 2010; Bagozzi and Yi, 2012)

9.4.3 Composite Reliability, Convergent Validity and Discriminate Validity

After using confirmatory factor analysis to established a good fit for the conceptual model, all the left measurements are tested to confirm the composite reliability, convergent validity and discriminant validity.

Composite reliability indicates the reliability and internal consistency of a latent construct, the acceptable value of CR is 70% and above. In Table 9.11, all constructs are above 70% level, which indicates composite reliability.

The convergent validity of the measurement model is assessed by the Average Variance Extracted (AVE) and Composite Reliability. AVE measures the level of variance captured by a construct versus the level due to measurement error, values above 0.7 are considered very good, the level of 0.5 is acceptable. As demonstrated in Table 9.11, all measurement

constructs have their AVE above 0.5 reaching the acceptable level. The AVE values indicate convergent validity.

	Electronic Risk 04	.826				
	Electronic Risk 05	.837				
	Electronic Risk 07	.790				
	Usage Conveivence 03		.773			
	Usage Convenience 04		.796			
	Usage Convenience 05		.730			
	Electronic Word-of-Mouth 01			-.635		
1	Electronic Word-of-Mouth 03			-.769		
	Electronic Word-of-Mouth 04			-.771		
	Electronic Word-of-Mouth 05			-.691		
	User Control 02				-.588	
	User Control 04				-.739	
	User Control 05				-.820	
	Customer Perceived Value 08					.801
	Customer Perceived Value 09					.857
	Usage Convenience 02					.483
2	AVE	0.54	0.67	0.59	0.52	0.52
3	Composite reliability	77%	86%	86%	81%	76%
	Cronbach's alpha	0.681	0.759	0.702	0.713	0.623

Table 9.11 Standardised factor loadings (1. regression weights), variance extracted (2. squared multiple correlations), and reliability estimates (3).

For discriminant validity test, the correlation between constructs are shown in Table 9.12, no value exceeds 0.85, demonstrating discriminant validity.

	ERisk	UsageCon	EWoM	UserCon	CPV
Electronic Risk	**0.67**				
Usage Convenience	-.121	**0.52**			
Electronic Word-of-Mouth	.083	-.231	**0.59**		
User Control	.067	-.233	.231	**0.52**	
Customer Perceived Value	-.158	.330	-.203	-.292	**0.54**

Notes: Average variances extracted are in bold on the diagonal. The values below the diagonal are the squared correlations between the constructs.

Table 9.12 Squared correlation Matrix.

9.4.4 SEM Analysis

The figure below shows the SEM model (see Figure 9.4) that is analysed in AMOS. In this test, three independent variables and the dependent variable are included in the model. The results in Table 9.13 indicate the null hypotheses that each of the independent variables has no relationships with the dependent variable have been rejected. The standardized regression weights are, from Electronic Risk to Customer Perceived Value, -0.244 (p=0.010); from Electronic Word-of-Mouth to Customer Perceived Value, 0.184 (p=0.048); from Usage Convenience to Customer Perceived Value, 0.522 (p=0.000). Therefore, the relationships between all three independent variables and the dependent variable are established, Electronic Risk is negatively related to Customer Perceived Value, both Electronic Word-of-Mouth and Usage Convenience are positively related to Customer Perceived Value. Amongst the three independent variables, Usage Convenience has the strongest effect on the value creation of mobile channel service.
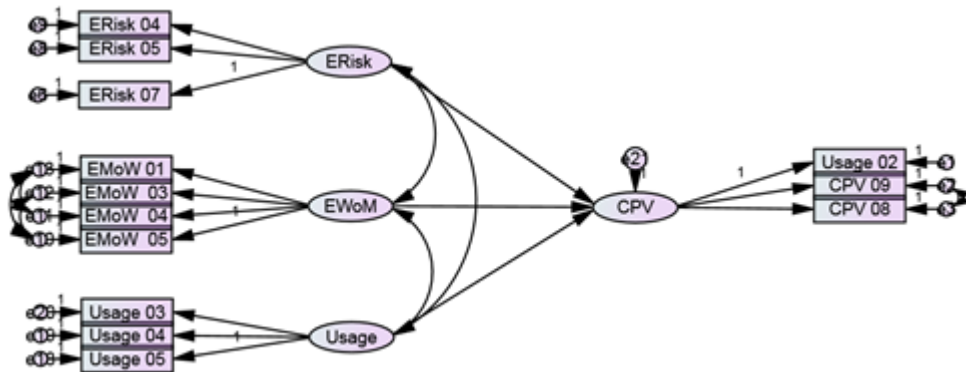
Figure 9.4 SEM model in AMOS

Relationship	Standardised Regression Weight (p-value)
Electronic Risk → Customer Perceived Value	-0.244 (p = 0.010, Sig)
Usage Convenience → Customer Perceived Value	0.522 (p = 0.000, Sig)
Electronic Word-of-Mouth → Customer Perceived Value	0.184 (p = 0.048, Sig)

Table 9.13 Regression analysis on the relationship between independent variables and dependent variable

9.4.5 Mediator Testing

In order to test the mediation effect from User Control to the relationships between independent variables and the dependent variable, this thesis adopts the methods introduced by Zhao et al., (2010).

In this method, there are five different types of mediation:

1. Complementary mediation: Mediated effect and direct effect both exist and point in the same direction.
2. Competitive mediation: Mediated effect and direct effect both exist and point in opposite directions.
3. Indirect-only mediation: Mediated effect exists, but no direct effect.
4. Direct-only nonmediation: Direct effect exists, but no indirect effect.
5. No-effect nonmediation: Neither direct effect nor indirect effect exists.

A decision tree (Figure 9.5) is adopted from Zhao's et al. (2010) work, and supporting the mediation testing in this thesis. The results are shown in Figure 9.6.
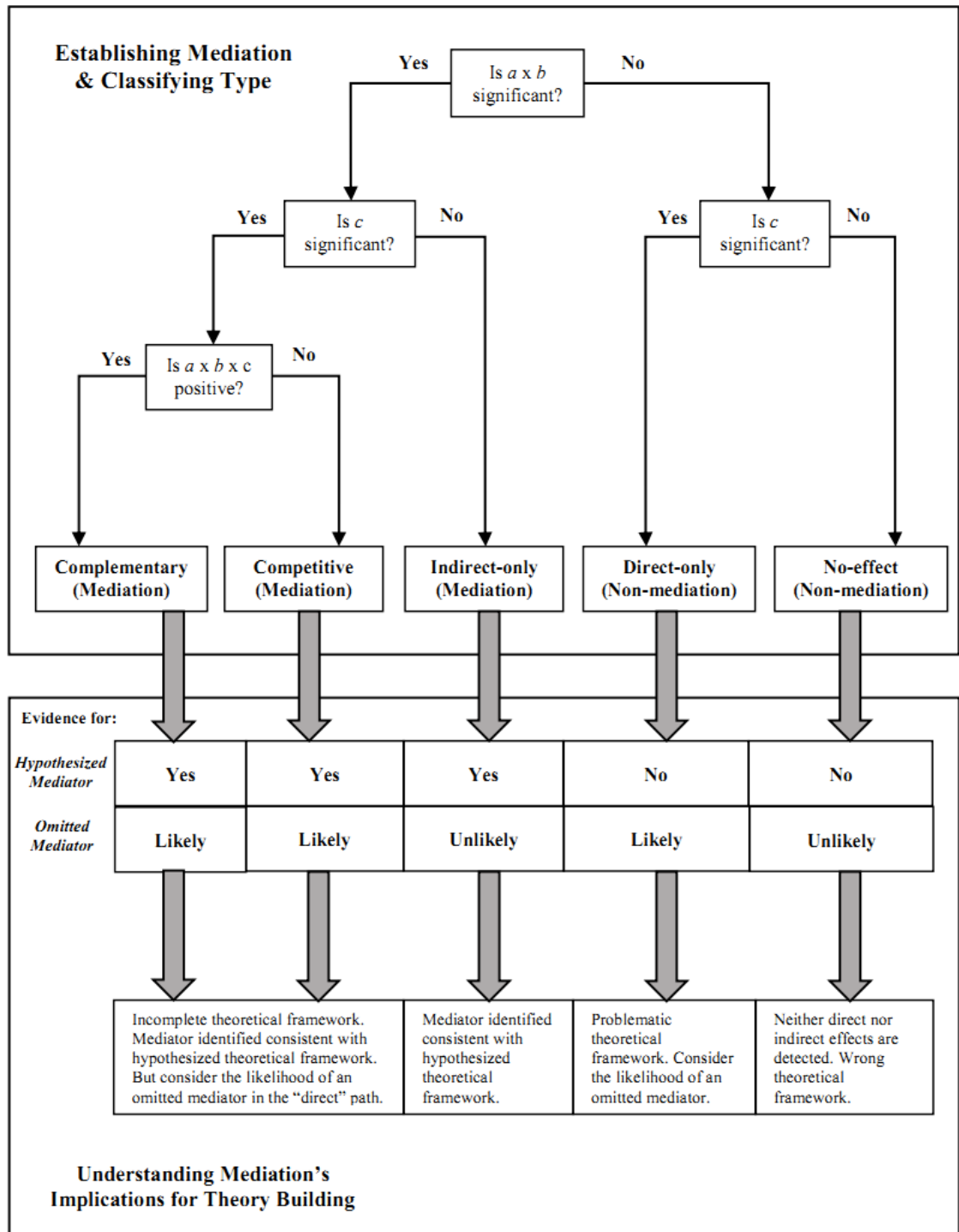
Figure 9.5 Decision Tree for establishing and understanding types of mediation and
nonmediation (Zhao et al., 2010).
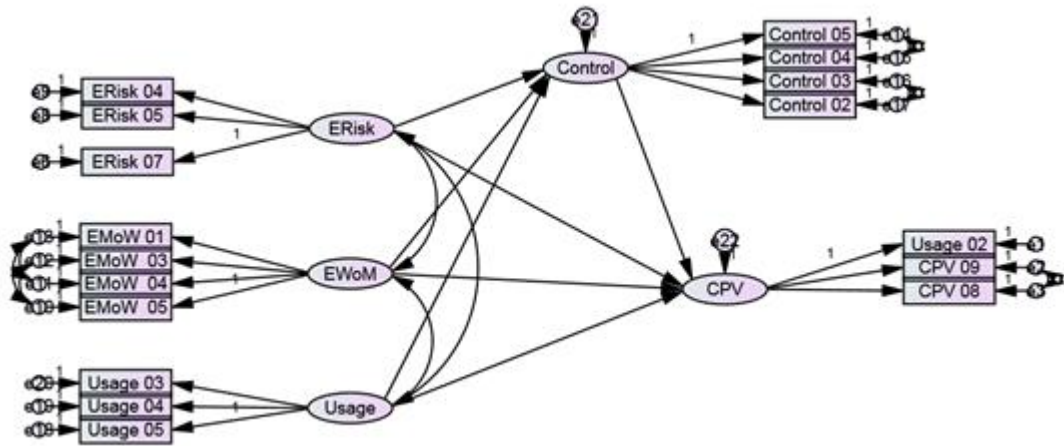
Figure 9.6 Conceptual model for mediation testing in AMOS

