Evaluating Online Support for Mobile Phone Selection: Using Properties and Performance Criteria to Reduce Information Overload

A thesis presented in partial fulfilment of the requirements for the degree of

Master of Information Science

in

Information Systems

at Massey University, Auckland,

New Zealand.

Chun Chieh Yang

2008

Low Risk Notification Statement

This project has been evaluated by peer view and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The author of this research is responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other hat the researcher(s), please contact Professor Sylvia Rumball, Assistant to the Vice-Chancellor (Ethics & Equity), telephone 06 350 5249, e-mail humananethics@massey.ac.nz.

Abstract

The mobile phone has been regarded as one of the most significant inventions in the field of communications and information technology over the past decade. Due to the rapid growth of mobile phone subscribers, hundreds of phone models have been introduced. Therefore, customers may find it difficult to select the most appropriate mobile phone because of information overload. The aim of this study is to investigate web support for customers who are selecting a mobile phone. Firstly, all the models of mobile phones in the New Zealand market were identified by visiting shops and local websites. Secondly, a list of all the features of these mobile phones was collated from local shops, websites and magazines. This list was categorised into mobile phone properties and performance criteria. An experiment then compared three different selection support methods: A (mobile phone catalogue), B (mobile phone property selection) and C (mobile phone property and performance criteria selection). The results of the experiment revealed that selection support methods B and C had higher overall satisfaction ratings than selection support method A; both methods B and C had similar satisfaction ratings. The results also suggested that males and females select their mobile phones differently, though there was no gender preference in selection support methods.

Keywords: Mobile phone, information overload, mobile phone properties, mobile phone performance criteria, mobile phone selection process satisfaction

Acknowledgements

I would like to thank a number of people who have helped me with the writing of this thesis. Firstly I would like to thank my supervisor Dr Brian Whitworth for providing me with this opportunity and his help and patience during all stages of my research. Thank you for your guidance, your revisions and patience with my questions. I am also in much debt to all the member of Brian's Group for their assistance and advice for this research. I would also like to thank Dr Beatrix Jone and Tong Liu for their help and advice in statistical analysis of the results. Thanks are also due to my friend Anderson Wang for his help with proof-reading this research. Lastly, I must thank my family and my girlfriend for providing me with support whenever I need it and for brightening up my year.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

1.1 Background

A mobile phone is a long-range portable electronic device for personal/business telecommunications over long distances (Mercer, 2006). It has become an important tool for people to communicate with each other. Mahatanankoon et al. (2004) stated that mobile phones have gone from being a rare and expensive electronic device that was used primarily for business to a pervasive, low-cost personal item. In the 1980s, the first generation (1G) of mobile phones was introduced. 1G mobile phones used analog transmission signals, and were replaced in the 1990s by the second generation (2G) of mobile phone systems, which used digital transmission signals (Sheriff, 2001). The biggest difference between 1G and 2G is the radio signal network (analog and digital mode). Voice transmission via analog mode often incurs some interruptions between mobile phone users, resulting in poor voice transmission. Mobile phone users can get a better quality of voice conversation via the digital mode (Adachi, 2001). Chae and Kim (2004) indicated that with the introduction of 2G systems, the size of mobile phones went from the larger “brick” 1G phones to hand-held devices that weighed 100-200g (as shown in Figure 1.1, pictures were collected from Google image search). This change was possible through technological improvements such as more advanced batteries and greater energy-efficiency. Oliphant (1999) indicated that the 2G mobile phones also provided digital transmission services such as SMS (Short Message System) and WAP (Wireless Application Protocol) that allows textual web browsing (text only) by users. With these major advancements, usage levels switched rapidly from 1G to 2G mobile phones and the population of mobile phone subscribers has risen rapidly (Ling & Yttri, 2001).

Figure 1.1 Examples of 1G and 2G mobile phones

2.5G and 3G mobile phone systems were subsequently introduced in 2000. The development of 2.5G and 3G was prompted by the demand for better data transmission services and access to the Internet (Ishii, 2004). Compared to earlier mobile phones, 2.5G and 3G handsets support many additional services such as MMS (Multi-media Message System), e-mail and web-browsing, and most models now also feature cameras (as shown in Figure 1.2, pictures were collected from Google image search). Mobile phones have become a powerful tool that are not limited to helping people communicate (Leung & Wei, 2000). The possibilities for additional services continue to be extended, with features such as TV streaming, e-mail and navigational maps. With the improvement of transmission speed from 19.2kbps (2G) to 2Mbps (3G), 3G has provided great potential for mobile commerce activities such as mobile banking, mobile shopping or telemetry services (Senn, 2000).

Figure 1.2 Examples of 2.5G and 3G mobile phones

In recent years, the adoption of mobile phones has been increasing rapidly in many parts of the world. There have been several studies investigating the adoption and growth rate of mobile phones. In 2002, Aoki and Downes revealed that for 34% of young people (between 16 and 22 years old) in USA owned mobile phones in 1999 and this percentage had rapidly increased to 90% by 2002. Rice and Katza's study in 2003 showed that there were more mobile phone subscribers than fixed land line subscribers around the world. Karjaluoto et. al. (2003) stated that up to 90% of the population of Finland that owned mobile phones in 2003. According to the CIA World Factbook (2007), the number of mobile phones in the UK has surpassed the number of people. As shown in Figure 1.3, the total number of mobile phone subscribers in the world was estimated to be above 2 billion by 2007 (Smith, 2007). Furthermore, the total number of mobile phones is expected to rise rapidly, encouraged in part by the success of mobile communication as the third-generation (3G) of mobile communication systems creates additional value for services with higher computing capabilities, such as video calling and faster transmission speeds.

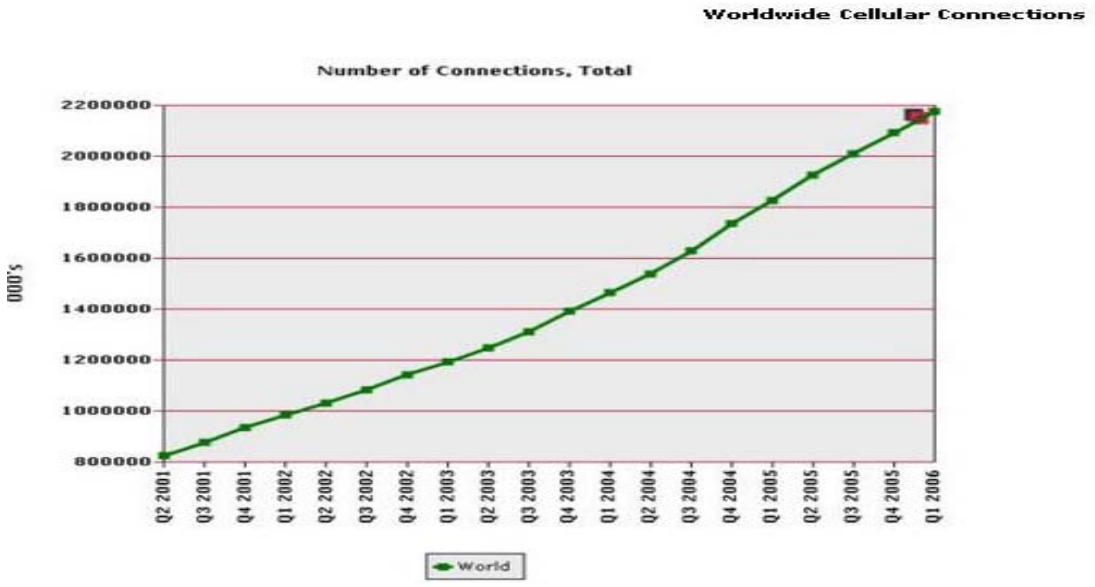


Figure 1.3 Population of mobile phone subscribers (Smith, 2007)

According to Nystedt (2007), “in China mobile phone growth rate has accelerated since it hit its first 100 million subscribers in July 2002. It took the company just a year and a half to add the next hundred million users, reaching 20.1 million at the end of November 2004”. There are still millions of potential subscribers, with China's population currently estimated at nearly 1.4 billion. With the high level of mobile phone penetration, it has become a key social tool, and people rely on their mobile phones to contact their friends or for business use (Davie et al., 2004). As several studies mentioned earlier have showed, mobile phones have become one of the most important products for customers. Mobile phones provide great assistance for users to communicate with each other anytime and anywhere in the world. Saker and Wells in 2003 indicated that the emergence of mobile commerce has generated a large potential wireless business market as a result of the rapid adoption of the mobile phone subscribers. If there was no adoption of mobile phones, there would be no mobile commerce. Magura (2003) indicated that convenience is paramount for people to use mobile technology. A study by Ito (2005) showed that approximately 40% of the population in Japan was accessing the Internet via their mobile phones. Funk (2007)

indicated that with the popularity of people accessing to the Internet via the mobile phones in Japan, mobile shopping activities such as buying tickets, downloading music and buying digital books is also becomeing popular. Therefore, a greater number of people than before are highly enthusiastic about and adopt mobile phones (Palen et al., 2000). In addition, a study by Ozcan and Kocak (2003) indicated that recreational and business uses were the two most important motives for mobile phone usage in Turkey.

1.2 Problem: Information Overload

With the rapidly growth of mobile phone subscribers, mobile phones have become important products for consumers. However, the increasing number of mobile phone models is causing information overload for consumers. Information overload is defined as the problem that occurs when people face so much information that they are unable to attend to all of it (Jinwon & Rong, 2001). With the rapid growth of information media agents, people are always receiving information such as news, mail, advertising or even social interaction (Pattie, 1994). Information overload affects people's frustration and stress, leading to low satisfaction and loss of time efficiency (Ingrid et al., 2006). There are over a hundred mobile phone manufacturers in the world. They intend to design new models of mobile phones with a focus on size, functionality, usability and body design in order to attract customers (Han et al., 2004). Mobile phone manufacturers have introduced many different types of handsets each month into the market in order to satisfy the customer's need, preference and intended usage of the phone. The seriousness of information overload has increased exponentially following the rapid increase of mobile phone models with different features. Most mobile phones nowadays have more than 50 features (Table 1.1 shows some common examples; for a complete list of features, please refer to Table 3.1). Customers may find that choosing a

mobile phone is becoming much more complicated because of the large number of technical features to be considered, which creates information overload.

Table 1.1 Common examples of mobile phone features

Brand	Video Call	WAP
Color	Video Camera	GPRS
Voice Control	Document Viewer	WIFI
Multi-language	Voice Recorder	Email
Camera	Time Management Tools	HSDP
SIM Card	HTML	Push to Talk
Customizable Theme	GPS	Touch Screen
Bluetooth	USB Storage	Joystick
USB	Text Message (SMS)	MMS

Isiklar and Buyukozkan (2005) stated that in today's market environment, mobile phone selection can be considered as a complex multi-criteria decision problem since expectations differ for people regarding different functional areas. In addition, most customers are not familiar with terminologies of mobile phones, such as Bluetooth, TFT LCD display, WAP, MMS, and 3G. They are unable to make their decisions without a clear understanding of these features.

1.3 Topic and Scope

Currently, mobile phones can be purchased through the website or through a local shop. This research is focused on web-based support for Internet mobile phone sales, not support for sales in shops. However, the support software developed could be used in a shop if a computer linked to the Internet was available in the shop. This research considers factors that affect mobile phone selection, but only that are based upon properties of the phone. It does not consider other factors that affect selection like individual properties, advertising, or marketing.

1.4 Purpose of Study

Different models of mobile phones have many different features. It is difficult for customers to choose a mobile phone that they are satisfied with given many choices and options. The result is information overload. The purpose of this study is to investigate how to better support customer selection of mobile phone online. The web-based support systems use different methods to reduce information overload in two ways:

1. *Phone properties*:

By letting users pre-select phones for consideration based on phone properties such as price, color and brand.

2. *Phone performance criteria:*

By letting users pre-select phones for consideration based on abstract performance criteria like usability or capability.

This research aims to benefit online mobile phone sales. It may also benefit designers and manufacturers who want to know what factors concern people who are selecting a mobile phone. The theoretical assumption is that the reduction of information overload can improve the process of mobile phone selection by a customer.

1.5 Outline of Study

In the following sections, chapter two will cover a review of the related literature on mobile phone selection factors and information overload will be covered, followed by a concluding relevant research question and hypotheses. In chapter three, the experimental method will be chosen as the research method to address the research questions; the proposed design of three selection support methods will be introduced.

Chapter four presents the results of these three selection support methods. Statistical comparison between these three methods were analysed using a Kruskal-Wallis Test and T-test; how these results related to the research hypotheses will then be shown. In chapter five, the contribution of this research and interpretation of the results will be introduced. Limitations and future work required for this research will be discussed.

Chapter 2: Literature Review

In this section, the general views of the previous work in mobile phone ergonomic features, mobile phone fashion statements, relationships between user preferences and mobile phone design elements and research methods are introduced. Discussion of user satisfaction with mobile phones will be introduced in section 2.1. In section 2.2, the fashion statement of mobile phones will be explored. The problem of information overload will be introduced in section 2.3. In section 2.4 the previous work relating to the relationship between user preferences and mobile phone design elements is discussed. In section 2.5 the existing online mobile phone shop will be introduced, and section 2.6 will focus on the performance measurement models. The dependent and independent variables will be introduced in sections 2.7 and 2.8. The conceptual framework of this research will be discussed in section 2.9. In section 2.10 the research question in this study will be introduced, and hypotheses will be discussed in section 2.11.