Based on the results demonstrated in Table 9.14, H4, which is the hypothesis that User Control is mediating the relationship between Electronic Risk and Customer Perceived Value, is rejected. All other five hypotheses are supported. The testing outcome – the structural model is shown as below (Figure 9.7).
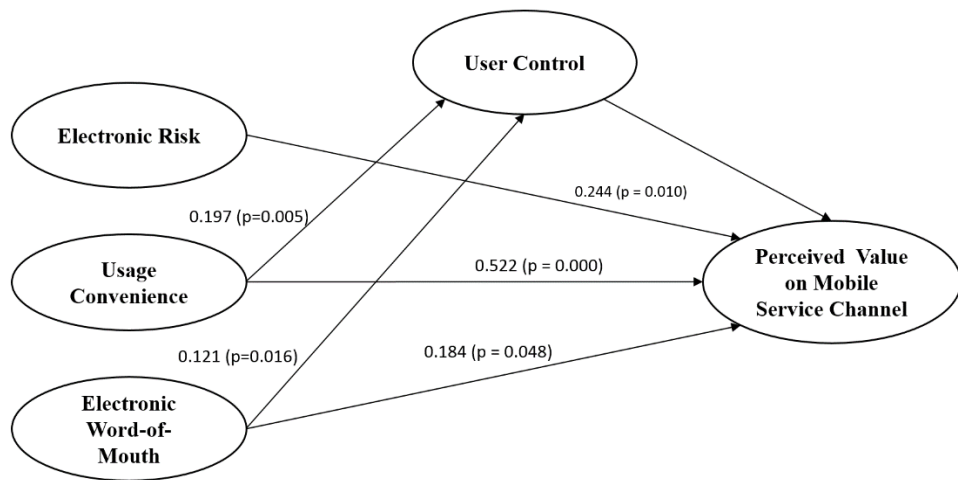

Figure 9.7 The structural model of customer perceived value proposition
on mobile channels

Hypotheses	Relationship	Standardised Regression Weight (p value)	Indirect relationship (p value)	Direct Relationship (p value)	Direction of Mediation	Mediation Type	Testing Result
H1	Electronic Risk → Customer Perceived Value	-0.244 (p = 0.010, Sig)					Supported
H2	Usage Convenience → Customer Perceived Value	0.522 (p = 0.000, Sig)					Supported
H3	Electronic WoM → Customer Perceived Value	0.184 (p = 0.048, Sig)					Supported
H4	User Control mediates Electronic Risk → Customer Perceived Value		-0.036 (p=0.220, NS)	-0.128 (P=0.040, Sig)	N/A	Direct-only (Non Mediation)	Rejected
H5	User Control mediates Usage Convenience → Customer Perceived Value		0.197 (p=0.005, Sig)	0.246 (P=0.039, Sig)	positive	Complementary (Mediation)	Supported
H6	User Control mediates Electronic WoM → Customer Perceived Value		0.121 (p=0.016, Sig)	0.034 (P=0.677, NS)	N/A	Indirect-only (Mediation)	Supported

Table 9.14 Summary of SEM analysis in AMOS

Chapter 10 Discussion

10.1 Introduction

As discussed earlier in Chapter 2, this thesis sets out to investigate the relationship between the usage of the information function on a mobile retail application, the time consumption of associated decision-making processes, and the probability of reaching a decision. Guided by three theoretical foundations, Prospect Theory, the Theory of Planned Behaviour and Minkowski Spacetime, this thesis developed a conceptual framework to achieve five research objectives (see Chapter 6). Using this conceptual framework as a subsequent guide to research, all five research objectives have been achieved through two analytical studies: 1) survival analysis on screen recording data for examining information processing characteristics contributing to customer perceived value, and 2) structural equation modelling focused on questionnaire data for examining antecedent/predicted value relationships.

The results from survival analysis and structural equation modelling highlight a number of key points for both marketing researchers and marketing practitioners. This chapter offers several sections of discussion to emphasise all the key findings of this research project. The following chapter will be split into five sections, each of the sections is addressing one research objective.

10.2 Research Objective 1

The first research objective, "to develop a time-related analytical approach for measuring and analysing consumers' behavioural data on mobile retail application" has been achieved. Survival time is perceived to be one of the crucial measurements that this thesis investigates for understanding consumer behaviour on the time dimension, so the development of a research model that uses Survival analysis satisfies this objective.

A consumer decision-making process is a combination of both cognitive processing and emotional processing when dealing with the information. This thesis employs three theoretical foundations to develop not only a better understanding on a cluster of concepts that are related to this topic, but a number of new concepts that connect the theoretical foundations to validate the overall research design. As mentioned in the conceptual framework (see Chapter 6), all the measurements needed for conducting a consumer

behavioural research have been successfully collected and analysed with an acceptable level of validity. Screen recording and survival analysis are designed, tested and utilised to perform this part of the study. Also worthy of mention, is that the secondary data provided by Boots' website provided key data for this thesis, and overall strengthened the research design.

10.3 Research Objective 2

Research Objective 2 is "to explore the relationship between the usage, the time consumption and the results of consumer decision-making process using the method developed in RO1". This has been achieved by collecting and analysing screen recording data relating to over 400 replica purchase processes.

Analysing screen recording data with survival analysis was the main methodological challenge for this thesis. Consumers' actual behavioural data is difficult to collect and analyse to reach a valid conclusion. This thesis has recruited 217 Nottingham Trent University undergraduate students to provide their hypothetical decision-making processes on Boots' mobilised website. All the screen recording data was manually processed to meet the requirement of performing survival analysis. This is one of the first attempts of applying survival analysis to mobile retail application research. Reflections and recommendation for further research are provided in the Conclusion (Chapter 11).

Basically, the results from survival analysis highlight the phenomena of information overload, which occurs when the amount of input information exceeds consumers' processing capacity (Edmunds and Morris, 2000; Klausegger et al., 2007; Chen et al., 2009). Decision makers have fairly limited cognitive processing capacity, which limits the quality of their decision-making processes, in terms of success rate and time consumption of these processes (Eppler and Mengis, 2004). This key issue is demonstrated in the survival analysis results (see Table 10.1).

Mobile Application Function	Decision-making Process for Decision (Exp(B), (Sig.))			
	Natural (434)	≤180sec (329)	≥180sec (105)	Modified, ≤180sec (434)
1. Related Product	0.973 (0.002)*	0.987 (0.338)	0.989 (0.339)	0.968 (0.022)*
2. Product Review	0.823 (0.000)*	0.865 (0.000)*	0.873 (0.001)*	0.830 (0.000)*
3. Review Rating	0.992 (0.411)	0.985 (0.301)	0.989 (0.374)	0.984 (0.284)
4. Product Description	0.741 (0.000)*	0.709 (0.000)*	0.879 (0.002)*	0.638 (0.000)*
5. Delivery Information	0.740 (0.005)*	0.772 (0.064)	1.166 (0.325)	0.673 (0.007)*
6. Product Pictures	0.870 (0.003)*	0.856 (0.026)*	1.013 (0.832)	0.855 (0.012)*
7. Product Sorting	0.922 (0.170)	0.819 (0.021)*	1.062 (0.502)	0.804 (0.007)*
8. Review Sorting	0.824 (0.201)	1.005 (0.979)	0.680 (0.119)	0.821 (0.293)
9. Product Listing	0.822 (0.000)*	0.816 (0.000)*	0.894 (0.010)*	0.768 (0.000)*
Mobile Application Function	Decision-making Process for Purchase (Exp(B), (Sig.))			
	Natural (434)	≤180sec (329)	≥180sec (105)	Modified, ≤180sec (434)
1. Related Product	0.976 (0.013)*	0.997 (0.836)	0.991 (0.495)	0.979 (0.134)
2. Product Review	0.809 (0.000)*	0.854 (0.000)*	0.863 (0.002)*	0.825 (0.000)*
3. Review Rating	0.993 (0.504)	0.976 (0.104)	0.991 (0.564)	0.977 (0.137)
4. Product Description	0.738 (0.000)*	0.675 (0.000)*	0.904 (0.031)*	0.620 (0.000)*
5. Delivery Information	0.788 (0.035)*	0.805 (0.133)	1.336 (0.086)	0.704 (0.022)*
6. Product Pictures	0.857 (0.003)*	0.822 (0.012)*	1.051 (0.438)	0.829 (0.008)*
7. Product Sorting	0.885 (0.069)	0.778 (0.007)*	1.043 (0.687)	0.780 (0.005)*
8. Review Sorting	0.819 (0.222)	0.937 (0.749)	0.754 (0.292)	0.726 (0.132)
9. Product Listing	0.756 (0.000)*	0.688 (0.000)*	0.882 (0.012)*	0.665 (0.000)*

Table 10.1. Summary of survival analysis results

From the figure above (Table 10.1), it shows three key findings. First of all, in the natural decision-making processes, basically, every function, individually, that the participants used in their decision-making processes are lowering the likelihood of reaching a decision, regardless of whether the decision is a purchase decision ('to buy' decision) or an outcome of a clear decision (either 'to buy' or 'not to buy' decision). This is indicated given the coefficients of all nine functions on Boots' website are less than one. However, as mentioned before, a few functions are the default functions that participants will have to use, for instance, related product function, review rating function (although not statistically significant in most case, this function is inevitably used in every decision-making process) and product listing function.

Between the two default functions that achieved statistical significance in survival analysis, the coefficient of related product function (0.973, p=0.002, sig) is relatively larger than the coefficient of product listing function (0.822, p=0.000, sig), which means related product function has less negative impacts on decision-making success rate. This result can be interpreted from a point of view of information overload, because in Boots' mobilised website, one usage of related product function means a very brief view of a combination of product name and a single picture. On the other hand, one usage of product listing means, on Boots' mobilised website, a potential of viewing twelve more pieces of related product information. This matches the basic principle of information overload theory that larger quantity of information is more easily to trigger information overload (Jackson and Farzaneh, 2012). Therefore, the usage of product listing function is more likely to cause information overload, and consequently leading to decision-making process without ideal outcomes (Gross, 2014). This phenomenon can be observed from all eight tables that related product function's coefficient is larger than product listing functions. Note that the marginal increases in decision-making efficiency for each function are not absolutely cumulative. That is, by removing all functions you would not achieve the optimum decision-making situation. Clearly, the optimum decision-making point will be at some point between all functions and no functions. The challenge then, is to find which functions, and in which order, are necessary for achieving the optimum situation. Also, what changes could be made to functions to increase their effectiveness. Aspects related to this will be covered in the final part of this Discussion chapter.

Second of all, both product description function (0.741, p=0.000, sig) and delivery information (0.740, p=0.005, sig) are negatively impacting the decision-making process outcome. Both the functions have achieved statistical significance in multiple analysis scenarios. However, with the lowest value of their coefficients, they have the strongest effects on lowering the probability for consumers to reach a decision.

Third of all, product sorting function, as a representation of the User Control mediator, that consumers control the sequence of product information displayed on the screen, is highlighted in all the analysis of decision-making processes that are shorter than three minutes (Chan et al., 2010). On one hand, in the results regarding all the 434 natural decision-making processes performed during the fieldwork (0.922, p=0.170, NS), or the 105 decision-making processes that are longer than three minutes (1.062, p=0.502, NS), this function does not significantly impact the probability of reaching a decision. On the other hand, interestingly, when analysing the decision-making processes that are less than three minutes, regardless of whether these processes are natural (0.819, p=0.021, sig) or modified (0.804, p=0.007, sig), this function plays a significantly important role in these relatively shorter decision-making processes. This, from a practical perspective, establishes a relationship between mobile functions usage and the time consumption of a decision-making process (Litt and Tormala, 2010).

Apart from the statistical figures mentioned about, this thesis has also managed to use all four elements in Prospect Theory to demonstrate a better understanding in this research context (Tversky and Kahneman, 1979, 1992). First of all, in Prospect Theory, a decision maker is judging value gain or loss relative to their own reference point, which can only be identified on an individual level (McDermott, 2004). In this thesis, it has been identified a new reference point that common to all, but is different from one consumer to another. This reference point is a temporal point of the beginning of a decision-making process, where the consumer is equipped with his/her maximum capacity of processing information for this particular decision-making process (Miller, 1956).

Second, diminishing sensitivity in Prospect Theory refers to the value function curve that is changing in accordance with the distance between the reference point and the value assessment point (Camerer, 2004). In this thesis, with support from Minkowski's ideas concerning spacetime (Minkowski, 1908) - the third theoretical foundation - and using the

concept of information process velocity, the shape of the curve representing consumers' capacity of perceiving value from using mobile application (see Figure 10.1 and Figure 7.1) is similar to the original curve in Prospect Theory. However, the difference between these two is worth to mention. In Prospect Theory, the capacity of gains in maximally changing near the reference point and becomes progressively less sensitive as it moves away from the reference point. In this thesis, the information processing velocity moves away from the maximum velocity cone (which has the same shape as the light cone in Minkowski Spacetime diagram) when the consumer uses a function that has survival coefficient that is less than 1. It moves towards the maximum velocity cone when the consumer uses a function that has its coefficient larger than one, but never exceeds the maximum velocity. The smaller the value of the coefficient has, the more progressively the velocity moves away from the maximum velocity cone. The third point, that of loss aversion, is not directly addressed in this thesis, given that on mobile service channels consumers' main sacrifice for making a decision is a period of time. The survival analysis result shows that consumers are using a User Control related function to significantly shorten their path towards successful decision-making processes.

10.4 Research Objective 3

The third research objective - "To develop a conceptual model as one perspective of understanding the perceived value proposition on mobile service channels" has been achieved.

Based on the literature review of the three areas related to this thesis: consumer decision-making processes, time concepts in consumer research and service value co-creation, a value proposition has been theoretically developed on the basis three theoretical foundations, but particularly from the Theory of Planned Behaviour, which indicates User Control acting as a mediator.

Rather than perceived benefits and perceived sacrifice representing the consumers' value evaluator's role, the mediator is representing consumers' value co-creation process controller' role. Both the roles are thoroughly discussed within the recent development of Service-dominant Logic. Four parties that are involved in the interactions on mobile channel service are identified. They are the first party consumers (focal consumer), the second party retail service provider that is offering software, the third party consumers

(fellow consumer) and fourth party the infrastructure and all the hardware that is involved (this is beyond the scope of this thesis). Three constructs of Electronic Risk, Usage Convenience and Electronic Word-of-Mouth are respectively assigned to the first three parties. Since the mediator is highlighting the service process controller's role, User Control is proposed to be the mediator in the mobile service value proposition.

10.5 Research Objective 4

Research Objective 4 is "to test the conceptual model from RO3 for exploring the role of User Control in the final testing result – the structural model".

Structural equation modelling is utilised to analyse questionnaire data to test the hypotheses developed from a value proposition. Three hypotheses – 1) Electronic Risk is negatively related to Customer Perceived Value, 2) Usage Convenience is positively related to Customer Perceived Value and 3) Electronic Word-of-Mouth is positively related to Customer Perceived Value is confirmed. The structural model is demonstrated in Table 9.13.

Structural equation modelling is used to test User Control's mediator role in pursuing this research objective. As mentioned above, the main relationships between three independent variables and the dependent variable are supported. This thesis adopts Zhao et al. (2010)'s mediation testing method. The result shows, firstly, that User Control has no mediation effect on the relationship between Electronic Risk and Customer Perceived Value. Secondly, User Control is fully mediating the relationship between Usage Convenience and Customer Perceived Value. Finally, User Control is fully mediating the relationship between Electronic Word-of-Mouth and Customer Perceived Value.

For testing the proposed conceptual model, 217 undergraduate students in Nottingham Trent University were invited to complete a questionnaire after their screen recording session. All 217 questionnaires are included in the questionnaire database. In the questionnaire, 46 Likert scale items were developed for measuring 5 constructs. All scale items were adopted from previous research in similar areas, and reviewed by five experts to help secure construct validity. The draft of the questionnaire was tested in a pilot study, and a few improvements - as detailed in the Methodology section - were made based on reflections on the pilot study. After the data was collected and input into SPSS, 7 steps of

tests and analysis were performed. These were, Cronbach's alpha test for reliability testing, principle component analysis for reducing data, confirmatory factor analysis for evaluating the model fit, common methods bias testing, convergent validity and discriminate validity tests, structural equation modelling for testing the relationships between three independent variables and the dependent variable, and finally, mediation testing for the proposed mediator, User Control.

As Table 9.13 shows, relationships between three independent variables and the dependent variable have been confirmed (Kleijnen et al., 2007; Kang et al., 2015). Further, User Control has been shown to mediate the relationships between Usage Convenience and Customer Perceived Value, and Electronic Word-of-Mouth and Customer Perceived Value. However, User Control has no mediation effects on the relationship between Electronic Risk and Customer Perceived Value.

Results show firstly that Electronic Risk is negatively related to Customer Perceived Value, with the regression weight of -.244 (p = .010, sig). In an electronic channel service context, it is particularly more important but coincidentally more difficult to manage consumers' trust perception towards either manufacturers or service providers. The reason could be, on mobile retail platforms, that all the interactions happening during the whole decision-making process are purely informational. The lack of physical presence of the product to be purchased, and the lack of physical interaction between companies and consumers make a trust between them the central issues (Kim et al., 2013).

In the questionnaire data analysis, three items were selected to represent the Electronic Risk construct, they are scale items 18, 19 and 21 (see Table 9.1). Item 18 is asking about participants' perception about using financially sensitive information on a mobile retail application; Item 21 is asking whether participants are comfortable to input their personal information on a mobile application; and item 19 is about participants' opinions on quickly making a purchase decision on mobile retail application - in terms of whether they feel confident that although the decision-making process is relatively shorter than these on other service channels (Tojib and Tsarenko, 2012) is the information they receive and process sufficiently precise and adequate? The impact from these three perspectives to Electronic Risk perception is significant, but not as much as reported and anticipated in the literature review section (Bart et al., 2005; Kim et al., 2007).

Consumers experiencing different levels of risk in technology innovation use various performance to evaluate their trust on electronic channels. Previous research (Yang et al., 2015) has established the relationship between consumers' risk perception and level of technology innovation in the context of mobile financial services. Therefore, the recent technology developments might provide insight into why consumers' risk perception is decreasingly influencing their value co-creation on a mobile channel service. For instance, as mentioned in the Introduction section, a high-resolution screen could be one of the technological innovations that increase consumers' trust towards manufacturers and service provider (Faroughian et al., 2012). With the assistance of high-resolution screen and high-resolution pictures of the product, manufacturers are able to demonstrate their products in detail, and consumers can engage in 'closer inspection' of a product. Both parties, consumers and companies, can use high-resolution screens/pictures to compensate for the lack of physical presence.

Another example, also a recent technological development used on mobile hardware, is the fingerprint scanner. This technology simply enhances the security of all the information stored in, or can be accessed with a specific mobile device. Therefore, although the fingerprint scanner is the function that integrated to the hardware, the software, which is mobile retail application can still benefit from it. This demonstrates how hardware improvements could impact decision-making efficiency but, as identified earlier, evaluating this is beyond the scope of the current research.

Another interesting finding on the testing surrounding Electronic Risk is, the relationship established between it and Customer Perceived Value. User Control, however, has no mediation effect on this relationship. This thesis also interprets this result from a technological point of view. More specifically, most of the security issues regarding financial information and private information are highly technological, which means, consumers have relatively weak control of those functions (Komiak and Benbasat, 2008). For instance, if a consumer wants to make a payment on a mobile device, certain information is required, such as name, card number, billing address, etc. It is difficult to control the information that is inputted to the mobile application, and decide whether to clear that information when the financial transaction is finalised. Deciding whether to keep that information on the mobile retail application or not is the only available means of

controlling the usage of such functions. Another example would be, when taking mobile devices with crucial information into the open environment, consumers are aware that there is a chance the device can be actively or passively lost. In this case, the control of that vital information entirely dependents on the technological protection from the hardware (for example, fingerprint scanner) and software (for example, password), which are both out of the consumers' control (Welter and Kautonen, 2005). Under such circumstance, any further attempt at controlling that information will engage information action outside the mobile retail application, for example, call the bank to cancel old card number. This also is beyond the scope of this thesis.

For the construct that represents Usage Convenience, the regression analysis results show a strong relationship (standardised regression weight = 0.522; p = 0.000, sig) between it and Customer Perceived Value. Three scale items are selected by Principle Component Analysis and Confirmatory Factor Analysis, which are scale item 03, 04, 06 (see Table 9.3). Item 03 is asking about the impact on time consumption when using a mobile channel service for making a purchase decision. Item 04 is asking participants' opinions on managing their time with the assistance of their mobile retail application. Item 06 is measuring participants' perception on the effectiveness of using mobile channel service to make a purchase decision.

From the consumers' perspective, the opportunities of using electronic channel services mean time savings and usage convenience; this is due to the higher efficiency of communication when compared to traditional service channels. Earlier research (Jayawardhena et al, 2009; Gummerus and Pihlström, 2011) also points out that mobile platform consumers are principally attracted by the convenience value of being able to access shopping information wherever and whenever they want. And this ubiquity value has been considered as a general motivation for adopting mobile channel services. The result, that Usage Convenience has a standardised regression weight of 0.522 (p=0.000, sig) - which is much stronger than Electronic Risk (-0.244, p=0.010, sig) and Electronic Word-of-Mouth (0.184, p=0.048, sig) - matches findings from previous research (Cho, 2006; Li and Miniard, 2006; Park and Kim, 2009; Chu and Kim, 2011)

Despite the inherent efficiency advantage over other service channels, previous research (Jacquet et al., 2010; Hotaling et al., 2015) shows that for mobile channel retailers, the

importance of taking care when designing the communication interface for their customers. Compared to traditional internet commerce, which requires a personal computer to process information, mobile channel service provides almost identical information in terms of quantity and richness of information. The size of the screen on mobile devices is a double-edged sword - on one hand, the mobility and ubiquity are only achievable with this relatively smaller screen; on the other hand, the information density is highly limited by it (Friendrich et al., 2009). Consumers need to not only control the functionality of mobile retail applications, they also need, occasionally, to control other matters when making purchase decisions.

For instance, as mentioned in the Introduction section, solving information density issues, defined as the amount of information that can be displayed on the screen at one time, requires consumers to perform further control. When using the product picture function on their mobile retail application, consumers might need to enlarge the picture to see greater details on a product. The enlarged picture requires further control of moving that picture around to show details. When consumers want to read about product description, certain control is also needed for enlarging fonts to a readable size, then moving the text around to fully read them. These phenomena make User Control improvement an essential step to generate and perceive usage value on mobile retail applications, particularly when consumers are trying to interact with second party electronic retailers.