2.1 Mobile phone features and user satisfaction

Users and designers are usually focused on a different point of view. Users normally focus on a product's image, and designers focus on a product's characteristics (Katz & Sugiyama, 2005). To link users and designers, ergonomics is the scientific application that concerns humans factors or behaviors in the design of objects, systems and environments with an understanding of interactions between humans and system elements in mind (IEA, 2000). In the related literature, a survey of hundreds of mobile phones revealed that each of them differed from each other in every design feature such as shape, color, size, material and so on (Han et al., 2004). Questions like what design

features are important in order to achieve user satisfaction should be considered to find out what makes a mobile phone attractive to user. The relationship between user satisfaction and mobile phone features will be discussed in the following section.

2.1.1 User satisfaction dimension

User satisfaction can be regarded as a key factor for manufacturers designing mobile phone features. User satisfaction can be defined as the users' subjective feeling towards a product from an image and impression perspective (Han et al., 2004). There is a close tie between a user's preferences and the success of a product. To design a successful product depends on a detailed understanding of consumer satisfaction (Chuang et al., 2001). However, to transfer user satisfaction into specific design specifications is a challenging task due to multi-dimensional psychological factors that are involved. A related study stated that "Kansei Engineering" process is an attempt to translate the customer's feeling of a product to design elements (Nagamachi, 2002). However, it is difficult to use the Kansei Engineering process in mobile phone design due to image/impression words like "elegance" or "fashion" that are involved. It is not clear how these can be translated into real design elements. Therefore, Han et al. (2004) developed an empirical model based on a relationship model between user satisfaction and mobile phone features, as shown in Figure 2.1.

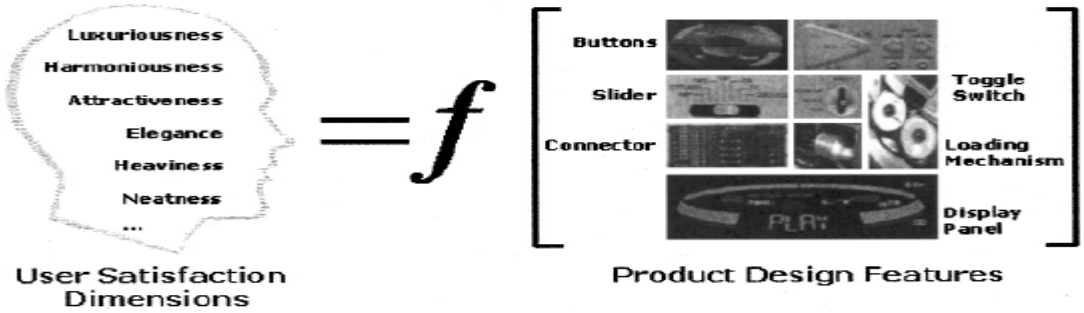


Figure 2.1 Relationship model between user satisfaction and product design features (Han et al., 2004)

This model shows the relationship between user satisfaction and product design features. For example, in user satisfaction dimensions, “Aesthetic” can be considered as the body design of the mobile phone (such as slider) in the mobile phone features dimension and “Entertainment” can be regarded as whether the mobile phone has got an MP3 player or Games. A conceptual relationship consisting of four stages is shown in Figure 2.2. Stage 1 and 2 defines the user satisfaction dimensions and product design features. These stages are the important ones when we intend to define mobile phone criteria and features in this study so only the first 2 stages will be discussed at this stage.

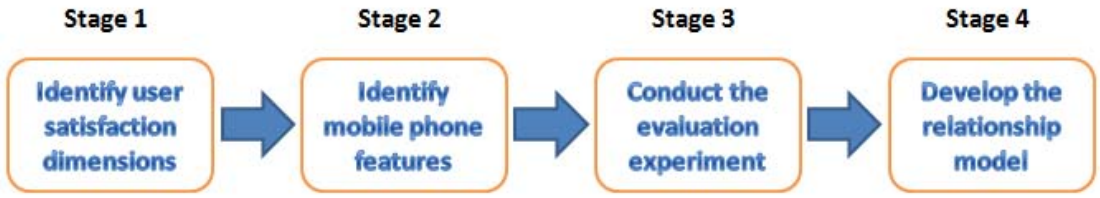


Figure 2.2 Functional relationship model development processes (Han et al., 2004)

Another related study in user satisfaction with product design illustrates that “user satisfaction means that products should provide pleasure and attractiveness” (Han & Hong, 2003). User satisfaction with mobile phones is a broad concept which includes functionality, usability and price. Han and Hong (2003) indicated that the functionality of mobile phones was no longer the only competitive factor for customers to select mobile phones. Usability and attractiveness were also becoming equally important factors when consumers considered selecting their next mobile phone. Therefore, attractiveness of the mobile phone and the mobile phone that can make customers feel pleasure were also important factors for consumer’s mobile phone selection. Han et al. (2004) selected 10 user satisfaction dimensions (as shown in Figure 2.3); these user satisfaction dimensions were used to help designers to identify critical design features.

Dimension	Definition
Color	The conceptual image of a product developed by its color (e.g., warm, cool, etc.)
Texture	The image of a product developed by its texture or touch (e.g., soft, coarse, etc.)
Harmoniousness	Feeling that the components of a product is well matched or in harmony
Luxuriousness	Feeling that a product looks flashy, splendid, or extravagant
Granularity	Degree to which a product is worked out with great care and in fine detail
Simplicity	Degree to which the user feels a product simple or tangled
Rigidity	Feeling that a product looks stout, stable, and secure
Salience	Degree to which a product is outstanding, prominent, and catching one's eyes
Attractiveness	Degree to which a product is pleasing, charming, and arousing interest
Overall Satisfaction	Degree to which the user likes or dislikes a product over another, and Degree to which a product is giving contentment or making the user satisfied

Figure 2.3 User satisfaction dimension in Han et. al's (2004) investigation

2.1.2 Design features of mobile phones

Most mobile phones nowadays have numerous design features in order to meet the satisfaction of customers. These design features are defined as the collection of human interface elements that users see, hear, touch, or operate. Functionality is not the only key factor in mobile phone design features. These also include many factors such as usability and aesthetics or the raw material of the phone. For example, the material of the mobile phone (such as anti-scratch material) may affect the user's perception of the phone's luxuriousness, usability may affect the ease of use of the phone, and aesthetics may affect whether the phone appears stylish to the user's sense of sight. Yun et al. (2003) indicated that the design of mobile phones is slightly different from other general consumer electronic products. Mobile phones are developed based on consumer's impressions. Mobile phone designers need to transfer customers' images into specific product realizations in order to reach user satisfaction. Therefore, to identify the design features of a mobile phone should start with determining the components/properties which are important to user satisfaction. Lai et al. (2004) assumed that mobile phones

consist of both hardware and software components. Hardware components include buttons, screens, speakers, cameras, and body design etc. Software components include MP3 players, operating systems, ringtones, and time management tools etc.

According to section 2.1.1 and 2.1.2, the user satisfaction dimensions and mobile phone design features are strongly associated. However, user satisfaction was the key motivation for mobile phone manufacturers to design mobile phone features. Results of Yun et al. (2003) indicated that shape, color, operating sounds and control of the mobile phone were perceived as important factors for customers.

2.2 Mobile phone regarded as a fashion statement

2.2.1 Mobile phones as a fashion image

Fashion is an area rich in communicative information about current mode of expression. People use it not only to express their identity, but also to perceive and understand others (Aoki & Downes, 2002). In Wilska's (2004) study revealed that young people in Finland were fascinated by the mobile phone with "trendy" and "impulsive" consumption styles prevalent among females. In Fortunati's (2005) study stated that "fashionableness" is the most important factor when people are choosing a mobile phone in Italy. She argues that mobile phones are an accessory that enriches those who hold it in their hand, which shows just how much they can communicate symbolically about oneself. Consequently, another study Swett (200) indicated that mobile phone manufacturers are considering more and more explicit futuristic and stylish designs in their new mobile phone models. For example, L'Amour and Nokia have been collaborating since 2005 to developed several models of mobile phones in order to attract female customers. And also in the second quarter of 2007, another fashion

company Prada was collaborating with LG mobile to develop a new model called “LG Prada KE850” which was also to attract many consumers (as shown in Figure 2.4, pictures were collected from Google image search).

Figure 2.4 Example of mobile phone fashion design

A modern, futuristic design impulse has been strongly articulated in the advertising campaigns for mobile communication. Zhang and Harwood (2004) revealed that household appliances such as telephones and computers are often associated with modernity in advertising themes. Many mobile phone manufacturers have also realised that the public understand technology to be of high status and socially desirable. Snellman (2003) stated that Nokia participates in numerous Hollywood films. Films such as James Bond, The Matrix, and The X-Files have displayed the futuristic image of Nokia’s mobile phones and this has influenced a lot of their audiences to purchase the models that they have seen in the films.

2.2.2 Consumer perception and reception

Mobile phones have also become one of the fashion statements for consumers nowadays. Fashion has become one of the motivations for consumers when they purchase their mobile phone. Fortunati (2005) indicated that mobile phones are the

technology that has expressed the highest mimetic capacity in regards to the system of fashion. There have been several studies that investigate the relationship between fashion and mobile phones. Katz and Sugiyama (2005) surveyed a class of undergraduate students about their attitude towards the fashion of mobile phone. As indicated in Figure 2.5, over half of the students agreed that a fashion statement is the most important factor for when they select their mobile phone. Fashion statements have become one of the important factors for people in selecting their mobile phone.

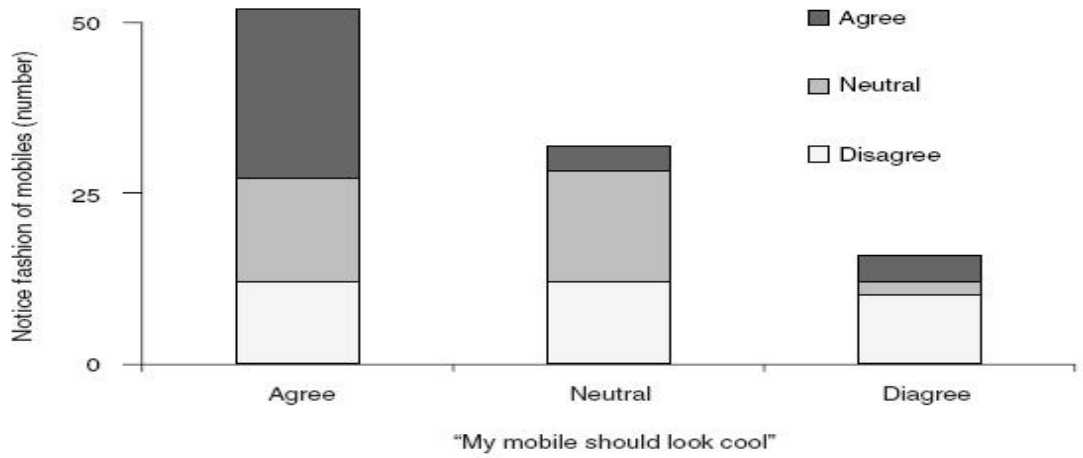


Figure 2.5 Fashion attitudes towards mobile phones N= 100 (Katz and Sugiyama, 2005)

Another study was investigated about the importance of the aesthetic dimension of the phone for youths in US and Japan (Katz & Sugiyama, 2006). The results indicated that American and Japanese youths were more likely to think that the style of the mobile phone was an important factor, and that they would get a mobile phone because it is fashionable (as shown in Figure 2.6).

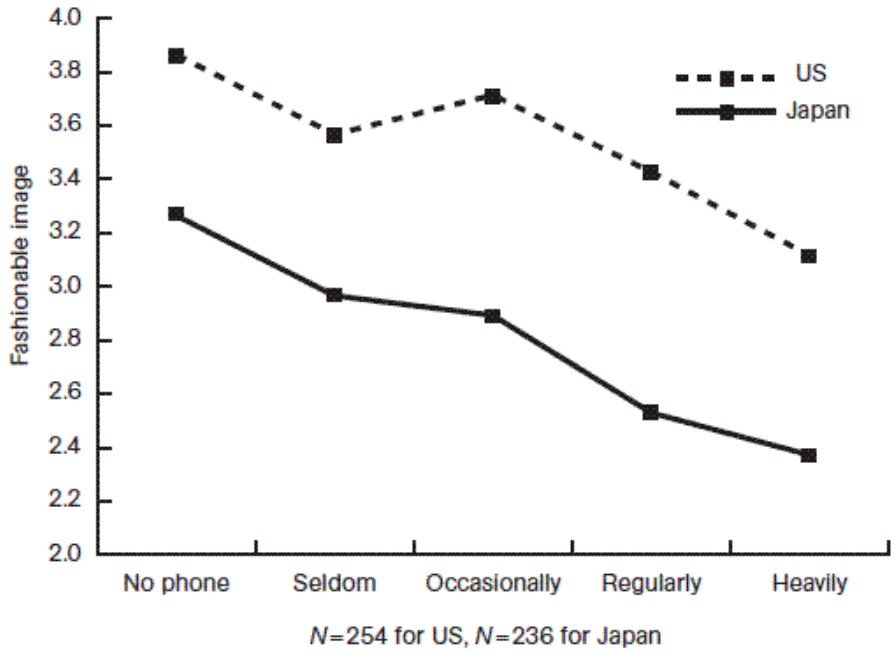


Figure 2.6 Result of “I would get a mobile phone just because it is fashionable.” (Katz & Sugiyama, 2006)

Overall, several studies suggest that young people are convergent in perceiving the mobile phone as a fashion tool.