The mediation test results confirm the hypothesis that User Control is fully mediating the relationship between Usage Convenience and Customer Perceived Value. When adding in User Control as a mediator, the relationship between Usage Convenience and Customer Perceived Value loses significance (p = 0.177, NS). Meanwhile, the relationship between Usage Convenience and User Control, and the relationship between User Control and Customer Perceived Value are both significant (p = 0.000, sig and p = 0.011, sig, respectively).

The hypothesis that Electronic Word-of-Mouth, the last independent variable, is positively related to Customer Perceived Value, is supported in the regression analysis (Standardised Regression Weight = 0.184; p = 0.048, sig). Generally, consumers are more likely to make purchase decisions based on their perceptions of recommendations and endorsements rather than their past interactions with product providers (Smith et al., 2005). Word-of-

mouth has been widely recognised as the vital reducer of functional, financial and social risks in the retailing industry (Mukherjee and Nath, 2007). Although products being purchased are tangible/physical the electronic retailing service itself is purely informational (Bendoly et al. 2005; Venkatesan et al., 2007). On electronic service channels, Electronic Word-of-Mouth generates greater credibility than the information provided both by electronic retailers and product manufacturers (Godes et al., 2005).

And more importantly, electronic word-of-mouth is the only way that the fellow consumers can become involved in a focal consumers' purchase decision-making processes (Grönroos, 2012). The fellow consumers are not selling the products for their own profit, their highly personalised information is effectively a gift, and one of the crucial elements the focal consumers would like to consider in their decision-making processes. Online reviews provide both product information, which can be compared with the information provided by retailers and manufacturers, and also enhance usage experience, which can lower the uncertainty of making a purchase by the first party consumers (Nielsen et al., 2007). Even negative electronic word-of-mouth information could have positive influence to purchase decision-making process, in terms of lowering first party consumers' expectations (Luís Abrantes et al., 2013).

When conducting mediator testing on the relationship between Electronic Word-of-Mouth and Customer Perceived Value, the hypothesis that User Control mediates this relationship is supported. Previous research (Sweeney et al., 2014) reported that for processing electronic word-of-mouth information a few specific functions should be provided, as a cluster of functions help the first party consumers to quickly and precisely locate the information they need. For instance, also mentioned in the survival analysis section, the overall review rating function and review sorting function help first parity consumers prioritise reviews according to their personal preference. The former is a feature that is provided by the second party electronic retailer, the latter is the feature that enables consumers to control their electronic word-of-mouth information processing. Given that all electronic word-of-mouth is more personalised and less organised than is second party (organisation-provided) information, User Control is crucial for mediating the relationship between electronic word-of-mouth information usage and the final outcomes of the purchase decision-making processes.

10.6 Research Objective 5

The last Research Objective is "to offer suggestions on mobile retail application design to enhance customer perceived value generation".

Since in the survival analysis section, the functions representing Electronic Risk - for instance, login information, delivery address, financial information - are not included, and in the structural equation modelling section, the mediator, User Control, has no mediation effects on the relationship between Electronic Risk and Customer Perceived Value, this section is mainly focusing on the comparison and contrast of the results regarding Usage Convenience, Electronic Word-of-Mouth, User Control and Customer Perceived Value. Reasons for the absence of Electronic Risk are detailed further above.

Both Usage Convenience and Electronic Word-of-Mouth are positively related to Customer Perceived Value in the final structural model. In survival analysis, however, all the functions are basically lowering the likelihood that consumers can reach either a decision ('to buy' or 'not to buy') or purchase decision ('to buy' only). These two different sets of results raise the vital issue of information overload, which refers to the amount by which input information a consumer needs to process exceeds his/her processing capacity. As mentioned in the first theoretical foundation of this thesis, in Prospect Theory, the decision maker is normally mentally overestimating the lower probability and underestimate the higher probability (Tversky and Kahneman, 1979, 1992). In this research context, it appears participants are overestimating the probability reaching a decision across the board. This is indicated by the positive relationships in the structural model and negative relationship in the survival analysis results. Therefore, as suggested in the second theoretical foundation (the Theory of Planned Behaviour; Ajzen, 1991), when the decision maker has strong control beliefs regarding a decision-making process, he/she is highly likely to make a decision. This decision-making intention issue is actually the biggest threat to a positive perceived value evaluation, given their expected support from processing the information is actually lowering their chance of reaching a decision.

The third theoretical foundation of this thesis, Minkowski's spacetime diagram that geometrically demonstrates the changing the process of a consumer's information processing velocity when he/she is trying to make a decision is invoked here. It is a

dynamic process that in human's memory system, short-term memory and long-term memory are interacting all the time to transmit information between them (Biehal and Chakravarti, 1982). Only the information in a consumer's short-term memory can be directly used for decision-making, as long-term memory is only responsible for the storage of information. The mechanism that how short-term memory and long-term memory works together is similar to the way that, in a computer, the RAM (Random Access Memory) and the Hard Drive are supporting the CPU (Central Processing Unit) to process information (Matlabtips.com, 2015).

In the exhibit below (Figure 10.1), regardless of the mental distance between a consumer's wants/needs and a confident/smart decision, the information processing velocity is always decreased when a piece of information is being processed and deliberated in a consideration of myriad trade-offs between benefits and sacrifices. When this particular piece of information is processed and considered, it will be transmitted to long-term memory to be recalled later, or to be forgotten directly from short-term memory (Szmigin, 2014). When either happens, the information processing velocity will increase, but will never exceed the maximum velocity this particular consumer can reach.

Based on the results from the structural model, where consumers are positive about processing information to reach a decision on a mobile retail application however, they appear to be consuming their capacity for processing information when they are processing it. This capacity consuming takes up a period of social time in their mind (Biehal and Chakravarti, 1982; Brannen and Nilsen, 2002). Therefore, the mobile retail application should be ultimately designed in such a way that during this period of social time in consumer's mind, information should be delivered to the consumer with an optimal pace (helping with the short-term, long-term memory interaction) and sequence (avoiding information overload occurring at the earlier stage of a decision-making process, otherwise an inadequate amount of information will be taken into consideration thus resulting in a poor quality decision). Based on Figure 10.1 to represent the optimal decision-making process, it would appear as an information processing cone (in red colour in the figure) that has enough volume to have a good quality decision within its range.

The results from both survival analysis and regression analysis show an interesting paradox - that consumers believe interactions on a mobile retail application contribute to their

decision-making process, but in reality, interaction, or using those functions, is lowering their chance of achieving a confident decision (Etkin et al, 2015). The equilibrium between having adequate information and minimising information overload effect becomes the key of value co-creation.
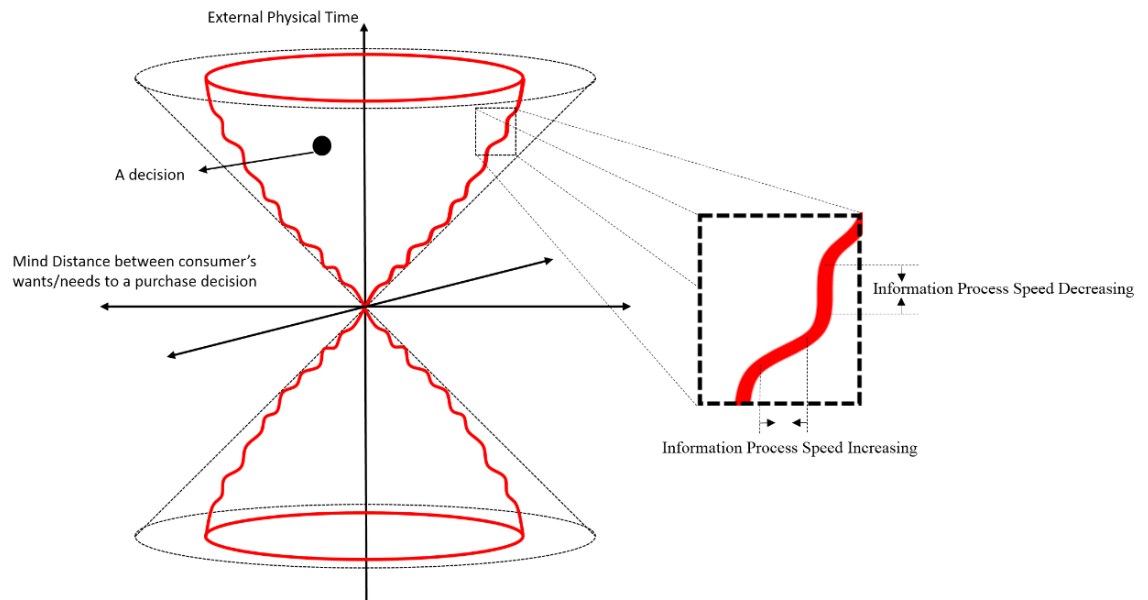

Figure 10.1 Information overload demonstrated in consumer decision-making process spacetime diagram

The industrial implications suggested by this thesis are based on the understanding of Survival Analysis, conceptual model testing, and findings regarding information overload theory. Although with the best results, only seven of nine functions on the mobile retail application have obtained statistical significance, this thesis is going to provide suggestions on the designing of all nine functions from a pragmatic perspective.

Generally, from the results of the value proposition testing, the independent variable of Usage Convenience has a much stronger positive influence on usage value co-creation than Electronic Word-of-Mouth, and User Control is mediating both the independent variables in the value proposition. This means, for enlarging the ultimate effects on the value proposition, enhancing or improving the functions related to either the independent variables, or the mediator, or both of them simultaneously will guarantee a better outcome for decision-making. This is making a 'buy' decision from the supplier's perspective, and a jointly efficient and effective decision from a customer's perspective. Therefore, to

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improve the interaction experiences with different parties, it might need to improve a combination of both independent functions and the mediation function together. Detailed suggestions are provided in the Conclusions Chapter, in Section 11.2.3.

From the results obtained via value proposition testing (the structural model), the independent variable of Usage Convenience can be seen to have a much stronger positive influence on customer perceived value co-creation than Electronic Word-of-Mouth. Further User Control is mediating both these two independent variables in the value proposition. This means that for enlarging the ultimate effects on the value proposition, enhancing or improving the functions related to either the independent variables, or the mediator, or both sides simultaneously, will guarantee a higher probability of reaching decisions. Therefore, to improve the interaction experiences between different parties, it might be necessary to improve both independent functions and the mediation function together. The functions should be improved in a way that consumer can better control their decision-making so that they can process as much information as possible (for making confident purchase decision) but lower the chance of encountering information overload.

The Related Product function is one of the representatives of User Convenience and its coefficient in Survival Analysis is close to one, which means the incidence of usage of this function would not hugely negatively impact consumers' likelihood of making a decision. Therefore, this suggests that on the product listing page (NOT the Product Listing function), and on the page for a specific product, it should offer a proportionally larger quantity of related product information. Although the amount of related product information can also be improved via both the Product Listing and Product Sorting functions, their coefficient values are smaller than that of the Related Product function, which implies the usage potential of those two functions should be limited. Therefore, the primary attempt of improving the overall information on related products (all the information on the products in the same category) should be focusing on the 'Related Product' function, not on 'Product Listing' function or 'Product Sorting' function. For example, the number of related product on a single product listing page should be increased from the current number of 12 to 20 (given the average number related product information participants viewed is 19.23, which can be approximated to 20), so that customers will see all the products that would normally see in a category without considering whether to use 'Product Listing' and 'Product Sorting' functions.

The 'Product Description' and 'Delivery Information' functions have very similar influences on the outcomes of the decision-making process. Both coefficient values are relatively small compared to other User Convenience-related functions. Therefore, the usage potential of these two functions should be reduced. Results suggest that, on a product page, a '(Brief) Product Description' should be provided along with a '(Detailed) Product Description' tab. On the '(Brief) Product Description' tab, only a brief overview of the product is provided, and all other product information is attached to the '(Detailed) Product Description' tab. It also recommended making the '(Brief) Product Description' tab the default one. The '(Detailed) Product Description' tab should be the penultimate one, leaving the 'Delivery Information' tab the last one, since these two can easily occupy a large amount of short-term working memory.

The last Usage Convenience function is 'Product Picture', which has a coefficient value less than 0.9. The suggestion pertaining to this function is not only based on the findings from Survival Analysis results, but also from respondent observations made during this research's fieldwork. Normally, when participants open a product page, they always have a quick scan of the default picture of the product. What has been problematic for them is, according to their comments, the 3-10 pictures associated to one product are organised in different orders. When the customers have a specific picture that they want to see, they usually need to quickly scan all pictures; identify the one they want to have a close look; tap the picture, and then, finally, look at it. According to information overload theory, this simple process of looking at multiple product pictures could easily occupy a large amount of short-term memory, and consequently slow down the information processing velocity. Therefore, it is recommended that electronic retailers should organise pictures for their customers with a default order (for example, a retailer is using a default order for the products in one category), so as to make it easier for the customers to quickly and precisely find the picture they want to look at. For example, on the Boots' website, visual depictions of all men's electronic shavers should have very similar or even exact same number and order of pictures. If a display order is determined, and the order is, the first picture is product front, the second picture is product back, the third picture is product package front, the fourth picture is product accessories, the fifth picture is the product of its usage environment, and the last picture is a user actually using the product; every product in this category should have their first six pictures organised in this order, and put other distinct

pictures after these six pictures. In this case, when a customer weights 'what would it look like when actually using this product' more than, for example, 'what the package of the product looks like', he/she can quickly tap the sixth picture of every product in this category without looking through all the pictures. In this way, a consumer can quickly empty his/her working memory and spend the limited available capacity on the picture arrangement they need to see rather than finding and organising view order of pictures for himself.

The next function to be considered is 'Product Review', which has a coefficient value around 0.80. This function is considered to be important in the value proposition, given it is how the third party consumers interact with the first party (focal) consumer. The suggestion for improving usage experience of this function is combined with usage of another function, 'Review Sorting'. The former represents the independent variable of Electronic Word-of-Mouth, whilst the latter represents the mediator, User Control. The suggestion is basically to reduce the potential for information overload to occur when consumers are using these two functions to read reviews of diverse complexity and length. More specifically, electronic retailers should reconsider their algorithms on organising customer reviews, in order to simply let consumers receive the relatively shorter reviews before letting them read the longer ones. For instance, within the Review Sorting function, there is an option called 'Most Relevant', the algorithm of this sorting function is firstly ordering all the reviews from the most relevant to the least relevant, as it is literately suggesting. The algorithm could secondly order the review with a similar level of relevance with the order from the shortest to the longest. Another example is when consumers choose the option of 'Newest' review first, and there are multiple reviews available from the same date, the algorithm should ideally organise those reviews in order from the shortest one to longest one.

Chapter 11 Conclusion

"Paradox is the essence of contemporary business."

(Woodall, 2012, p173)

11.1 Concluding Remarks

The overall aim of this thesis is investigating the relationship between mobile retail application usage, the probability of reaching an expected decision, the time consumption of the decision-making process and the value perception underpinning consumer behaviour on this service platform. It uses customer perceived value concept as a research lens to critically examine the consumer decision-making process on mobile retail applications with a time related research method, then explores how the mobile application functions might impact usage value on this platform. Finally, it provides insights on designing mobile retail applications to marketing practitioners.

In the marketing literature (Strom et al., 2014), it has been suggested that both marketing researchers and practitioners need to understand the value propositions being offered to consumers. Particularly for the retailing industry, for as the service providers, they are facing the challenges of offering multi-channel service to co-create value with their customers (Kleijnen *et al.*, 2004). Mobile channel service is the service channel that has been changing the landscape of the electronic retailing, or even the whole retailing industry, since it was introduced to the commercial world. It is reported that this service channel is capable of lowering the temporal and spatial barriers for focal customers to conduct information interaction, with other parties involved (Grönroos, 2012). The interactions are happening at the level that no other channel has ever been able to manage before (Trueman et al., 2012). However, it still remains unclear how this service channel influences consumers' value perception and, too, their actual behaviours. More importantly, since all the physical boundaries have been significantly lowered, retailing industry has become much more digital and informational than before (Konczal, 2008). This offers a great opportunity to further examine information interactions and how consumers predict and perceive the value they derive from these interactions.

This research project recognises the importance of time consumption when customers evaluate the service experience (Ganesh et al. 2010), and engages+ with a philosophical

understanding of time. When considering time in consumer research area, there are three concepts of time that need to be taken into account: these are physical time, natural time and social time. All three concepts of time act as behavioural coordinates for consumers, with physical time more influential to the common frame of reference that is shared by every party on this service channel, and social time and natural time only perceived in the consumer's individual frame of reference. Understanding that every consumer is evaluating the time consumption of a service process within two different frames of reference is the biggest challenge for designing research that investigates consumer behaviour on the time dimension. This present research reviews the understanding of time from various scientific areas, and utilises one aspect of Minkowski's work on spacetime. It not only enlightens the research design, but also provides strong connections between a number of theories from different scientific realms. In this thesis, concepts of spacetime are applied via the use of survival analysis to geometrically illustrate the changing of consumers' information processing velocity when they are trying to make a decision. This insight provides crucial insights for conducting probability weighting, which is an element taken from a further theoretical foundation of this work – Prospect Theory.

This thesis suggests consumers' information processing velocity is determined by their cognitive intelligence and emotional intelligence, which, collectively, define the maximum speed at which they can process information. Later, when the velocity becomes, or very close to, zero, it can be considered as an indicator of whether the motion of their decision-making process is still ongoing. Since, within a continuous decision-making process, the information processing velocity is directly related to the probability of reaching a decision, the impact of processing a piece of information on the velocity can also be considered as a proportional impact on the probability of making a decision. As a consequence, the three measurements for examining the actual usage value demonstrated in the conceptual framework (see Chapter 6) are operationalised with survival analysis, both theoretically and statistically. The research design employed is capable of quantifying (with direction) the impact of the informational interactions that take place during a decision-making process, and also of testing the causal relationship between these interactions and the final event outcome.

Another theoretical challenge addressed by this thesis is the development of a value proposition representing another part of probability weighting – the perceived value

proposition. The Theory of Planned Behaviour is chosen here following the review of several extant consumer decision-making models. With the support from Grönroos (2012)'s insight regarding the four parties involved in service value co-creation, the Theory of Planned Behaviour guides the development of a conceptual model defining the problem(s) to be addressed. For mobile retail application usage, four parties are involved in influencing the decision-making process. The first party is the consumers him/herself who is using the application for decision-making. The second party is the service provider, the electronic retailer who provide mobile retail applications to the consumer. The third party comprises fellow customers, who have previously purchased the product that interests the first party consumers. The fourth party is the conjoint digital infrastructure (mobile networking)/hardware (mobile handheld device, for example, smartphones, tablets) hybrid, but the effect from this is beyond the scope of the current thesis. Value-related constructs that are defined as representing the three parties whose influence is addressed via a customer perceived value definition framework are provided in sections 5.3.3 and 7.4.2.

Further to the constructs that are representing information interactions between key parties, the Theory of Planned Behaviour also emphasises the important role of a consumer's 'control beliefs' and their 'perceived behavioural control'. The combination of these two elements represents consumers' evaluation of the probability of reaching an expected decision. This indicates that when consumers are choosing specific functions during their decision-making process, they need to collect not only information pertaining to service/product attributes, but also the functions that enhance the probability of making a decision. From a practical perspective, there is a set of functions that are embedded into the mobile application for this purpose: for instance, product listing, product sorting and review sorting. The usage of this set of functions is the means by which consumers control the information interaction, sequence and duration. The prediction of the effectiveness of using those control functions, then, impacts the overall prediction of the usage value. With this understanding and support from the Theory of Planned Behaviour, User Control is proposed as a mediator in the customer perceived value proposition.

More than 200 undergraduate students from Nottingham Trent University were invited to participate in this thesis. They are the source for two sets of data used for this quantitative research study. Firstly, each of them performs two separate decision-making processes on Boots' mobilised website representing their actual behavioural, and the data collected is

processed with Survival Analysis. Additionally, each of the participants completed a questionnaire, providing data for testing the proposed conceptual model - which is the customer perceived value proposition of mobile channel service. The questionnaire data are analysed using regression analysis and mediator testing in Structural Equation Modelling.

When comparing and contrasting the results from the behavioural analysis (survival analysis on actual behavioural data) and the value proposition (regression analysis and mediator testing on questionnaire data), it identifies a paradox. Consumers believe information interaction on mobile retail applications is supporting their decision-making process, in terms of they can reach a confident purchase decision easily and quickly. However, when they are actually using mobile retail applications, the usage of certain functions will decrease their information processing velocity, which consequently lowers the probability of reaching a decision. This is the essence of this thesis's theoretical contribution and offers deep insights for industrial implication. In the next section, all the contributions from this thesis are presented using Gorley and Gioia's (2011) research contribution framework as a guide. Following this the thesis concludes with a consideration of research limitations, recommendations for further research and, finally, personal reflection on future research activity.

11.2 Research Contribution

11.2.1 Contribution Framework

In terms of what constitutes a theoretical contribution, there are several emphasises, such as advancing knowledge, providing new connections among precepts to move current thinking forward and exploring the practical implications. In Gorley and Gioia's (2011) framework, there are two dimensions that define the nature of theoretical contribution; they are originality and utility (see Figure 11.1 further below). The originality dimension can be categorised into 1) advancing understanding incrementally or 2) providing revelatory understanding to the area. The utility dimension also has two subcategories, 1) practical usefulness and 2) scientific usefulness.

The originality of a research refers to challenging and extending existing knowledge to offer a critical redirection of existing views, or offering a new point of view on a topic (Conlon, 2002). Research providing incremental insight responds to a test on value-adding

that advances the theoretical understanding in a field. Although incremental understanding is often described as minor or marginal improvement beyond that which has been researched previously, this sort of contribution is a necessary aspect of theory development. By contrast, a revelatory insight rests in the scientific idea that reveals what cannot be learned otherwise. A new revelatory theory profoundly and unconventionally re-examines and challenges the fundamental understanding of a specific research community. Any original thinking that is surprising, novel or transformative could potentially constitute a revelatory contribution.