2.3 Information overload

Information overload occurs when people face so much information that they are unable to perceive all of it. Several studies investigate the problem of information overload. A study by Mark (1994) stated that information overload can occur when a person feels overwhelmed by the amount of information to be understood. Another study Ingrid et al. (2006) stated that the information overload affects people’s decision making, quality of work and job satisfaction. Therefore, information overload is an important issue that influences people to perceive information and make decisions correctly. It seems that one of the possible solutions for information overload is to reduce the amount of information. However, Jinwon and Rong’s (2001) study suggested that to reduce the amount of information does not guarantee the positive value of information, and the

overload problem cannot be resolved if users are provided with information with a high volume of noise. Therefore, they suggest that information overload is the combination of three factors: information quantity, information format, and information quality (as shown in Figure 2.7).

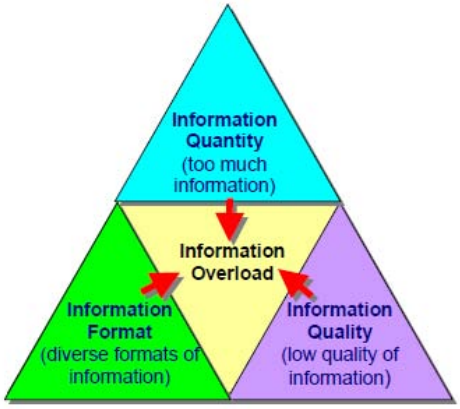


Figure 2.7 Factors of information overload (Jinwon & Rong, 2001)

Information quantity consists of the amount of information. Information format relates to diverse formats of information, and information quality relates to the quality of information. This multidimensional classification of information overload allows people to better understand information overload and to establish the solution to the problem.

Pattie (1994) introduced software agents that assist users to reduce information overload. The software agents would learn and act by keep tracking of the user's actions over long periods of time (Figure 2.8 shows the procedure between agent and user). For example, if an email agent would notice that a user always sent email to the mailing list "Postgraduate-Group", and then it could offer to automatically display the mailing list the next time that the user types "Post" (MS Outlook would be the common example).

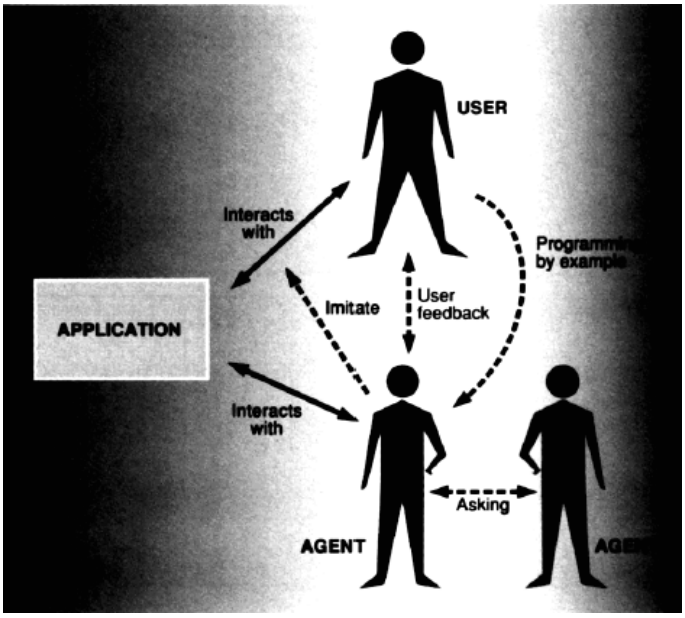


Figure 2.8 Example of agents that reduce information overload (Pattie, 1994)

2.4 Previous related work in mobile phone selection

In Isiklar and Buyukozkan's (2005) study, they attempt to evaluate mobile phone features in respect to the users' preferences order by using a multi-criteria decision making approach. This study was focusing on a young age group (aged between 16 to 22) in Turkey and only one out of three models of mobile phone was suggested for subjects after subjects completed their experiment. The evaluation procedure of this study consisted of three main steps, as shown in Figure 2.9. In the beginning, they identified the most important mobile phone criteria for the users. After constructing the evaluation criteria hierarchy, an Analytic Hierarchy Process (AHP) was used to calculate the criteria weights, which were finally were ranked using the Technique for Order Preference by similarity to ideal solution (TOPSIS) method. Lai et. al. (2002) stated that AHP allows users to reduce complex decisions into a series of one-on-one comparisons, and then use the numerical ratings from the comparisons to establish a priority weight for each criterion.

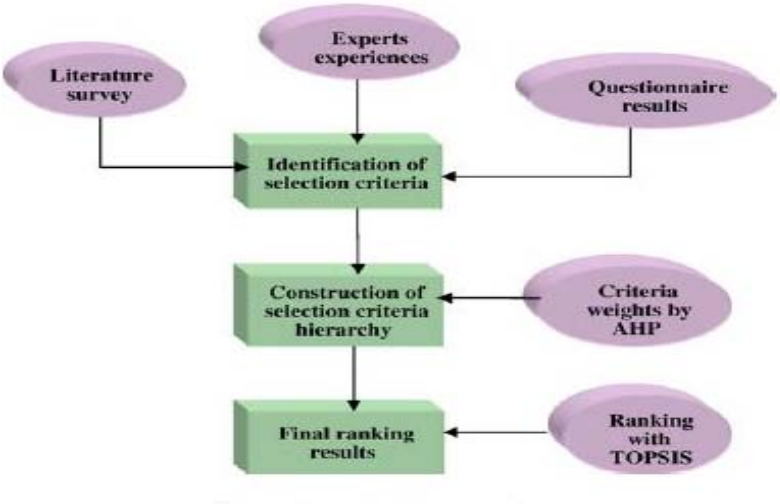


Figure 2.9 Evaluation procedures in Isiklar & Buyukozkan's (2005) study

In this study, mobile phone features were categorised into two criteria, followed by six sub-criteria (as shown in Table 2.1). These two criteria were product-related and user related. Technical features, physical appearance and price were categorized as product-related criteria. User-related criteria included features that involved usability, brand and entertainment.

Table 2.1 Criteria, sub-criteria and descriptions of mobile phones (Isiklar & Buyukozkan, 2005)

Criteria	Sub-criteria	Description
Product related criteria		
	Basic requirements	-Reasonable cost/price
		-Standard part used
		-Standard process applied
	Physical characteristics	-Design standards
		-Weight
		-Dimension
		-Shape
		-Water resistance
		-Solidity
		-Attractiveness
		-Raw material properties
	Technical features	-Talk time
		-Standby time
		-International roaming
		-Safety standards
User related criteria		
	Functionality	-Ease of use
	Brand choice	-Market vision
		-Technical support
	Customer excitement	-Games
		-Ringing tones diversity
		-Local language adaptability
		-Business life facilitating services

Once the mobile phone criteria and sub-criteria were defined, the decision making

problem's hierarchy structure was formed as shown in Figure 2.9. The AHP method was used to weight each of the criteria represent in Table 2.2.

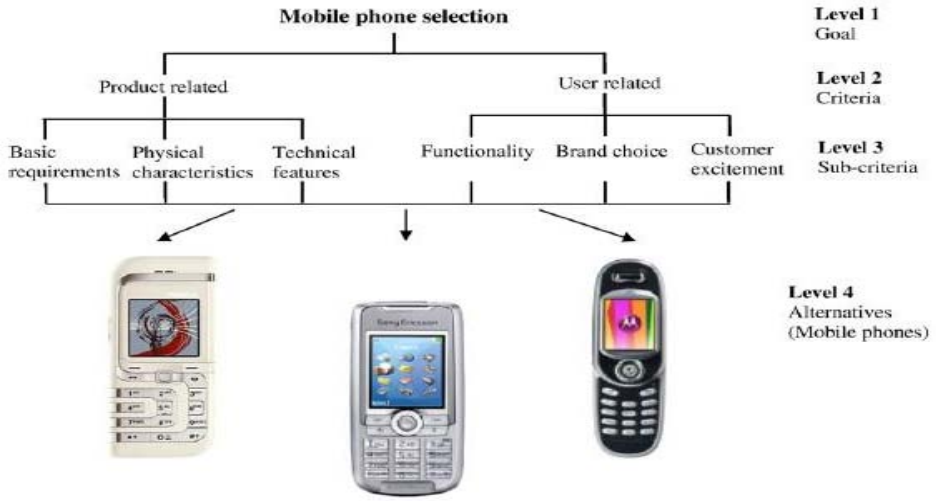


Figure 2.10 The decision making problem's hierarchy (Isiklar & Buyukozkan, 2005)

Table 2.2 Priority weights in the AHP decision tree (Isiklar & Buyukozkan, 2005)

Criteria	Weight between the criteria (%)	Weight within the criteria (%)	Ranking	Weight among the sub-criteria (%)	Ranking
Product-related	0.333				
Basic requirements		0.193	3	0.064	6
Physical characteristics		0.282	2	0.094	4
Technical features		0.525	1	0.175	2
User-related	0.667				
Functionality		0.614	1	0.409	1
Brand choice		0.260	2	0.173	3
Customer excitement		0.126	3	0.084	5

As shown in Table 2.2, the results suggested that youth in Turkey were more concerned with user-related criteria than product-related criteria. Functionality had the highest ranking which showed that youth in Turkey were more concerned with functionality rather than other sub-criteria. Technical features and brand had the second highest

ranking. Physical characteristics sub-criteria were ranked in third place. Customer excitement and basic requirements were ranked in last place.

Beside, Karjauluoto et al. (2003) surveyed 397 young adults in Finland. Results revealed that the price was the most important factors while they were purchasing a new mobile phone.

2.5 Existing mobile phone online shops

There are two famous mobile phone selection websites in New Zealand which are the Vodafone and Telecom online stores.

2.5.1 Telecom online store

In the Telecom online store, all the models of mobile phones are already shown at the beginning of web page with a short description (as shown in Figure 2.11).

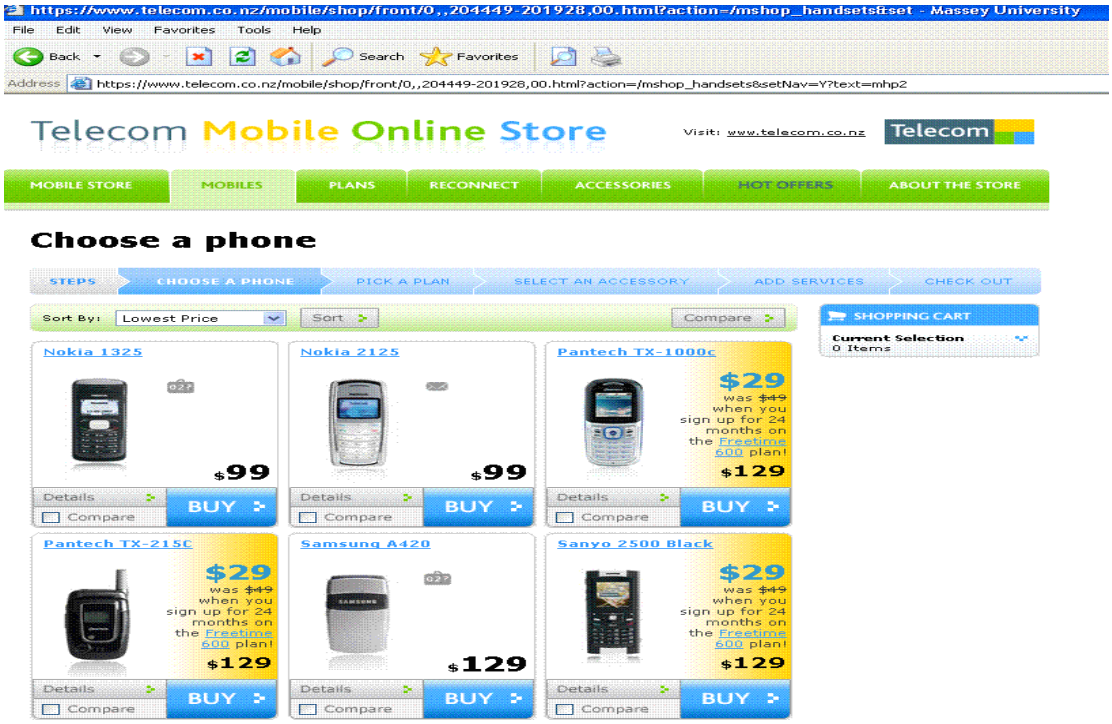


Figure 2.11 Example of the Telecom Mobile Online Store

Telecom has categorised all models of mobile phone in one page which allows the user to browse it. Each mobile phone shows a short description and a price in the category. Short descriptions were used to avoid information overload for the user. Therefore, Telecom picks some important features and uses icons instead of words to allow the user to perceive the information easily. When users click any particular model of phone, the whole specification will appear in the next page.

2.5.2 Vodafone online store

In the Vodafone online store, several mobile phone properties were shown at the beginning of the web page (as shown in Figure 2.12). These mobile phone properties are divided into 3 main categories which include: “Price”, “Brand” and “Key features”. Vodafone divided key features into 4 categories: Calling & Messaging, Connectivity, Entertainment and Others. These conditions allow the user to select the requirement of the mobile phone features that they are looking for. The suggested model of phones will be shown with short descriptions after the user selects one of the requirements. In the same way as the Telecom online store, the Vodafone online store also picks some important features out as a short description, but Vodafone use words instead of icons. Icons of mobile phone features can be seen when users click to see the specification of any particular model of phone.

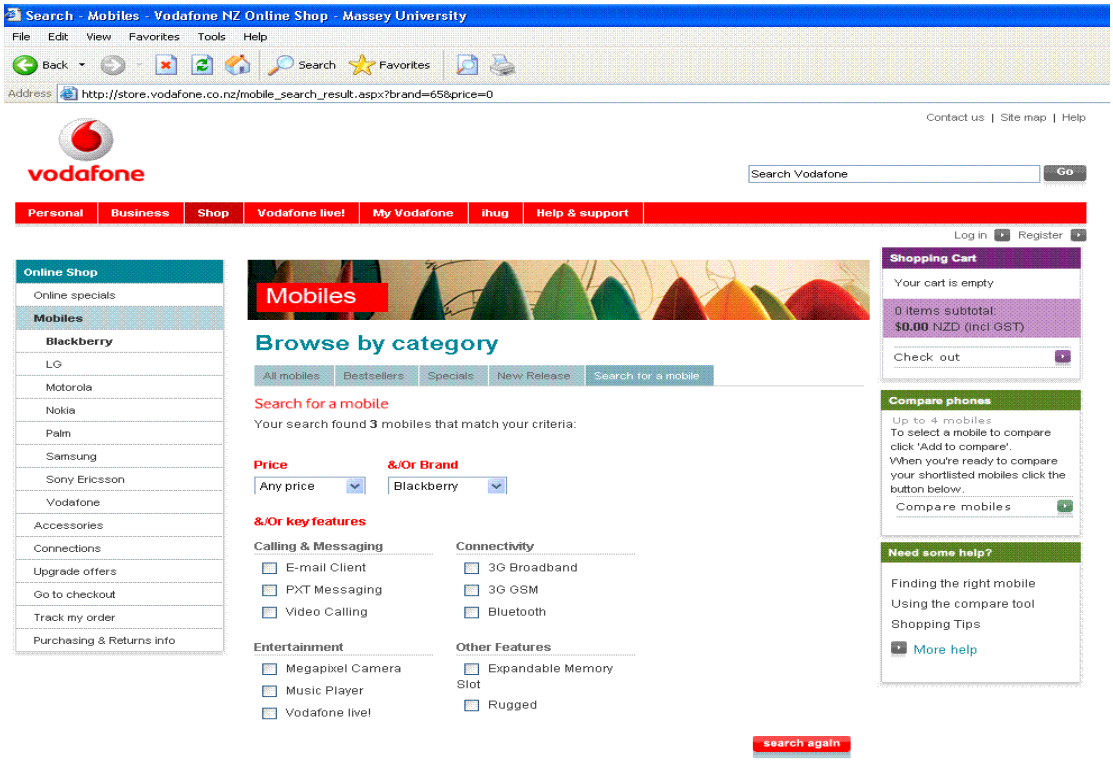


Figure 2.12 Example of Vodafone Online Shop

2.6 Performance measurement models

2.6.1 The Web of System Performance (WOSP) model

The WOSP model is a theoretical framework for the balanced design and evaluation of advanced information systems (Whitworth & Zaic, 2003). It consists of four system elements (boundary, internal structure, effectors and receptors) which are followed by eight system design goals (security, extendibility, flexibility, reliability, functionality, usability, connectivity and privacy) - refer to Table 2.3 for more details. A “Boundary” element is there to separate the whole from the surrounding environment. For example, people have a skin boundary. “Internal structure” elements support and coordinate its operations. For instance, the brain can act as an internal structure that is controlling the operation of body parts such as muscle, eyes and ears. Elements of type “Effector” act upon the environment to gain benefit and avoid damage, and “Receptor” elements

analyze and receive environment information. For example, a computer has a case, motherboard, and printer as effectors, and a keyboard and mouse as receptors. The purpose of the WOSP model is to evaluate the performance of web browsers, but can also be applied to other software or products depending on the situation.

Table 2.3 System performance goals in the WOSP model (Whitworth & Zaic, 2003)

System Element	Goal	Definition
Boundary	*Security*	*To protect against unauthorized entry, misuse or takeover by outside elements.*
	Extendibility	*To use outside elements as part of the system*
Internal structure	*Flexibility*	*To adapt the system' operation to new or changing environments*
	Reliability	*To continue operating despite internal part failure*
Effector	*Functionality*	*To act directly on the environment to produce a desired change*
	Usability	*To minimize the relative resource costs of action*
Receptor	*Connectivity*	*To open and use communication channels with other systems*
	Privacy	*To control communication channels with other systems and the release of self information*

In research titled "Expanding the Criteria for Evaluating Social-Technical Software" (Whitworth et al., 2007), technology acceptance model (TAM) and WOSP models were used to evaluate three different types of Web-browser for organizing and ranking the results by using the AHP method. Kwon and Chidambaram (2000) indicated that TAM model was originally developed from Davis (1989) which was used to evaluate the software usage behavior and how users come to accept to use the technology. In this literature, two evaluation frameworks (TAM and WOSP models) for social-technical software were compared. After comparison between the TAM and WOSP models, the results revealed that the WOSP model has a better evaluation outcome than the TAM model. Subjects gained more confidence in their choice when using WOSP and WOSP evaluation was more accurate than TAM.

2.6.2 Quality dimensions in E-commerce software tools

Krishnan and Subramanyam (2004) examine users' overall satisfaction with E-commerce software by using 5 quality dimensions across customers from North America and Japan. They used Bayesian analysis to analyse the average influence of each dimension on overall customer satisfaction (as shown in Figure 2.13) as well as the variability of each dimension across the two samples.

$$\text{Overall Satisfaction} = f(\text{Capability, Usability, Performance, Reliability, Documentation}).$$

Figure 2.13 Empirical model of overall satisfaction (Krishnan and Subramanyam, 2004)

These dimensions include capability, usability, performance, reliability and documentation. The key definition is shown below:

1. Capability

   This attribute measures product functionality in terms of key features supported by the software product.

2. Usability

   The effort spent by users of software products in learning how to use the software can significantly influence the acceptance of the software by customers.

3. Performance

   The performance attribute of software indicates aspects such as response time to users operations, time to display outputs, and efficient use of computing resources such as memory and storage space for user operations.

4. Reliability

   This attribute represents the conformance quality of the software. For software applications, disruptions during the usage of the product have to be minimal. Software failures such as freezing of computing resources and the potential loss of

data can drastically influence customer satisfaction with the software.

5. Documentation

   The quality of the documentation and the user manuals that accompany the software product can influence the learning curve of the user by improving the user's ability to solve trivial problems and to get comfortable with the product's functionality.

Their results indicated that the importance of quality dimensions was significantly different between North American and Japanese. Usability dominates other dimensions in North American, and Japanese users placed an emphasis on capability.

2.7 Dependent variable

2.7.1 Satisfaction with the mobile phone selection process

This research investigates online mobile phone selection support. The dependent variable of this research is users' satisfaction with the process of selection. The question asked of subjects will be "how much they preferred the given selection support method?" In previous research, Davis (1989) suggested the following aspects of software satisfaction:

1. Efficiency: That selection process provides the results more quickly.

2. Usefulness: That selection process is useful.

3. Ease of selection: That selection process is easy to understand.

4. Ease of use: That selection process is ease to use.

The above aspects will be used, as well as measuring the overall satisfaction of the selection process.

2.7.2 Satisfaction with the mobile phone selected

This research will also measure user satisfaction with mobile phone selected. In section 2.1, Han et al. (2004) defined user satisfaction as the users' subjective feelings toward a product. User satisfaction in this case involves product aspects such as usability, price and color. Chaung et al. (2001) stated that there is a close tie between users' preference and the success mobile phone design. Therefore, user satisfaction of the product will be the key factor for designer while they were designing the mobile phone. The following aspects will be used to measure the confidence of the selected mobile phone and willingness to use the selection process in the future:

1. Confidence: That selected mobile phone is suitable one.

2. Intention to use again: Willingness to repeat the selection process in the future.

2.8 Independent variable

The previous review suggests that the main factor that effect users' phone selection satisfaction is information overload (i.e. the quantity of information being presented). In section 2.3, several studies indicated that the information overload has an influence on how well people can perceive information and make decisions correctly. However, reducing the amount of information does not guarantee the positive value of information, and the problem of information overload still cannot be solved. Therefore, Jinwon and Rong (2001) stated that there are three information overload factors: information quantity, information quality and information format - which can help us to establish feasible solutions to the problem. This research is focusing on factor of information format. For example, Isiklar and Buyukozkan (2005) categorised all mobile phone selection factors into criteria and sub-criteria in order to reduce number of comparison by using the AHP method. In this research, we intend to categorise all mobile phone

features into mobile phone properties and performance criteria (change the information format). People can choose their phones by selecting the mobile phone properties (like price) or performance criteria (like Usability). To developed mobile phone performance criteria, we intend to apply some designing goals from the WOSP model (Whitworth et al., 2007) and quality dimension of e-commerce tools (Krishnan & Subramanyam, 2004).

In section 2.2, (Katz & Sugiyama, 2006) and (Fortunati, 2005) indicated that fashion statements have also become key factors in mobile phone design. Based on section 2.1 and section 2.2, we explore that mobile phone features and mobile phone design are strongly connected to user satisfaction. These factors are equally important when customers select their mobile phone. Several studies also provide evidence that fashion statements are highly influential on people's minds and decision making while they are choosing a mobile phone. At this stage, we may conclude that usability, functionality, and aesthetics (fashion statements) are the most important factors for customers selecting their mobile phone. However, the concept of fashion cannot be defined clearly from mobile phone features. It also varies between individual (e.g. some people like the pink color, but some people do not). So this research is not addressing this factor.

2.9 Conceptual framework

Based on the previous review, the following framework (as shown in Figure 2.14) was developed for this study. This framework has three parts as numbered on Figure 2.14, which are:

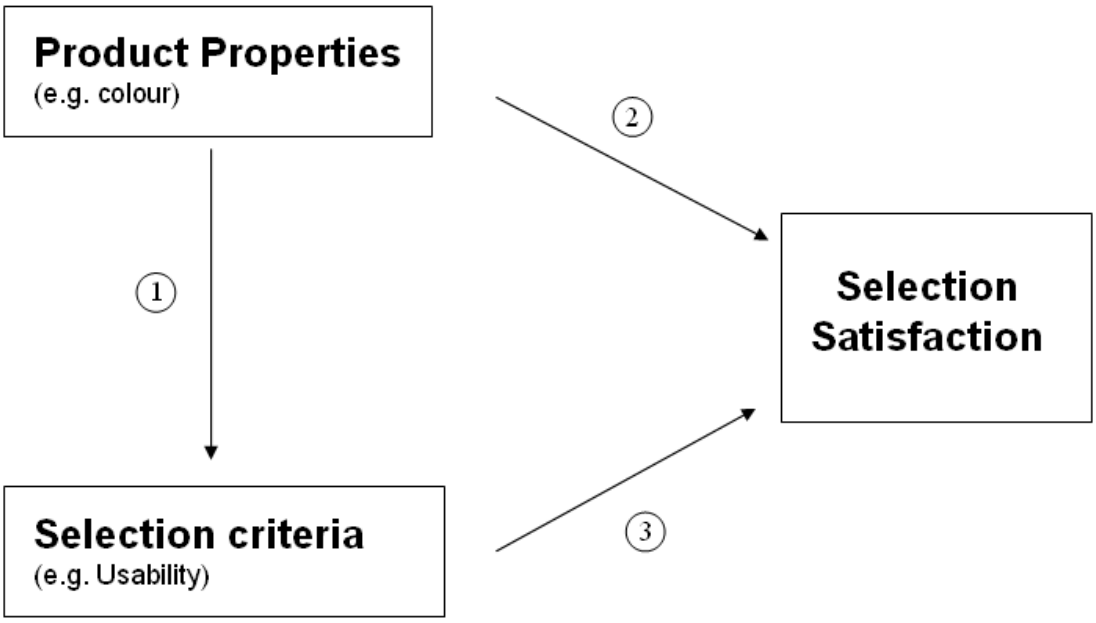


Figure 2.14 Mobile phone selection satisfaction framework

In Figure 2.14, selection satisfaction is satisfaction with the mobile phone selection process. It can be measured similarly to software satisfaction (Davis, 1989). Selection satisfaction process may also be closely measured to the satisfaction with the selected product.

1. Product properties affect selection criteria

The process of practical properties to performance criteria (as indicated by "1") was developed from relationship model (as shown in Figure 2.1). Han et al. (2004) assumed that user satisfaction is affected by mobile phone properties. In this research, user satisfaction will be regarded as the selection criteria that are affected by product properties. Different people would select different product properties and selection criteria.

2. Product properties affect selection satisfaction

The process of practical properties to selection satisfaction (as indicated by "2") was developed from the Vodafone online store. Vodafone online store allows customers to

select their favourite mobile phone properties in order to meet their selection satisfaction. Different people would select different product properties.

3. Selection criteria affect selection satisfaction

The process from selection criteria to selection satisfaction (as indicated by "3") was developed from the quality dimension satisfaction model (as shown in Figure 2.13). Krishnan and Subramanyam (2004) used five performance dimensions to measure the users' overall satisfaction with the software. In this research, the performance criteria ratings of mobile phone will be used to evaluate users' selection satisfaction. Different people will use different selection criteria.

2.10 Research question

There are two different selection support methods that arise from the conceptual framework (as shown in Figure 2.14): 1. Product properties affect selection satisfaction. 2. Product properties and selection criteria affect selection satisfaction. Therefore, the research question of this study is **Does online selection support for mobile phone affect the mobile phone selection satisfaction?** The known elements of satisfaction also raise sub-questions to the main research question, namely whether online support affects:

1. Selection time
2. Perceived usefulness
3. Perceived an ease if selection process
4. Perceived an ease to use
5. Perceived user satisfaction
6. Perceived confidence in phone selected
7. Willingness to use the selection process in the future

This research question also raises two additional questions:

A. How do users prioritise mobile phone features (mobile phone properties and performance criteria)?

B. Are there individual differences in selection support method preferences between different types of users?

2.11 Hypotheses

Hypotheses that arise from the above research main question and sub-question B are as follows:

2.11.1 Research main question

A useful mobile phone selection support method should decrease the time taken to select a mobile phone.