Moving to the first aspect of the utility dimension, scientific utility refers to an advance that improves conceptual consistency or can enhance the operationalisation of a theory. In this sense, if the outcome of a research can provide efficiency and structure to the research topic as well as to research design, and can identify new conditions and boundaries of factors that are studied, this thesis can be considered to have improved research practice. On the other hand, the practical utility can be achieved when the theory is directly focused on solving real-life problems for practitioners. The originality and utility dimensions can often work together producing different but complementary levels of theoretical contribution. This is where the researcher demonstrates an ability to produce original thinking in the discipline and usefulness in its application. In the framework (Figure 11.1), the four quadrants are defined as: 1) research that displays both original, revelatory insight and scientific usefulness; 2) research that is scientifically useful but without adequate originality; 3) research that provides revelatory insight without adequate scientific usefulness and 4) research that scores low on both dimensions.
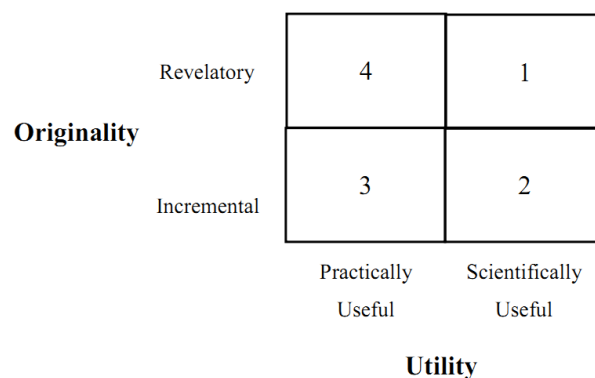

Figure 11.1 Dimensions for Theoretical Contribution

In the next section, this thesis turns a reflective lens on itself and demonstrate a number of contributions from this thesis to the marketing field using Gorley and Gioia's, (2011) framework. A summary of the research contributions arising from this thesis is provided below (Table 11.1), and demonstrating which Quadrant of the framework each of the research contributions belongs to.

The first section of research contributions (research contribution 1, 2 and 3) of this thesis derive mainly from three perspectives: that which emerges from Survival Analysis of consumers' actual behavioural data; that which derives from the regression analysis and mediator testing on the proposed conceptual model; and that which comes from interpretation of the analysis results in the context of information overload theory. Research contribution 4 and 5 are mainly related to the challenge of designing consumer research that takes account of the impact of the time dimension on customer decision-making in a mobile retailing context. Research contribution 6 is provided to electronic industries with insights on mobile retail application design.

11.2.2 Research Contribution 1

This thesis began with a great interest in investigating the relationship that exists between the usage functions on a mobile retail application and their impact on the probability of a consumer actually making a decision. This thesis represents one of the first few attempts to analyse actual consumer behaviours on mobile retail applications in this area, and the scientific challenge is guided by three theoretical foundations: Prospect Theory, the Theory of Planned Behaviour and Minkowski Spacetime. As the research lens, customer perceived value concept brings in a value co-creation view for examining the service process.

Firstly, the coefficients produced by survival analysis explicitly demonstrate there is a relationship between usage of the various functions on the Boots mobile website and the ultimate outcomes of observed consumer decision-making processes. These show that the usage of every function – that is, each occurrence of information interaction on mobile application - is lowering the probability of reaching a decision, regardless of whether this is viewed as purchasing/not purchasing from a consumer's perspective, or is a decision of purchasing from a retailer's perspective.

No.	Research Contribution	Related Research Objective	Originality	Utility	Quadrant
1	Providing coefficients representing the relationship between function usage and the likelihood of reaching a decision.	RO 1 & 2	Incrementally Original	Scientifically Useful	2
2	Providing a structural model as the customer perceived value proposition on mobile service channels and how User Control plays its mediator role in it.	RO 3 & 4	Incrementally Original	Scientifically Useful	2
3	Providing insights on the 'Probability Weighting' phenomenon on mobile service channels, that mobile users are overestimating the impacts from using functions to the likelihood of reaching a decision.	RO 2 & 4	Incrementally Original	Scientifically Useful	2
4	Providing insights on applying survival analysis to consumer behaviour research, and using Minkowski Spacetime to geometrically understand the results.	RO 1	Incrementally Original	Scientifically Useful	2
5	The scale items used in this thesis provide adequate reliability and validity, and can be used in similar areas.	RO 3	Incrementally Original	Scientifically Useful	2
6	Providing practical recommendations to mobile retail application design to electronic retailing industry.	RO 5	Incrementally Original	Practically Useful	3

Table 11.1 Research contributions summary

The function that produces the least negative impact is the 'related product' function, with its coefficient value close to one in both the natural decision-making process analysis and the modified decision-making process analysis. This is the only function that consumers can keep using without sabotaging their likelihood of reaching a decision. Other functions with smaller statistical significance values can be considered as falling into the 'safe range' of adequately providing necessary quantity and quality of information, but not having too big an effect in lowering the likelihood of making a decision. It is argued that this contribution is incrementally original as it provides insights on the relationship between function usage and the outcome of the decision-making process, as well as scientifically useful in terms of introducing a method for examining information overload in a consumer research context.

When analysing screen recording data with survival analysis, each of the value-based constructs other than Electronic Risk has at least one function that achieved statistical significance in relation to the usage value of mobile applications. It is thought that Electronic Risks relate functions (i.e. those related to consumers' beliefs about financial protection) were not collected in the field, because the research participants were not actually buying products during the data collection session and did not use all the functions that are related to financial security. Consequently, those functions' impact on decision-making could not be effectively evaluated.

11.2.3 Research Contribution 2
This thesis makes a notable theoretical contribution through the testing of the perceived value proposition of mobile service channels. The Theory of Planned Behaviour acts here as the theoretical foundation, and the Customer Perceived Value construct is used as a research lens to guide this thesis from two perspectives. Firstly, for any value related research there should be a focus both on the interactions that happen during the service process, and also the identification of the parties that are involved in these interactions. Exploration of the information interaction, including the development of a customer perceived value framework, identification of the parties involved, review of the previous usage of the constructs in the framework, and the operationalisation of these constructs, make a substantive contribution to consumer research. In this thesis, this theoretical development helps identify three independent variables and one mediator variable

(representing the four parties involved in mobile application value co-creation) that have an effect on customer perceived value of the mobile platform (dependent variable). The results from the regression analysis between the three independent variables and the dependent variable accept the hypotheses 1 (Electronic Risk is negatively related to Customer Perceived Value), 2 (Usage Convenience is positively related to Customer Perceived Value) and 3 (Electronic Word-of-Mouth is positively related to Customer Perceived Value). Further, with the support of the Theory of Planned Behaviour, this thesis highlights User Control's role as a mediator in customer perceived value proposition. The relationships between three independent variables and the dependent variable represent the consumers' role as an evaluator of value. The mediator role of User Control represents the consumers' role as a significant force in the co-creation of value.

From the test results based on the questionnaire data, User Control's mediator's role is recognised by value proposition paths from both Usage Convenience to Customer Perceived Value, and from Electronic Word-of-Mouth to Customer Perceived Value. The variable of Electronic Risk rejects User Control's mediation effects. Electronic Risk refers to beliefs about information protection mechanism on mobile applications that is far beyond the control of the actual users, and it is a highly technical issue across many sectors. For instance, the bank sector – as well as the mobile service platform itself - is also responsible and provides mechanisms for protecting consumers' financial information. In other words, in the consumers' perception, it is believed that the complex service infrastructure plus hardware (for example, electronic retailer, banking sector, third-party payment (optional, delivery company and mobile networking infrastructure) are involved in such financially sensitive interaction, and mobile retail application user cannot effectively control such information interactions. Similar to the first contribution mentioned above, this particular contribution offers incremental insight via the development of a conceptual model and a resulting in a structural model that represents the customer perceived value proposition in this context. It is scientifically useful as it offers insight into the nature of the relationship between the five key constructs.

11.2.4 Research Contribution 3
One key theoretical contribution emerges when comparing and contrasting the results of survival analysis and customer perceived value proposition testing, and is heavily related to the ideas concerning information overload. Other than the functions related to Electronic

Risks, which cannot be observed due to the research limitations discussed further above, the actual usage of every function lowers the probability for consumers to reach a decision. On the other hand, however, in the value proposition, consumers believe that conducting informational interactions is in favour of reaching a decision. This paradox reveals the cognitive and emotional limitations of human nature in terms of the capacity a consumer to effectively, and continuously, process information. Although this thesis was not designed to purposely and directly observe and test the impact of information overload on mobile retail application usage, the natural advantages of reducing physical barriers to conducting information interaction on mobile platform become evident in this thesis, and suggests this is an ideal field in which to derive insights on information overload. This may also contribute to research into consumer learning that is relevant to a human's limited short-term memory capacity for processing information.

If consumers' short-term memories are not emptied for the incoming information in time, their processing capacity would be slowing down to the consumers' absolute speed of processing information. Since the absolute speed, or velocity of processing information, is related to the probability of reaching a decision, the coefficients produced by survival analysis can be used to demonstrate the extent to which the information provided via a mobile platform function can slow down a user's information processing velocity - and ultimately lower their chance of reaching an expected decision. Those coefficients not only provide evidence of the existence of information overload on a mobile platform, they also - and more importantly - provide insights on how to avoid information overload from a practical perspective. This is therefore guiding the industrial application that is addressed in the following section, further below. This contribution is an outcome that relates probability weighting to this context. Therefore, this particular contribution is incrementally original and scientifically useful.

11.2.5 Research Contribution 4

For justifying the usage of survival analysis to analyse behaviour data, this thesis reviews the concepts of time. This requires a review of existing theories, not only in the marketing area, but also in other fundamental scientific fields. Given the difficulties and complexities of making objective measurements of consumers' internal perception of time and, and more importantly, attempting to understand the relationships between them, this thesis adopts one element of Minkowski's work on spacetime. Strong links between consumer

behaviour and survival analysis have been established. Using a theoretically anchored justification for using survival analysis, the current study philosophically and methodologically contributes to the marketing literature by suggesting a possible way of quantitatively incorporating the variables of time in into consumer behaviour research. Interestingly, results from survival analysis can also provide insight into another theory – that of information overload. This may open another door of employing survival analysis in the marketing area. This contribution can be considered as scientifically useful since it utilises relationships between ideas from differing scientific disciplines: for example, survival analysis originates from health-care research and Minkowski Spacetime diagram is from the field of physics. This contribution is incrementally original as well.

11.2.6 Research Contribution 5

When theoretically developing the customer perceived value proposition on time dimension, this thesis critically examines and selects five sets of scale items assigned as three independent variables, one mediator and one dependent variable. All items were reviewed by five experts to enhance validity. For analysing the questionnaire data, reliability and validity tests, and common methods bias issues, were all addressed. The results from regression analysis and mediator testing in Structural Equation Modelling are promising and demonstrate the viability of these scales. Future marketing research on electronic retailing channels from a temporal point of view could include some of the scale items utilised for this study. This framework-based contribution is both scientifically useful and incrementally original.

11.2.7 Research Contribution 6

This thesis also contributes to electronic industries, providing insights on mobile retail application design. The industrial implications suggested by this thesis are based on the interpretation of survival analysis results, the conceptual model testing result (the quantified structural model) and findings on information overload theory. Given that from the screen recording results seven of nine mobile retail application functions were found to be statistically significant, suggestions on designing all nine functions - from a practical perspective – can be offered. Detailed discussion on mobile retail application design is provided in Section 10.6.

This set of contributions is focused on solving a number of real-life problems for marketing practitioners and not purely for scientific purposes. Therefore, it is practically useful but has limited academic application.

11.3 Limitations

The study findings are subject to limitations in common with similar survey based consumer behaviour research. First, it should be taken into account that the central limitation arises from a relatively small sample size (n=217) when compared to the population actually using mobile retail applications for decision-making, or to the number of Boots.com customers. Therefore, caution must be exercised when looking to generalise results for the general population and, too, when applying findings from this thesis to the actual practice of the Boots website.