H1. Online mobile phone selection support method affects selection time.

A useful mobile phone selection support method should be perceived as more useful.

H2. Online mobile phone selection support method affects perceived usefulness.

A useful mobile phone selection support method should be perceived as making the selection process easier.

H3. Online mobile phone selection support method affects perceived ease of selection process.

A useful mobile phone selection support method should be perceived as more easy to use.

H4. Online mobile phone selection support method affects perceived ease to use software system.

A useful mobile phone selection support method should generate high satisfaction.

H5. Online mobile phone selection support method affects user satisfaction.

A useful mobile phone selection support method should produce higher confidence in the phone that has been selected.

H6. Online mobile phone selection support method affects perceived confidence in the phone selected.

A useful mobile phone selection support method should results in higher willingness to use the system again in the future.

H7. Online mobile phone selection support method affects perceived willingness to use the software system in the future.

2.11.2 Research question B

HB1. Gender affects the mobile phone selection support method preference.

HB2. Experience level affects the mobile phone selection support method preference.

The following chapter describes a pilot study that was initiated by preliminary results in order to reduce the mistakes that may have occurred in the research method stage.

Secondly, all the features of mobile phones will be categorised into mobile phone properties and performance criteria. A randomised block experimental design was chosen for this study.

Chapter 3: Method

3.1 Pilot study

To ensure the reliability of this research, a pilot study was performed to try out the research methods and tools required to discover any uncovered problems.

3.1.1 A complete list of mobile phone features and database

Firstly we needed to collect a complete list of mobile phone features using surveys, visiting mobile phone shops and various Internet websites. A preliminary survey was carried out in two sections (please refer Appendix A for complete survey question). In section one, each interviewee was asked the question “What are the top three things you looked for when choosing your current mobile phone?” In section 2, interviewees were asked another similar question: “What are the top three things you will look for when choosing your next mobile phone?” The results were recorded: priority scores of various mobile phone features/criteria are shown in Figure 3.1 and Figure 3.2. There were 20 mobile phone features provided for interviewees to select from, and an option of “other” was also provided for interviewees if they could not find their choices from the given features. There were 17 subjects in the preliminary survey. Results of the preliminary survey are shown in Figure 3.1 (the top 3 things considered when their current mobile phone was chosen) and Figure 3.2 (the top 3 things to be considered when choosing their next mobile phone).

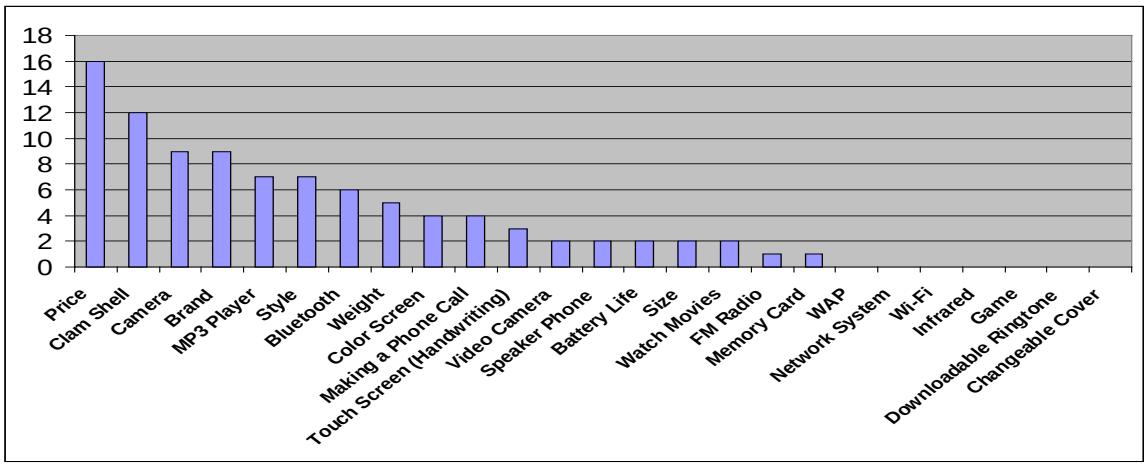


Figure 3.1 Priority scores of technical features when consumers chose their current mobile phone

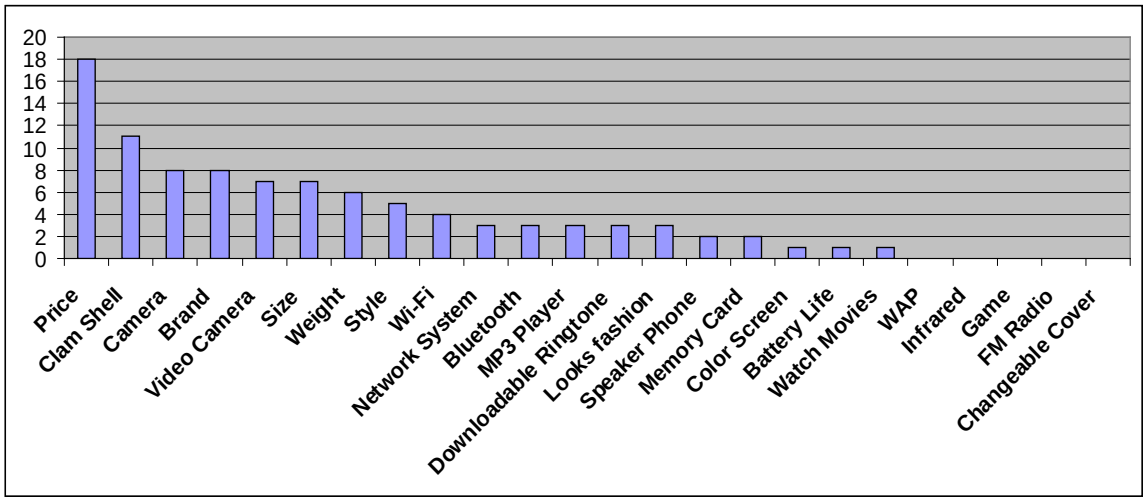


Figure 3.2 Priority scores of technical features when consumers choose their next mobile phone

3.1.2 Preliminary result conclusion

According to the survey results, many people chose “other” mobile phone features over the provided features. Therefore, we need a complete list of features for mobile phones in order to evaluate support methods more accurately. To get a more complete list of mobile phone features, mobile phone stores were the first placed to visit. Secondly, to obtain more details on mobile phone features (there were normally only 4 or 5 features for each phone in a mobile phone store) New Zealand local websites (such as, the

Vodafone online store, Telecom online store and Dick Smiths) and local mobile phone magazines (such as MyMobile) were sourced.

There is a variety of reasons why people choose their mobile phones differently. There are many different models of mobile phones for consumers to select in the current market, and each mobile phone may have a variety of features (around 30 to 50 features). However, as a result of information overload, it is difficult for people to understand all features and to know which feature is most important for them. Therefore these mobile phone features are simplified into seven performance criteria. The users can rank the importance of these performance criteria.

There are a large number of new mobile phone models introduced to the market constantly. There are different features between current and future models of mobile phones. In this study, we will focus on mobile phone models which have been introduced since February 2008. After collecting surveys and visiting shops and websites, a complete list of mobile phone features is summarised as shown in Table 3.1.

Table 3.1 A list of mobile phone features in the current market

Brand	Video Call	WAP
Color	Video Camera	GPRS
Voice Control	Document Viewer	WIFI
Multi-language	Voice Recorder	Email
Camera	Time Management Tools	HSDP
SIM Card	HTML	Push to Talk
Customizable Theme	GPS	Touch Screen
Bluetooth	USB Storage	Joystick
USB	Text Message (SMS)	QWERTY
External Memory	Vibrate	Picture Caller ID
Downloadable Ringtone	Body Design	One Touch Emergency
Downloadable Game	MP3 Player	Speed Dialling
Head phone port	FM Radio	Predictive Text Entry
PC Synchronization	Movies	Screen Size
Talk Time	Stream Viewing	Size
Standby Time	Game	Weight
Battery Replacement	Polyphonic Ringtone	Button Type
Internal Memory	Multi-Media Message	Infrared
Water Proof	Network System	Null Button
Operation System	Speaker Phone	

3.2 Mobile phone selection factors

According to the pilot study, many mobile phones nowadays have more than fifty features. Therefore, selection factors of mobile phone have become complicated. To simplify this, mobile phone selection factors will be considered in two parts: mobile phone properties and performance criteria.

3.2.1 Mobile phone properties

Mobile phone properties can be seen as the multi-decision points (requirements) for people to select their mobile phone. Mobile phone properties allows users to select the mobile phone requirements which they are interested in and they can also reduce the

amount of time spent on comparing mobile phone performance criteria (which will be introduced in section 3.2.2). The mobile phone features in Table 3.1 that cannot be used to compare phones (such as body design, brand) were considered as mobile phone properties. These properties include:

1. Aesthetics: Body design and main colour

According to previous literature aesthetics are also becoming one of the important selection factors when people choose their current/next mobile phone. At this stage, "body design" and "main colour" of a phone are categorised as mobile phone conditions because one cannot compare aesthetics of different phones. For example, consumer A might like the clam shell design with a pink colour, but consumer B might prefer a slider design with black colour. There is no standard for aesthetics because people have different points of view. Therefore, these two features are considered as mobile phone properties rather than mobile phone performance criteria. In the current market, there are 3 different body designs of mobile phones, including 'standard', 'clam shell' and 'slider'. The main colours of mobile phones include black, white, pink, blue, yellow and green.

2. Brand

Brand was considered as part of the "reliability" criteria. However, there is no standard measurement of brand issue in mobile phones. For example, some people may think that Nokia is more reliable compared to Motorola, but other people may not think that way. Therefore, "brand" was considered as belonging to mobile phone properties, which allows people to choose their preferred brand.

3. Price

Price could also be one of the important factors when people choose their mobile phone. It is an independent value, and cannot belong to mobile phone features. At this stage, it was considered as a mobile phone property as people are allowed to select their own

parameter of price.

3.2.2 Mobile phone performance criteria

Mobile phone performance criteria are a combination of the WOSP model (Whitworth & Zaic, 2003) and quality dimensions of E-commerce tools (Krishnan & Subramanyam, 2004). There are seven mobile phone performance criteria: “flexibility”, “capability”, “connectivity”, “reliability”, “usability”, “extendibility” and “entertainment”. In this research, mobile phone performance criteria are used to categorise mobile phone features in order to simplify mobile phone selection. The purpose of mobile phone performance criteria is to allow people to select their mobile phones by rating the importance of the performance criteria on a scale from 1 to 5. Therefore, mobile phone features which can be used to compare mobile phones will be under the mobile phone performance criteria.

3.2.2.1 Grouping mobile phone features

1. Flexibility

Under flexibility performance criteria, we can categorise mobile phone features that can support new and changing environments as users require. For example, a mobile phone that supports SIM cards will be flexible for people who want to transfer their contacts list from their existing phone to a new phone. Table 3.2 shows the mobile phone features that are categorised in the flexibility performance criteria.

Table 3.2 Flexibility performance criteria

Features	**Description**
Speaker Phone	Allow users to use speaker phone while they are driving.
Voice Control	Allow users to use voice to make/receive phone calls.
Multi-language	Allow users to switch the menu into different languages.
Null Button	Allow users to turn on/off the silent mode by pressing a button.
SIM Card	Allow users to transfer the phone contact from one to another.
Customizable Theme	Allow users to change their favourite wallpaper on the phone.

2. Capability

Mobile phone features that support or assist users doing their job would be categorised as capability performance criteria. For example, people can take a photo instantly by using a camera-enabled mobile phone or view a directions guide using a GPS-enabled mobile phone. Mobile phone features that meet the capability requirements are shown in Table 3.3.

Table 3.3 Capability Performance Criteria

Features	**Description**
Camera	Allow users to take photos using the mobile phone.
Video Call	Allow users to make 2-way video conversations.
Video Camera	Allow users to record videos by using the mobile phone.
Document Viewer	Allow users to open and edit Word, Excel and/or PDF files.
Voice Recorder	Allow users to record voice.
Time Management Tools	Allow users to use tools like a to-do-list, calendar and calculator.
HTML	Allow users to browse the Internet by using their mobile phone.
GPS	Allow users to use GPS functions to locate their current destination.
Text Message	Allow users to text a message to others.
Vibrate	Alert users by vibration when there is an incoming call.

3. Connectivity

Connectivity performance criteria categorise mobile phone features that can open or use communication channels with other people, other systems or networks. This

performance criteria can be applied when people are using Skype to make a call by using a Wi-Fi enabled mobile phone. Table 3.4 shows the mobile phone features under the connectivity performance criteria.

Table 3.4 Connectivity performance criteria

Features	**Description**
Infrared	Allow users to transfer file wirelessly through other device.
WAP	Mobile phones which have WAP function.
GPRS	Mobile phones which have GPRS function.
WIFI	Allow users to access the Internet through wireless LAN.
Email	Allow users to send/receive the email.
HSDP	Allow users to download/upload a file wirelessly in 3.5Mbps.
Push to Talk	Allow users to use their mobile phone as "Walkie-Talkie".

4. Reliability

Reliability performance criteria categorise mobile phone features that can continue operating despite internal part failure. For example, business men/women always talk on the phone, so mobile phones that have longer talk times & standby times would be more reliable for them. Table 3.5 indicates the mobile phone features under reliability performance criteria.

Table 3.5 Reliability performance criteria

Features	**Description**
Talk Time	The maximum talk time which allows users to call.
Standby Time	The maximum standby time of a mobile phone.
Battery Replacement	Allow users to replace the battery of the mobile phone.
Internal Memory	Internal memory of a mobile phone.
Water Proof	A mobile phone that has a water resistance function.
Operation System	Operating system of the mobile phone, e.g. Windows or Symbian

(Note: This definition of the reliability is a property of the mobile phone itself, not of the communication network, or of the warrantee provided by the supplier.)

5. Usability

Usability performance criteria can be applied to mobile phone features that involve the ease of use of a phone and minimise the actions required to complete a task. For example, people can make a phone call more easily by using speed-dialling instead. Table 3.6 shows mobile phone features that are categorised as usability performance criteria.

Table 3.6 Usability performance criteria

Features	**Description**
Touch Screen	A mobile phone that has a touch screen enabled function.
Joystick	Allow users to scroll and select the menu by using a joystick.
QWERTY	Allow users to write emails or messages by using a mini keyboard.
Picture Caller ID	Allow users to see the caller's photo when receiving a call.
One Touch Emergency	Allow users to make an emergency call by pressing a button.
Speed Dialling	Allow users to make a quick call by pressing a button.
Predictive Text Entry	Allow users to type their messages in a faster way.
Screen Size	Screen size of the mobile phone.
Size	Dimension of the mobile phone (width x length x height).
Weight	Weight of the mobile phone.
Button Type	Button type of the mobile phone. E.g. normal, flat, keyboard

6. Extendibility

Mobile phone features which are applied “to add or use outside elements to enhance the ability of the phone” should be considered in extendibility performance criteria. For example, people can store more photos or music songs in their extendable mobile phone memory by inserting a memory card. Table 3.7 shows the mobile phone features that are categorised in extendibility performance criteria.

Table 3.7 Extendibility performance criteria

Features	**Description**
Bluetooth	Allow users to connect to Bluetooth devices such as earphones.
USB	Allow users to connect the phone to a computer.
External Memory	Allow users to extend the memory of the phone.
Downloadable Ringtone	Allow users to download a new ringtone for the phone.
Downloadable Game	Allow users to download a new game for the phone.
Head phone port	Allow users to insert earphones.
PC Synchronization	Allow users to synchronise their phones with computers.

7. Entertainment

Entertainment performance criteria can be applied to mobile phone features which can "entertain" the user. For example, MP3 Player enabled mobile phones will appeal to people who love listening to music. Mobile phone features that are categorised in entertainment performance criteria can be seen in Table 3.8.

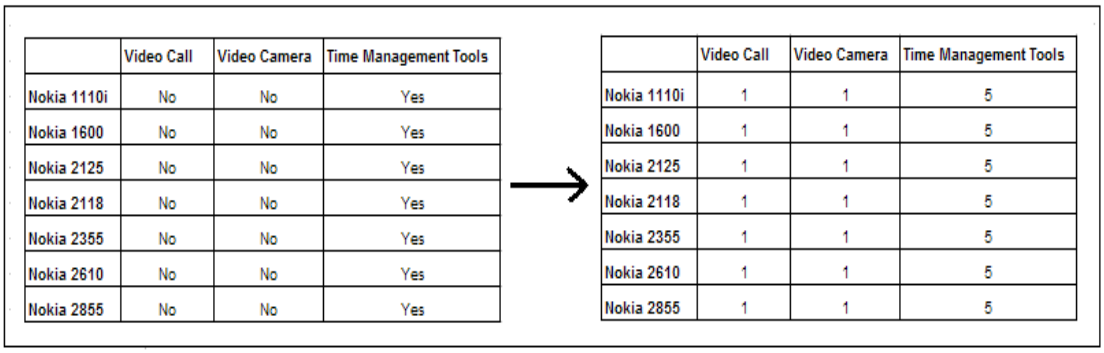
Table 3.8 Entertainment performance criteria

Features	**Description**
MP3 Player	Allow users to listen to music in MP3 format.
FM Radio	Allow users to listen to FM Radio.
Movies	Allow users to watch the movies on the phone.
Stream Viewing	Allow users to watch multi-media services through the Internet.
Game	Allow users to play a game on the phone.
Polyphonic Ringtone	Provide a better quality of ringtone.
Multi-Media Message	Allow users to send/receive photos & short sound media.

3.2.2.2 Mobile phone numeric rating

As mentioned earlier, people will select their phone by rating the importance of each mobile phone performance criteria. The answer to the presence of a mobile phone feature is either "Yes" or "No". These features were then assigned a score of 5 or 1 respectively. For example, a mobile phone with video call function would get a score of 5, whilst on the other hand a mobile phone without video call would get a score of 1 (as

shown in Figure 3.3).



	Video Call	Video Camera	Time Management Tools
Nokia 1110i	No	No	Yes
Nokia 1600	No	No	Yes
Nokia 2125	No	No	Yes
Nokia 2118	No	No	Yes
Nokia 2355	No	No	Yes
Nokia 2610	No	No	Yes
Nokia 2855	No	No	Yes

	Video Call	Video Camera	Time Management Tools
Nokia 1110i	1	1	5
Nokia 1600	1	1	5
Nokia 2125	1	1	5
Nokia 2118	1	1	5
Nokia 2355	1	1	5
Nokia 2610	1	1	5
Nokia 2855	1	1	5

Figure 3.3 An example of transforming features into rating values

However in other cases, mobile phones features which involve more than two numeric values (such as weight, talk time, standby time, memory capacity, screen size, phone size and camera pixels) were rated in another way. To rate these features, firstly we need to find out the minimum and maximum values from the 105 mobile phones in the database (as shown in Table 3.9). Then we can rank these values from 1 to 5 by using the 20% rule. For example, Nokia 6630 has 3.5 hours talk time, which is ranked as “3” due to the 20% rule, as shown in Table 3.9. Therefore, by using this method, we can transfer the mobile phone information into scores as shown in Figure 3.4.

Table 3.9 The minimum and maximum values of mobile phone features

	Minimum	Highest
Weight	78g	285g
Talk Time	2 hours	7 hours
Standby Time	144 hours (6 days)	450 hours (18.75 days)
Memory	1MB	4GB
Polyphonic Ringtone	1 chords	72 chords
Screen Size	1.5 inches	3 inches
Camera	0 mega pixel	500 mega pixel

Table 3.10 Example of talk time rating

Model	Talk Time	Rank	Model	Talk Time	Rank	Model	Talk Time	Rank
Z520i	7		MY400V	4		Sanyo6600	3	
Z310i	7		Treo750v	4		Sanyo3100	3	
W850i	7		Treo700wx	4		SamsungZ540	3	
W200i	7		Treo650	4		SamsungA900	3	
V630i	7		N91	4		MYC2-3	3	
P990i	7		N73	4		TX215c	3	
M600i	7	5	6101	4		TX1000c	3	
K800i	7		5500	4		N80	3	
K310i	7		MotoE770v	4		6070	3	2
N95	6.5		spjas	4		6020	3	
MotoK1	6.5		HP HW6965	4		3220	3	
550SH	6		spsp5	4		2610	3	
Sanyo9000	6		kp202	4		2118	3	
MotoC118	6		ku800	4	3	nx225	3	
MotoV360v	6		2865	4		MotoZ3	3	
HP RW6800	5.5		2355	4		MotoV6maxx	3	
1600	5		7390	4		Sanyo8400	3	
1100i	5		SamsungW531	4		8800	2.75	
2125	5		SamsungZ10	4		MotoV3x	2.5	
Blackberry 8707	5		GX29	3.5		MotoV3maxx	2.5	
smartflip	5	4	N70	3.5		N93i	2.5	1
jamin	5		6630	3.5		Sanyo7500	2.5	
MotoV3	5		6288	3.5		GX17	2.5	
MotoW220	5		6275	3.5		SamsungZ400	2.45	
MotoL7	5		6235	3.5		770SH	2	
5140i	5		6234	3.5				
jasjar	4.5		6165	3.5				
kjam	4.5		6131	3.5				
			2855	3.5				
			SamsungA920	3.5				

	Talk Time(hrs)	Standby(hrs)	Build in Memory(MB)
Nokia 2865	4	336	12
Nokia 3220	3	336	4.5
Nokia 5140i	5	288	4
Nokia 5500	4	240	64
Nokia 6020	3	336	3.5
Nokia 6070	3	288	3.5
Nokia 6101	4	300	3.5
Nokia 6131	3.5	240	8

→

	Talk Time(hrs)	Standby(hrs)	Build in Memory(MB)
Nokia 2865	3	4	2
Nokia 3220	2	4	2
Nokia 5140i	4	3	2
Nokia 5500	3	2	2
Nokia 6020	2	4	2
Nokia 6070	2	3	2
Nokia 6101	3	4	2
Nokia 6131	3	2	2

Figure 3.4 Example of transforming feature into rating value

3.2.2.3 Reliability and validity

After all of the mobile phone features were transformed into numeric values, correlation analysis was used to ensure that the mobile phone features in each performance criteria were independent. SPSS were used for analysis, and features with zero standard

deviation or a correlation bigger than 0.8 were removed.

1. Flexibility performance criteria

Table 3.11 Descriptive statistics of flexibility feature ratings

	Mean	Std. Deviation	N
Multi Language	3.99	1.75	105
SIM Card	4.08	1.69	105
Voice Control	4.57	1.25	105
Customizable Theme	4.57	1.25	105
Speaker Phone	4.81	0.86	105
Null Button	5.00	0.00	105

Table 3.11 indicates the average score of flexibility features in 105 mobile phones. The table shows that all of the phones have "null button" features and over 80% of the phones do have speaker phone, multi-language, voice control, and customizable theme features, and support SIM cards.

Table 3.12 Correlation of flexibility feature ratings (N=105)

		FLX_SPK	FLX_ VoiceCon	FLX_ MultiLang	FLX_NullBut	FLX_SIM	FLX_ CusTheme
FLX_SPK	Pearson Correlation	1	.102	-.002	.[a]	-.123	.102
	Sig. (2-tailed)		.357	.989	.	.270	.357
FLX_VoiceCon	Pearson Correlation	.102	1	-.203	.[a]	.363**	.875**
	Sig. (2-tailed)	.357		.066	.	.001	.000
FLX_MultiLang	Pearson Correlation	-.002	-.203	1	.[a]	.145	-.203
	Sig. (2-tailed)	.989	.066		.	.192	.066
FLX_NullBut	Pearson Correlation	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)	.	.	.	.	.	.
FLX_SIM	Pearson Correlation	-.123	.363**	.145	.[a]	1	.271*
	Sig. (2-tailed)	.270	.001	.192	.		.013
FLX_CusTheme	Pearson Correlation	.102	.875**	-.203	.[a]	.271*	1
	Sig. (2-tailed)	.357	.000	.066	.	.013	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

Table 3.12 shows a strong correlation (0.875) between voice control and customisable themes. This shows that a mobile phone with a voice control feature is likely to have customisable theme feature.

SIM cards, voice control, and customisable themes show moderate correlations. SIM cards were positively correlated with voice control (0.363) and customizable themes (0.271). Mobile phones which have SIM card features are likely to have voice control and customisable theme features. Other features of reliability show very weak relationships between each other.

Finally, all of the mobile phones have a null button, so this feature was not used to compare mobile phones.

The final list of flexibility performance criteria was selected by first removing features with a zero standard deviation, followed by removing features with a correlation over 0.79. Therefore, the null button (standard deviation < 0.5) and customizable theme (r = 0.875) features were removed. The final list of flexibility performance criteria is shown in Table 3.13.

Table 3.13 The final list of flexibility criteria performance

Features	Description
Speaker Phone	Allow users to use speaker phone while they are driving.
Voice Control	Allow users to use voice to make/receive a phone call.
Multi-language	Allow users to switch the menu into different languages.
SIM Card	Allow users to transfer phone contacts from one to another.

2. Extendibility performance criteria

Table 3.14 Descriptive statistics of extendibility ratings

	Mean	Std. Deviation	N
External Memory	3.22	2.00	105
Bluetooth	3.84	1.82	105
PC Synchronization	1.96	1.72	105
USB	4.32	1.51	105
Head phone port	4.66	1.12	105

The table of means and standard deviations shows the average scores of extendibility

features in 105 mobile phones. Table 3.14 indicates that over 90% of phones had headphones and USB ports, 60% of mobile phones supported extension memory card, and 70% of phones had Bluetooth enabled wireless technology. On the other hand, only 39% of phones supported PC synchronization.

Table 3.15 Correlation of extendibility feature ratings (N=105)

		EXT_Bluetooth	EXT_USB	EXT_ ExternalMem	EXT_HeadPort	EXT_PCS
EXT_Bluetooth	Pearson Correlation	1	.635**	.604**	.476**	.359**
	Sig. (2-tailed)		.000	.000	.000	.001
EXT_USB	Pearson Correlation	.635**	1	.502**	.558**	.254*
	Sig. (2-tailed)	.000		.000	.000	.021
EXT_ExternalMem	Pearson Correlation	.604**	.502**	1	.338**	.449**
	Sig. (2-tailed)	.000	.000		.002	.000
EXT_HeadPort	Pearson Correlation	.476**	.558**	.338**	1	.171
	Sig. (2-tailed)	.000	.000	.002		.122
EXT_PCS	Pearson Correlation	.359**	.254*	.449**	.171	1
	Sig. (2-tailed)	.001	.021	.000	.122	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 3.15 indicates several observations of features that are moderately correlated. These are Bluetooth and USB (0.635), Bluetooth and external memory (0.604), USB and external memory (0.502), USB and headphone ports (0.558), downloadable ringtones and downloadable games (0.684), and downloadable games and headphone ports (0.554).