Secondly, looking at the sample and research context as part of the bigger picture, this thesis was conducting a research in a single industry, on a single electronic retailer's website and supported by the sample from a very specific demographic group. Although a focused research constituency has the obvious benefits of controlling cross-industry or socio-cultural variation, caution must be taken when generalising the result to other electronic retailing companies, or to other countries. The corollary to this, of course, is that every aspect of research contributes to the broader body of knowledge and that provided it is rigorously performed it incrementally enhances wider scientific understanding

Third, although substantial steps were taken to help assure reliability and validity throughout the entire research design and execution (particularly for questionnaire design and conceptual model testing), it was not always possible to produce results with the highest and idealist standards. For example, there are two rounds of reliability and validity tests in the questionnaire data analysis. The first round is before principle component analysis and confirmatory factor analysis. From the Cronbach's Alpha result, all constructs reached Cronbach's Alpha that is higher than 0.7, which is generally considered acceptable. However, after the CFA analysis, the Cronbach's Alpha of Electronic Risk and Customer Perceived Value varied between 0.7 and 0.6. This result is not greatly negatively impacting the reliability of this part, but it does decrease psychometric confidence and results must therefore be considered tentative. Repeating the work using the same research protocols would be necessary for confidence to be enhanced.

Fourth, in order to gain a deeper understanding of consumer decision-making process, including the factors that influence it, the time consumed in its performance and the results obtained, it would have been useful to take account other potentially causal factors. As the Theory of Planned Behaviour suggests, for example, educational background, gender and income all play a role in determining how consumers behave. These factors could well be playing a moderator role in determining how a value proposition is perceived. It would not have been possible, given the relatively limited sample size, to obtain reliable inferential data across a meaningful range of informant characteristics so it was determined not to incorporate associated analyses into the study. To address differing social factors would require either a much larger sample, or a range of dedicated studies each focusing on a particular aspect of individual difference. This, in turn, would require a re-examination of relevant theories plus re-developed scales and, eventually, the development of new conceptual frameworks leading to revised structural models. Within the current design of this thesis, a number of factors, for example, age, gender and educational background are used, but as sampling filters only, to assure a balanced and apposite sample addressing the objectives of the present study.

11.4 Recommendations for Further Research

In this section, I offer several recommendations to marketing academics who may be interested in pursuing further this thesis. These recommendations could provide a pathway for encouraging consumer behaviour research in thus far unexplored directions.

First of all, the application of survival analysis in this thesis reveals the potential of further use in the consumer behaviour area. As discussed in the methodology section, first, it enables the investigation of relationships between variables to the temporal dimension. With it, every identified behaviour during a period of time can be directly linked to the ultimate outcome of not only a decision-making process, but any consumer-related process. For example, a service process without a purchase decision to make, but where a point for the customer to evaluate the quality of this service process, could be of interest. Secondly, survival analysis provides different ways of interpreting the ultimate outcome of a decision-making process. For example, in this thesis, it has evaluated decisions of either 'buy' or 'not to buy' as from consumers' perspective (see Section 8.5.1), alternatively, it uses the decision of 'to buy' from a retailers' perceptive (see Section 8.5.2). Each set of

targeting decision (set 1: 'to buy' and 'not to buy' together; set 2: 'to buy' only) provides a set of coefficients to represent the relationship between the functions used and the decision-making outcome. This flexibility would benefit future research design.

Furthermore, the flexibility of survival analysis application, and of Cox regression more specifically, could be used in other ways. The current thesis only takes into account the occurrence of a targeted event – a temporal point that a decision-making process ends (with/without a decision), which is used as the indicator of that decision-making velocity reaches zero. This thesis does not depend on determining the spatial understanding of a consumers' thinking process (that is, the absolute mental distance between the beginning point and the ending point of a decision-making process or the length of the information path required for reaching a decision). However, future research need not follow this path, the spatial view could be as important and useful as the velocity view. For example, within the context of the current research, if the targeted event becomes a control variable, which means participants have to reach a purchase decision regardless how much time they spent on it, or indeed how many times they need to use mobile applications functions, it can provide valid findings that help determine what functions are positively/negatively influencing outcomes for making a purchase decision with an infinite amount of time. With those findings, and how much time targeting consumers normally spent on each function, the time consumption on decision-making process becomes controllable. This would be particularly interesting in the cases when companies are aiming for more usage (time spending on their service), rather than boosting sales figures (quick decision-making process with high success rate).

Second of all, future research could adopt a longitudinal method that facilitates a series of data collection sessions over a period of time. With this research setting, researcher might be able to collect higher quantity and quality data to investigate the 'real-life purchase activities', which means a research can capture as many as consumers' information sources as possible, and more importantly, find out the different weights (in a consumer decision-making process) of different type of information, or same information have different weights when being attached to different communication channels (Kothari, 2009; Taylor at al., 2015; Robson and McCartan, 2016).

Last but not least, it is recommended that future research develops mobile service value proposition with different theoretical foundation (TPB for this thesis), different research lens (customer perceived value for the current research), a different set of constructs associated with different scales items. As mentioned in Section 11.3, in this thesis, most of the reliability and validity testing, factor loading, model fit in CFA and common methods bias test has statistically reached the acceptable level, but not the higher level that would benefit the generalisation all the findings. The application of a new theoretical foundation (for example, TAM model or UTAUT model) might reveal other parts of the puzzle of value co-creation process on mobile service environment (Okazaki and Mendez, 2013; Wang et al., 2015).

11.5 Personal Reflection and Future Direction

This section will first detail the researcher's reflections on the conduct of the study and outline the problems encountered and limits on ambition for the study. This also informs changes he would make if the research was repeated. In the final part, the researcher reveals his personal ambitions that might arise from performing this work. As mentioned in the limitation to the research design (see Section 7.5), when the researcher was conducting the pilot study of this thesis, it has been tried to recruit participants who could provide more data regarding the direction of information. More specifically, with the understanding of purchase decision -making process, it was encouraging participants to share the information of how useful, or how strongly a particular piece of information could positively or negatively support their decision-making process.

Practically, the researcher had prepared audio recording equipment for this propose, and two research fellows offered their help on this matter. However, based on the observation on a number of decision-making process practice of those participants, it was quite significant that once the participant was required to speak out how they value the information currently showed on the screen, their decision-making processes would be lengthened to the extent which hugely impacts the validity of survival analysis part. Those participants stated that they needed time to think about how to express their feelings of how useful the current information was. This task obviously occupies the capacity of their short-term memory and encourage information overload.

Another issue that was reported by the pilot study participants is that the evaluation of the quality of a piece of information could change during their decision-making process. One particular example that dynamic evaluation occurred is, when the participant was trying to find out useful word-of-mouth information, they may feel the first a few information were not as useful as they expected, but after viewing quite an amount of word-of-mouth information, they realised that the first viewed information was the most useful one. In this case, the direction of the information becomes extremely difficult to evaluate by the participants, and to be observed or measured by the researcher.

The possible solution for obtaining information direction data could be a development of data collection platform. More specifically, after the participant completes a decision-making process, he/she could re-evaluate the usefulness of every piece of information he/she had viewed. This task requires a real-time information identification system to clearly identify all the temporal point when a participant switch from one piece of information to another. Given the researcher needed to spend much more time to process the screen recording data than the actual length of those decision-making processes, this task would be highly challenging. But once it has been invented and validated, this platform can be used by multiple types of consumer behaviour research.

Another less technical solution is conducting a longitudinal research. With the ongoing research process, participants may get used to sharing their thought without significantly lengthening their decision-making process. Also, they might be able to remember all the useful information during the decision-making process and provide the final evaluation after they complete it.

To sum, all the points in this reflection section are regarding the quality of consumer behaviour data. During the development of current research, the researcher is fully aware that there are companies that are collecting consumer behavioural data, for example, IBM for Boots' case. The researcher would like to engage with any kind of collaboration to contribute to consumer research.

At the planning stage of this thesis, the research was going to develop a sample mobile retail application for behavioural data collection. A sample application with a small amount of information was produced initially, but dropped eventually. The researcher

highly appreciates the flexibility such a fully controlled research platform might bring to a research similar to the current one. It would enable an improving process on data collection instrument developing by tweaking the application to the point that it can neglect any major negative impact on the validity of a consumer behaviour research. For example, if such an application is in use, the research would be able to more precisely and accurately record the decision-making process, would be able to purposefully modify the application to generate a richer database and would be able to change the current research design to a full experiment mode with all the major variables being tightly controlled. Last but not least, it would be able to share, and improve this mobile research platform with a much wider range of research community. Therefore, the researcher is looking forward to collaboration with any individual or organisation (research team, research institution or commercial organisation) that are also enthusiastic about consumer research, as well as developing IT skills.

The opportunity of collaboration might appear in the circle of academic community, and the best way to be part of this circle is to provide value to this community. More specifically, the researcher is going to prepare himself for an academic conference and possibly an academic publication. Currently, several ideas have been developed on how these plans might precede, further endeavour needs to dedicate to this.

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Appendix

Appendix A. Participant Information Sheet

Participant Information Sheet

Applying Survival Analysis to investigate Mobile Retail Applications from a Customer Perceived Value perspective

<u>**What is this piece of research about?**</u>
This research project is examining how customer perceived value can be generated and delivered in mobile service channels. The objective of this research is to provide both theoretical and practical insights into how mobile service can enhance its contribution to service marketing by the effective use of information and financial functions specifically associated with the electronic retailing sector.

<u>**Project rationale**</u>
Despite adopting mobile technology as a new generation of service platform, many organisations have not been able to fully realize the potential that this offers. Given that mobile channels could enable customers to access service anytime and anywhere they want, a lack of understanding in respect of value patterns has led to disappointing results in this area.

Though many marketing researchers and practitioners believe that there is huge potential in offering additional customer perceived value by adopting mobile service channels, it is still unclear how this value might be generated through service processes. This research investigates user control as one potential contributor to the value of mobile services. Enhanced levels of user control could influence how quickly and precisely users can receive the decision making information they want when making purchases via mobile applications.

<u>**Methods of investigation**</u>
This research uses a combination of screen (ipad) recording and questionnaire analysis to investigate the research objectives outlined further above. University students who have experience of using mobile devices will be invited to view product information and/or purchase (in a virtual sense) any product by using either a mobile application or a mobile version of a website. After that, participants will also be asked to complete a questionnaire. Participants are also welcome to offer their opinions on the application functions related to their decision making processes on a mobile platform. Note this opinion sharing will be audio recorded, and it is optional.

<u>**Your involvement and the purpose of your involvement?**</u>
Your participation in this research would involve half an hour or less of your time, and will be used to track your decision making processes in the context of a typical retail mobile service platform. Note, that we will track normal processes related to *buying decisions* and that you will not be required to buy anything! The 'screen' recording will record movements you make on the screen - it will not record *you* making those movements.

<u>**Where will the screen recording be conducted?**</u>
The screen recording will be conducted in a place where you feel relaxed and are at ease using the mobile device (ipad) to view product information and/or make a buying decision. This could be either in our university' buildings, or in any public area near our university (though this must be covered by the university's wifi network).

What will happen with the screen recording data?

Confidentiality is a paramount consideration in this research. Screen recordings (and the optional audio recordings) will be recorded on to a laptop and will be analysed later. We are only concerned with the steps you go through and how long it takes you to make a decision to buy or not to buy. The secured laptop is only accessible to the researcher.