There were several features showing weak correlations. They included Bluetooth and downloadable games (0.335), Bluetooth and headphone ports (0.476), Bluetooth and PC synchronisation (0.359), USB and downloadable games (0.327), USB and PC synchronisation (0.254), external memory and downloadable games (0.264), external memory and headphone ports (0.338), external memory and PC synchronisation (0.449), and downloadable ringtones and headphone ports (0.288).

According to Table 3.9 and Table 3.10, it is not necessary to remove any features from the list due to low correlations and standard deviations, which are above 0.5.

3. Reliability performance criteria

Table 3.16 Descriptive statistics of reliability feature ratings

Feature	Mean	Std. Deviation	N
Standby Time	2.60	1.25	105
Talk Time	3.17	1.24	105
Internal Memory	3.06	1.13	105
Operating System	4.40	0.92	105
Water Proof	1.10	0.61	105
Battery Replacement	5.00	0.00	105

The table of means and standard deviations shows the average scores of reliability features in 105 mobile phones. Table 3.16 shows that all of the phones can replace the battery and only 2% of phones have waterproof features.

Table 3.17 Correlation of reliability feature ratings (N=105)

		REL_ TalkTime	REL_ StandTime	REL_ BatteryRep	REL_ InternalMem	REL_WaterPf	REL_OS
REL_TalkTime	Pearson Correlation	1	.170	.[a]	.150	.042	-.166
	Sig. (2-tailed)		.124	.	.177	.704	.133
REL_StandTime	Pearson Correlation	.170	1	.[a]	-.052	-.013	.192
	Sig. (2-tailed)	.124		.	.641	.907	.083
REL_BatteryRep	Pearson Correlation	.[a]	.[a]	.[a]	.[a]	.[a]	.[a]
	Sig. (2-tailed)	.	.	.	.	.	.
REL_InternalMem	Pearson Correlation	.150	-.052	.[a]	1	-.008	-.503**
	Sig. (2-tailed)	.177	.641	.		.940	.000
REL_WaterPf	Pearson Correlation	.042	-.013	.[a]	-.008	1	.103
	Sig. (2-tailed)	.704	.907	.	.940		.353
REL_OS	Pearson Correlation	-.166	.192	.[a]	-.503**	.103	1
	Sig. (2-tailed)	.133	.083	.	.000	.353	

**. Correlation is significant at the 0.01 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

Table 3.17 shows the correlation (-0.503) between internal memory and operating systems. The negative correlation coefficient indicates that a mobile phone with a bigger capacity of internal memory has a lower reliability in operating system. This is most likely because these phones with bigger memory come with operating systems such as Windows, Palm OS or Symbian.

The final list of reliability performance criteria was selected by first removing features with a zero standard deviation, followed by removing features with a correlation over

0.79. In this case, it was only needed to remove the battery replacement (standard deviation = 0); the other features should remained on the list (correlation < 0.79).

Table 3.18 The final list of reliability performance criteria

Features	**Description**
Talk Time	Maximum talk time which allows user to call.
Standby Time	Mobile phone maximum standby time.
Internal Memory	Internal memory of mobile phone.
Water Proof	Mobile phones that have a water resistance function.
Operation System	Operating system of mobile phone, e.g. Windows, Symbian.

4. Connectivity performance criteria

Table 3.19 Descriptive statistics of connectivity feature ratings

	Mean	Std. Deviation	N
Infrared	2.64	1.98	105
Push to Talk	1.58	1.42	105
WIFI	1.58	1.42	105
GPRS	4.57	1.25	105
Email	4.66	1.12	105
WAP	4.81	0.86	105
HSDP	1.10	0.62	105

According to Table 3.19, about 10% of phones supported push to talk, Wi-Fi and high speed data transfer. There were over 80% of mobile phones that support WAP, GPRS, and email. Only less than 5% of mobile phones supported high speed data transfer function.

Table 3.20 Correlation of connectivity feature ratings (N=105)

		CON_Infra	CON_WAP	CON_ GPRS	CON_WIFI	CON_Email	CON_HSDP	CON_PPT
CON_Infra	Pearson Correlation	1	-.041	.291**	.285**	.165	.029	.145
	Sig. (2-tailed)		.711	.008	.009	.137	.796	.190
CON_WAP	Pearson Correlation	-.041	1	.283**	-.067	.337**	.035	.093
	Sig. (2-tailed)	.711		.009	.545	.002	.751	.406
CON_GPRS	Pearson Correlation	.291**	.283**	1	.143	.731**	.055	.143
	Sig. (2-tailed)	.008	.009		.196	.000	.623	.196
CON_WIFI	Pearson Correlation	.285**	-.067	.143	1	.125	.159	.123
	Sig. (2-tailed)	.009	.545	.196		.261	.152	.267
CON_Email	Pearson Correlation	.165	.337**	.731**	.125	1	.048	.125
	Sig. (2-tailed)	.137	.002	.000	.261		.669	.261
CON_HSDP	Pearson Correlation	.029	.035	.055	.159	.048	1	.159
	Sig. (2-tailed)	.796	.751	.623	.152	.669		.152
CON_PPT	Pearson Correlation	.145	.093	.143	.123	.125	.159	1
	Sig. (2-tailed)	.190	.406	.196	.267	.261	.152	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3.20 shows that GPRS and email have the strongest correlation (0.731) in connectivity. Other features in connectivity show very weak correlations between each other ($r < 0.50$). Therefore, it was not necessary to remove any of the features from the connectivity list because all of their standard deviations were over zero and the correlations were smaller than 0.8.

5. Usability performance criteria

Table 3.21 Descriptive statistics of usability feature ratings

	Mean	Std. Deviation	N
Joystick	2.20	1.85	105
QWERTY	1.72	1.55	105
Size	3.27	1.37	105
Picture Caller ID	4.47	1.36	105
Button Type	4.40	1.32	105
Touch Screen	1.48	1.31	105
One Touch Emergency	1.43	1.25	105
Weight	3.80	1.17	105
Screen Size	2.81	1.15	105
Speed Dialling	5.00	0.00	105
Predictive Text Entry	5.00	0.00	105

Table 3.21 shows that all of the mobile phones support speed dialling and predictive text

entry. Over 80% of mobile phones had a picture caller ID function and only 10% of mobile phones supported the one touch emergency function. Less than 10% of mobile phones had a QWERTY keyboard.

Table 3.22 Correlation of usability feature ratings (N=105)

		USB_Touch	USB_Joystick	USB_QWERTY	USB_PicID	USB_1Emg	USB_SpeedDial	USB_T9	USB_ScreenSize	USB_Size	USB_Weight	USB_Button
USB_Touch	Pearson Correlation	1	-.162	.692**	.145	.109	.a	.a	.612**	-.425**	-.541**	-.622**
	Sig. (2-tailed)		.143	.000	.192	.327	.	.	.000	.000	.000	.000
USB_Joystick	Pearson Correlation	-.162	1	-.240*	.102	.109	.a	.a	-.050	-.147	-.111	.222*
	Sig. (2-tailed)	.143		.029	.360	.327	.	.	.654	.185	.320	.044
USB_QWERTY	Pearson Correlation	.692**	-.240*	1	.184	.038	.a	.a	.626**	-.413**	-.565**	-.646**
	Sig. (2-tailed)	.000	.029		.097	.736	.	.	.000	.000	.000	.000
USB_PicID	Pearson Correlation	.145	.102	.184	1	.136	.a	.a	.586**	-.237*	-.314**	-.180
	Sig. (2-tailed)	.192	.360	.097		.219	.	.	.000	.031	.004	.103
USB_1Emg	Pearson Correlation	.109	.109	.038	.136	1	.a	.a	-.009	-.011	.095	.161
	Sig. (2-tailed)	.327	.327	.736	.219		.	.	.936	.922	.393	.147
USB_SpeedDial	Pearson Correlation	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.	.	.
USB_T9	Pearson Correlation	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.	.	.
USB_ScreenSize	Pearson Correlation	.612**	-.050	.626**	.586**	-.009	.a	.a	1	-.538**	-.783**	-.657**
	Sig. (2-tailed)	.000	.654	.000	.000	.936	.	.		.000	.000	.000
USB_Size	Pearson Correlation	-.425**	-.147	-.413**	-.237*	-.011	.a	.a	-.538**	1	.683**	.374**
	Sig. (2-tailed)	.000	.185	.000	.031	.922	.	.	.000		.000	.001
USB_Weight	Pearson Correlation	-.541**	-.111	-.565**	-.314**	.095	.a	.a	-.783**	.683**	1	.618**
	Sig. (2-tailed)	.000	.320	.000	.004	.393	.	.	.000	.000		.000
USB_Button	Pearson Correlation	-.622**	.222*	-.646**	-.180	.161	.a	.a	-.657**	.374**	.618**	1
	Sig. (2-tailed)	.000	.044	.000	.103	.147	.	.	.000	.001	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

Table 3.22 shows a strong correlation (-0.783) between screen size and weight. This shows that if a mobile phone has a larger screen size, its weight is also likely to be heavier. Touch screen, QWERTY, weight, size and screen size are also associated with each other. Mobile phones which have a QWERTY keyboard are more likely to have a larger screen size (0.612), and mobile phones with a larger screen size are more likely to have a QWERTY keyboard (0.692). All of the mobile phones have speed dialling and predictive text entry, so these features were not used for comparisons. Other features of usability showed weak relationships between each other.

The final list of usability performance criteria was selected by first removing features with a zero standard deviation, followed by removing features with a correlation over 0.79. Therefore, the features of speed dialling and predictive text entry (standard

deviation = 0) were removed. The final list of usability performance criteria is shown in Table 3.23.

Table 3.23 The final list of usability performance criteria

Touch Screen	Mobile phones which have touch screen enabled function.
Joystick	Allow users to scroll and select the menu by using joystick.
QWERTY	Allow users to write emails or messages by using a mini keyboard.
Picture Caller ID	Allow users to see the caller's photo when they receive a call.
One Touch Emergency	Allow users to make emergency calls by pressing a button.
Screen Size	Screen size of the mobile phone.
Size	Dimension of the mobile phone (width x length x height).
Weight	Weight of the mobile phone.
Button Type	Button type of mobile phone, e.g. normal, flat, keyboard

6. Capability performance criteria

Table 3.24 Descriptive statistics of capability feature ratings

	Mean	Std. Deviation	N
Video Call	2.54	1.96	105
HTML	3.75	1.87	105
Document Viewer	2.11	1.80	105
Video Camera	4.04	1.72	105
Voice Recorder	4.47	1.36	105
Camera	2.76	1.19	105
GPS	1.05	0.44	105
Time management tools	5.00	.00	105
Text Message	5.00	.00	105
Vibration	5.00	.00	105

According to Table 3.24, all of the mobile phones have time management tools, text messaging, and vibration functions. Over 80% of mobile phones had a voice recorder and a video camera. Less than 10% of mobile phone had a GPS function, and about 20% of mobile phone had document viewer functions.

Table 3.25 Correlation of capability feature ratings (N=105)

		CAP_Cam	CAP_VCall	CAP_VideoCam	CAP_DocView	CAP_VoiceRe	CAP_TimeMang	CAP_HTML	CAP_GPS	CAP_TEXT	CAP_Vibrate
CAP_Cam	Pearson Correlation	1	.666**	.554**	.309**	.553**	a	.590**	.210	a	a
	Sig. (2-tailed)		.000	.000	.004	.000	.	.000	.057	.	.
CAP_VCall	Pearson Correlation	.666**	1	.446**	.450**	.310**	a	.428**	.139	a	a
	Sig. (2-tailed)	.000		.000	.000	.004	.	.000	.209	.	.
CAP_VideoCam	Pearson Correlation	.554**	.446**	1	.286**	.611**	a	.591**	.062	a	a
	Sig. (2-tailed)	.000	.000		.009	.000	.	.000	.576	.	.
CAP_DocView	Pearson Correlation	.309**	.450**	.286**	1	.242*	a	.418**	.178	a	a
	Sig. (2-tailed)	.004	.000	.009		.028	.	.000	.107	.	.
CAP_VoiceRe	Pearson Correlation	.553**	.310**	.611**	.242*	1	a	.579**	.043	a	a
	Sig. (2-tailed)	.000	.004	.000	.028		.	.000	.698	.	.
CAP_TimeMang	Pearson Correlation	a	a	a	a	a	a	a	a	a	a
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.	.
CAP_HTML	Pearson Correlation	.590**	.428**	.591**	.418**	.579**	a	1	.075	a	a
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.		.503	.	.
CAP_GPS	Pearson Correlation	.210	.139	.062	.178	.043	a	.075	1	a	a
	Sig. (2-tailed)	.057	.209	.576	.107	.698	.	.503		.	.
CAP_TEXT	Pearson Correlation	a	a	a	a	a	a	a	a	a	a
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.	.
CAP_Vibrate	Pearson Correlation	a	a	a	a	a	a	a	a	a	a
	Sig. (2-tailed)	.	.	.	.	.	.	.	.	.	.

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

a. Cannot be computed because at least one of the variables is constant.

Table 3.25 shows that the strongest correlation (0.666) was between video calling and camera. Other features of capability show moderate correlations with each other. These include camera and video camera (0.554), camera and HTML, and camera and USB storage (0.642).