Once the data has been collected, a backup copy of the recordings will be made on to a memory card and will be kept in a locked cabinet at the university. Additionally, participants' personal information will not be collected during the screen recording session. Each screen recording file and your signed consent form will be assigned a unique code, which will be generated by an online 'random number generator'. The number range will be from zero to one million. This seven digit number will ensure that no participant can be identified by any party beyond the researcher and the participant her/himself.

What are your rights as a participants?

You have the right to withdraw your consent at any point during the screen recording. You also have the right to refuse to answer any items on the questionnaire, or any verbal questions we ask and the right to request a break throughout the recording. Additionally, a copy of the screen recording could be provided if you request it. If you feel you would like to change something or withdraw any data you have provided this will, of course, be accommodated. What you need to do is, sending an email with data withdraw request to the research student (see contact details below) no longer than six weeks after your participating the data collection, and offering your name in that email. Then the data you provided will be permanently excluded from this research and safely destroyed.

What happens now?

If you would like to participate in this research all you have to do is fill out the attached consent form and return it to me. Alternatively, you can email me or call me on the details provided below. Once I have received your confirmation, I shall contact you to arrange a screen recording date and time, and we can also arrange where the screen recording will be carried out.

Meanwhile, if you have any further questions regarding the research, please do not hesitate to contact me using the contact details below. I will be more than happy to answer any questions you may have.

Contact Details

Research Student: Kai Zhu

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Burton Street, Nottingham, UK, NG1 4BU

Location: 4th floor Chaucer
Email: kai.zhu2009@my.ntu.ac.uk

Director of Study: Dr. Tony Woodall

Nottingham Trent University
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Burton Street, Nottingham, UK, NG1 4BU

Location: 6th floor Newton
Email: tony, woodall@ntu.ac.uk

Thank you for reading this research brief. Your time is very much appreciated.

Appendix B. Consent Form

Consent Form

Applying Survival Analysis to investigate Mobile Retail Applications from a Customer Perceived Value perspective

I, the undersigned, confirm that (please tick box as appropriate):

1.	I have read and understood the information about the project, as provided in the Participant Information Sheet.	☐
2.	I have been given the opportunity to ask questions about the project and my participation.	☐
3.	I voluntarily agree to participate in the project.	☐
4.	I understand I can withdraw my consent after my participating in this research without giving reasons, provided this is done within six weeks. I will not be penalised for withdrawing nor will I be questioned on why I have withdrawn.	☐
5.	The procedures regarding confidentiality have been clearly explained (e.g. use of names, pseudonyms, anonymisation of data, etc.) to me.	☐
6.	I consent to screen recording, questionnaire, optional audio recording of data collection as detailed in the Participant Information Sheet.	☐
7.	The use of the data in this research has been explained to me.	☐
8.	I understand that I have the right to request the screen recording, questionnaire, optional audio recording, and I also have the right to request the withdrawal of any information that I have given.	☐
9.	I, along with the Researcher, agree to sign and date this informed consent form.	☐

Participant:

_____   _____   _____
Name of Participant   Signature   Date

_____
Student Number of Participant

Researcher:

____Kai Zhu_____   _____   _____
Name of Researcher   Signature   Date

Appendix C. Questionnaire Sample

Mobile Application Usage Questionnaire

Applying Survival Analysis to Investigate Mobile Retail Application from a Customer Perceived Value Perspective by Kevin Zhu

RNG No. ☐☐☐☐☐☐☐

Please read the following note before completing this questionnaire.
This questionnaire is collected purely for an academic research in order to understand your opinions on mobile service channel within electronic retailing context. Any of your experience on purchasing products or services on mobile devices would help us to improve our understanding of this fast developing service channel. Your participation is completely voluntary, the responses and the results are treated confidentially and anonymously. Thank you in advance for your cooperation.

In this section, could you please indicate that, compared to other service channels (e.g. Internet channel, face-to-face channel), **to what extent do you agree or disagree with the following statements about making purchase decisions on Boots' mobile application?**

		Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
1	Mobile retail application (with access to internet) enables me to receive information (e.g. pictures, reviews and feedbacks) of a product anytime and anywhere I want.	☐	☐	☐	☐	☐
2	Using mobile retail application is a convenient way to make purchase decision.	☐	☐	☐	☐	☐
3	Using mobile retail application makes my shopping decisions less time consuming.	☐	☐	☐	☐	☐
4	Using mobile retail application helps me manage my time better.	☐	☐	☐	☐	☐
5	Using mobile retail application offers more opportunities to receive product information from different resources (e.g. reviews from third parties).	☐	☐	☐	☐	☐
6	I spend my time efficiently when I make my purchase decision on mobile application.	☐	☐	☐	☐	☐
7	I quickly get what I want to know when making purchase decisions on mobile application.	☐	☐	☐	☐	☐
8	I use less information to make my shopping decisions on mobile application than other service channels (e.g. Internet channel, face-to-face channel).	☐	☐	☐	☐	☐

1

	Could you please indicate that, compared to other service channels (e.g. Internet channel, face-to-face channel), **to what extent do you agree or disagree with the following statements about making purchase decisions on Boots' mobile application?**	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
9	Using mobile retail application encourages me to share more experiences (reviews and feedback) of a product with others.	☐	☐	☐	☐	☐
10	Using mobile retail application enables me to read more review and feedbacks (of a product) from other users.	☐	☐	☐	☐	☐
11	Through word-of-mouth communication (read and leave reviews of product) on mobile retail application, I have increased my knowledge of the product quickly.	☐	☐	☐	☐	☐
12	Recommendations reported through mobile retail application help me make my decision easier.	☐	☐	☐	☐	☐
13	Using mobile retail application is not a more convenient way to receive information for making shopping decisions.	☐	☐	☐	☐	☐
14	Using mobile retail application allows me to access word-of-mouth information (e.g. reviews from others) more easily.	☐	☐	☐	☐	☐
15	Using mobile retail application makes me worry about whether the mobile application will perform well enough to fulfil my expectation.	☐	☐	☐	☐	☐
16	There is a chance that there will not be enough or good enough information for me to make my decision on mobile application.	☐	☐	☐	☐	☐
17	I feel confident the visual design of mobile application can help me to accomplish the tasks I have in mind.	☐	☐	☐	☐	☐
18	Using mobile channel transaction causes me to be concerned about my financial information security (credit/debit card, bank account information).	☐	☐	☐	☐	☐
19	In general, it would be more risky to quickly make a purchase decision on mobile application.	☐	☐	☐	☐	☐
20	Using mobile retail application would be more likely to expose my private information (delivery information, purchase history, wishlist) to unauthorised persons.	☐	☐	☐	☐	☐
21	There would be too much uncertainty associated with giving personal information on mobile application.	☐	☐	☐	☐	☐
22	Using mobile retail application makes my shopping decisions more manageable (start, pause or end the process anytime and anywhere I want)	☐	☐	☐	☐	☐

2

	Could you please indicate that, compared to other service channels (e.g. Internet channel, face-to-face channel), **to what extent do you agree or disagree with the following statements about making purchase decisions on Boots' mobile application?**	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
23	Using mobile retail application enables me to make my decision (of purchasing or not purchasing) more often.	☐	☐	☐	☐	☐
24	Using mobile retail application enables me to make my decision (of purchasing or not purchasing) more quickly.	☐	☐	☐	☐	☐
25	Using mobile retail application does not increase the number of products I take into consideration.	☐	☐	☐	☐	☐
26	I enjoy having control over my own shopping decisions on mobile application.	☐	☐	☐	☐	☐
27	Using mobile retail application makes me able to control the **time** of my information searching, receiving and sharing (communicating with different information resources anytime I want).	☐	☐	☐	☐	☐
28	Using mobile retail application makes me able to control the **location** of my information searching, receiving and sharing (communicating with different information resources anywhere I want).	☐	☐	☐	☐	☐
29	I use more information to make my shopping decisions on mobile application than other service channels (e.g. Internet channel, face-to-face channel).	☐	☐	☐	☐	☐
30	I would like to use mobile retail application as much as I can on my decision making process.	☐	☐	☐	☐	☐
31	Using mobile retail application allows me to make my decision (purchasing/not purchasing) more frequently.	☐	☐	☐	☐	☐
32	Using mobile retail application makes me exchange information with others (leaving feedbacks and reviews, sharing experiences) more readily.	☐	☐	☐	☐	☐
33	Using mobile retail application impacts my decision making process more than other service channel (e.g. Internet channel, face-to-face channel).	☐	☐	☐	☐	☐
34	The benefits I received from making decisions on mobile application worth the risks I take.	☐	☐	☐	☐	☐
35	I can live a more flexible lifestyle when I shop using a mobile application.	☐	☐	☐	☐	☐
36	Using mobile retail application means I have more control over the way I live my life.	☐	☐	☐	☐	☐

3

	Could you please indicate that, compared to other service channels (e.g. Internet channel, face-to-face channel), **to what extent do you agree or disagree with the following statements about making purchase decisions on Boots' mobile application?**	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly Disagree
37	Being able to use mobile retail application for shopping is a distinct advantage for me.	☐	☐	☐	☐	☐
38	The positives of using a mobile application always outweigh the negatives.	☐	☐	☐	☐	☐
39	As I consider using mobile application to make shopping decision, I worry about whether the application will really perform as well as it is supposed to.	☐	☐	☐	☐	☐
40	If I were to use mobile application, I become concerned for how well its visual design can help me to make my shopping decision.	☐	☐	☐	☐	☐
41	Negative comments reported through mobile retail application help me make my shopping decisions more easily.	☐	☐	☐	☐	☐
42	Using mobile application on making purchase decisions has no impact to my lifestyle.	☐	☐	☐	☐	☐
43	Using mobile retail application means I am less reliant on other information sources (e.g. internet channel, face-to-face communication with other person) to make my purchase decisions.	☐	☐	☐	☐	☐
44	The layout (visual design) of mobile application could slow down my buying decisions.	☐	☐	☐	☐	☐
45	Using mobile retail application allows me to make my purchase decision the way I like.	☐	☐	☐	☐	☐
46	Using mobile retail application (with access to internet) enables me to shop anytime, and anywhere, I want.	☐	☐	☐	☐	☐

4

In this section, could you please offer your general information in order to analyse whether students with different gender, age and education background have different usage and perceptions of making shopping decisions on mobile application.

47   What is your gender?

☐ Female   ☐ Male

48   Please tick the box in which your age group is.

☐ Under 20   ☐ 21-25   ☐ 26-30   ☐ Over 30

49   Please tick the box in which your current study programme is.

☐ Undergraduate ☐ Masters ☐ Doctoral ☐ Other

50   What is your cultural background?

☐ Australia and Oceania   ☐ Central America and the Caribbean   ☐ Europe   ☐ Far East

☐ Middle East, North Africa, and Greater Arabia   ☐ North America   ☐ South America

☐ South Asia   ☐ Sub-Saharan Africa ☐ United Kingdom

51   How often do you use mobile retail application (any mobile application) to view information?

☐ Very often   ☐ Often   ☐ Sometimes   ☐ Never

52   How often do you use mobile retail application (any mobile application) to make purchase decision?

☐ Very often   ☐ Often   ☐ Sometimes   ☐ Never

53   You are also welcome to offer any comment for this survey. Please write it down in the table below.

Thank you for completing this questionnaire. Your time it very much appreciated.

5

Appendix D. Hard Copy of a Decision-making Process Log