According to Table 3.23 and Table 3.24, it was not necessary to remove features from the capability list as the correlations were low and the standard deviations were > 0.5.

7. Entertainment performance criteria

Table 3.26 Descriptive statistics of entertainment feature ratings

	Mean	Std. Deviation	N
Streaming Viewing	3.02	2.01	105
Movie	3.31	1.99	105
FM Radio	2.45	1.93	105
MP3 Player	3.75	1.87	105
Polyphonic Ringtone	4.69	0.96	105
MMS	4.76	0.96	105
Game	4.95	0.44	105

Table 3.26 indicates the average scores and standard deviations of extendibility

performance criteria in 105 mobile phones. Over 90% of phones had games, MMS and polyphonic ringtones. About 60% of mobile phones had an MP3 player function.

Table 3.27 Correlation of entertainment feature ratings (N=105)

		ENT_MP3	ENT_FM	ENT_Movie	ENT_ StreamView	ENT_Game	ENT_ PolyRing	ENT_MMS
ENT_MP3	Pearson Correlation	1	.238*	.686**	.528**	.164	.458**	.375**
	Sig. (2-tailed)		.030	.000	.000	.140	.000	.000
ENT_FM	Pearson Correlation	.238*	1	.236*	.141	.083	.194	.190
	Sig. (2-tailed)	.030		.032	.202	.455	.079	.085
ENT_Movie	Pearson Correlation	.686**	.236*	1	.815**	.129	.256*	.194
	Sig. (2-tailed)	.000	.032		.000	.244	.019	.079
ENT_StreamView	Pearson Correlation	.528**	.141	.815**	1	.112	.206	.155
	Sig. (2-tailed)	.000	.202	.000		.314	.062	.162
ENT_Game	Pearson Correlation	.164	.083	.129	.112	1	.426**	.436**
	Sig. (2-tailed)	.140	.455	.244	.314		.000	.000
ENT_PolyRing	Pearson Correlation	.458**	.194	.256*	.206	.426**	1	.870**
	Sig. (2-tailed)	.000	.079	.019	.062	.000		.000
ENT_MMS	Pearson Correlation	.375**	.190	.194	.155	.436**	.870**	1
	Sig. (2-tailed)	.000	.085	.079	.162	.000	.000	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3.27 shows that the strongest correlation is between polyphonic ringtones and MMS (0.875). This indicates that a mobile phone with a polyphonic ringtone feature is likely to have a Multi-media message (MMS) feature. The second strongest correlation is between streaming view and movies (0.815). Correlations of MP3 and movies (0.686) and MP3 and streaming view (0.528) are moderate.

SIM cards, voice control and customisable themes show weak correlations. SIM cards was positively correlated with voice control (0.363) and customizable themes (0.271).

According to Table 3.26 and Table 3.27, the features of streaming viewing and polyphonic ringtones were removed due to high correlations with MMS (0.875) and movies (0.835). The final list of entertainment performance criteria are shown in Table 3.28.

Table 3.28 The final list of entertainment performance criteria

MP3 Player	Allow users to listen to music in MP3 format.
FM Radio	Allow users to listen to FM Radio.
Movies	Allow users to watch movies on the phone.
Game	Allow users to play a game on the phone.
Multi-Media Message	Allow users to send/receive photos and short sound media.

3.2.2.4 Performance criteria comparison

After the initial analysis for each performance criterion, the complete and independent list of mobile phone features was obtained. In the next stage, the comparisons of all performance criteria were analysed to ensure that each of the performance criteria were independent from each other.

Table 3.29 Descriptive statistics for performance criteria

Performance Criteria	**Mean**	**Std. Deviation**	**N**
Capability	3.28	1.23	105
Flexibility	4.40	0.76	105
Entertainment	3.66	1.14	105
Connectivity	2.99	0.68	105
Usability	2.84	0.40	105
Reliability	2.87	0.47	105
Extendibility	3.60	1.22	105

Table 3.30 Correlation of performance criteria ratings

		Capability	Flexibility	Entertainment	Connectivity	Usability	Reliability	Extendibility
Capability	Pearson Correlation	1	.600**	.843**	.695**	.401**	.168	.834**
	Sig. (2-tailed)		.000	.000	.000	.000	.128	.000
Flexibility	Pearson Correlation	.600**	1	.456**	.376**	.310**	.295**	.410**
	Sig. (2-tailed)	.000		.000	.000	.004	.007	.000
Entertainment	Pearson Correlation	.843**	.456**	1	.716**	.308**	.183	.866**
	Sig. (2-tailed)	.000	.000		.000	.005	.098	.000
Connectivity	Pearson Correlation	.695**	.376**	.716**	1	.397**	.130	.647**
	Sig. (2-tailed)	.000	.000	.000		.000	.241	.000
Usability	Pearson Correlation	.401**	.310**	.308**	.397**	1	.401**	.375**
	Sig. (2-tailed)	.000	.004	.005	.000		.000	.000
Reliability	Pearson Correlation	.168	.295**	.183	.130	.401**	1	.207
	Sig. (2-tailed)	.128	.007	.098	.241	.000		.061
Extendibility	Pearson Correlation	.834**	.410**	.866**	.647**	.375**	.207	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.061	

**. Correlation is significant at the 0.01 level (2-tailed).

Table 3.30 shows that Capability, Entertainment and Extendibility are highly correlated to each other. In other words, these performance criteria are not independent. The reason

for this is that there are several features in these performance criteria that are highly correlated. For example, camera (capability) is highly associated with extendable memory (extendibility), which allows users to store photos. Extendable memory is also correlated to movies and MP3 player (entertainment) because storing movies and music on the phone requires a bigger capacity of memory.

Therefore, mobile phone features of extendibility and entertainment were integrated into Capability in order to make each of the performance criteria independent. The new performance criterion of capability is shown in Table 3.31.

Table 3.31 The new capability features list

Features	Description
Camera	Allow users to take photos by using the mobile phone.
Video Call	Allow users to make 2-way face to face conversations.
Video Camera	Allow users to record a video by using the mobile phone.
Document Viewer	Allow users to open and edit Word, Excel and/or PDF file.
Voice Recorder	Allow users to record voice.
HTML	Allow users to browse the Internet by using their mobile phones.
MP3 Player	Allow users to listen to music in MP3 format.
FM Radio	Allow users to listen to the FM Radio.
Movies	Allow users to watch movies on the phone.
Game	Allow users to play a game on the phone.
Multi-Media Message	Allow users to send/receive photo and short sound media.
USB	Allow users to connect the phone with a computer.
External Memory	Allow users to extend the memory of the phone.
Head phone port	Allow users to insert earphones.
PC Synchronization	Allow users to synchronise their phones with a computer.

Table 3.32 Descriptive statistics of criteria performance feature comparison

	Mean	Std. Deviation	N
Capability	3.56	1.08	105
Flexibility	4.36	.77	105
Connectivity	2.99	.68	105
Usability	2.84	.40	105
Reliability	2.87	.47	105

Table 3.33 Correlation of performance criteria feature ratings

		Capability	Flexibility	Connectivity	Usability	Reliability
Capability	Pearson Correlation	1	.403**	.731**	.395**	.210
	Sig. (2-tailed)		.000	.000	.000	.057
Flexibility	Pearson Correlation	.403**	1	.284**	.180	.282**
	Sig. (2-tailed)	.000		.009	.103	.010
Connectivity	Pearson Correlation	.731**	.284**	1	.397**	.130
	Sig. (2-tailed)	.000	.009		.000	.241
Usability	Pearson Correlation	.395**	.180	.397**	1	.401**
	Sig. (2-tailed)	.000	.103	.000		.000
Reliability	Pearson Correlation	.210	.282**	.130	.401**	1
	Sig. (2-tailed)	.057	.010	.241	.000	

**. Correlation is significant at the 0.01 level (2-tailed).

As shown in Table 3.33, after integrating entertainment and extendibility into the capability criteria, each performance criterion has now become independent from each other. Therefore, a reliable mobile phone selection system in which all performance criteria are independent from each other has been developed.

3.3 Research design

A randomised block experimental design was chosen for this study. There were three support systems for the user in this experiment. These support methods included (A) Mobile phone catalogue, (B) Mobile phone properties with descriptions, and (C) Mobile phone properties, performance criteria and descriptions.

3.3.1 Mobile phone support system

Selection support method A: Mobile phone description

1. At the beginning, people will be asked to click “START” to initiate the mobile phone selection system, as shown in Figure 3.5.

Figure 3.5 Homepage of selection support method A

2. System A will represent all the models of mobile phones for the user to select, as shown in Figure 3.6.

Figure 3.6 Example of search results

3. When user the clicks on any particular model of phone, the full specification will be listed, as shown in Figure 3.7.

Figure 3.7 Example of the specification page

Selection support method B: Mobile phone properties and descriptions

1. At the beginning, people will be asked to click “START” to initiate the mobile phone selection system as shown in Figure 3.8.

Figure 3.8 Homepage of selection support method B

2. In the next page, people will be asked to select their desired mobile phone properties, as shown in Figure 3.9.

Figure 3.9 Example of mobile phone properties page

3. The result will come up based on the user's selection, as shown in Figure 3.10.

Figure 3.10 Example of search results

4. If people would like to see more specifications of a particular phone, they can click on “Specification” and the page will come up as shown in Figure 3.11.

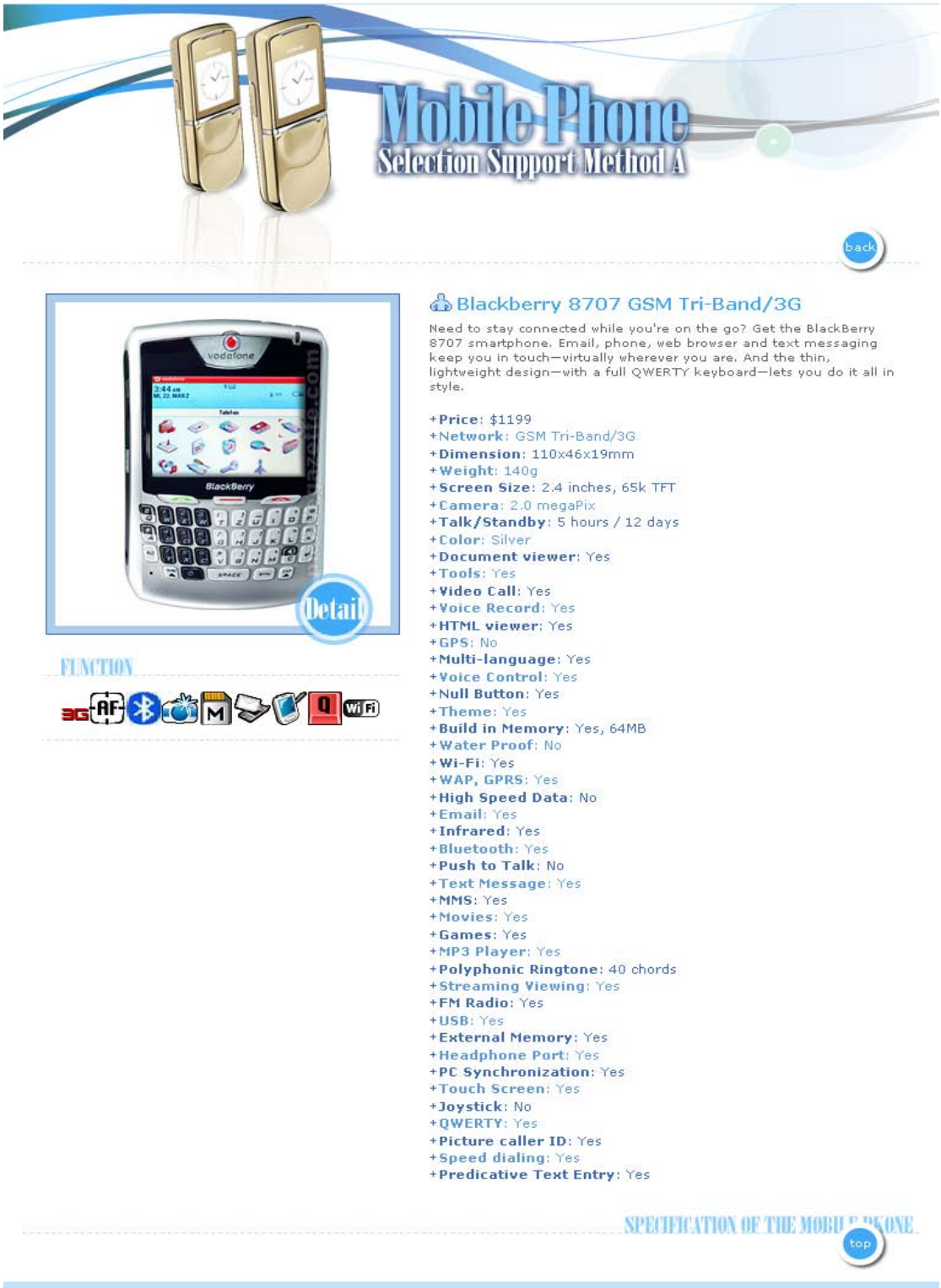


Figure 3.11 Example of the specification page

Selection support method C: Mobile phone properties, performance criteria and descriptions

1. As with systems A and B, people will be asked to click “START” to initiate the mobile phone selection system, as shown in Figure 3.12.

Figure 3.12 Homepage of system C

2. In the next page, people will be asked to select the mobile phone conditions and the level of importance of 5 different aspects (as shown in Figure 3.13).

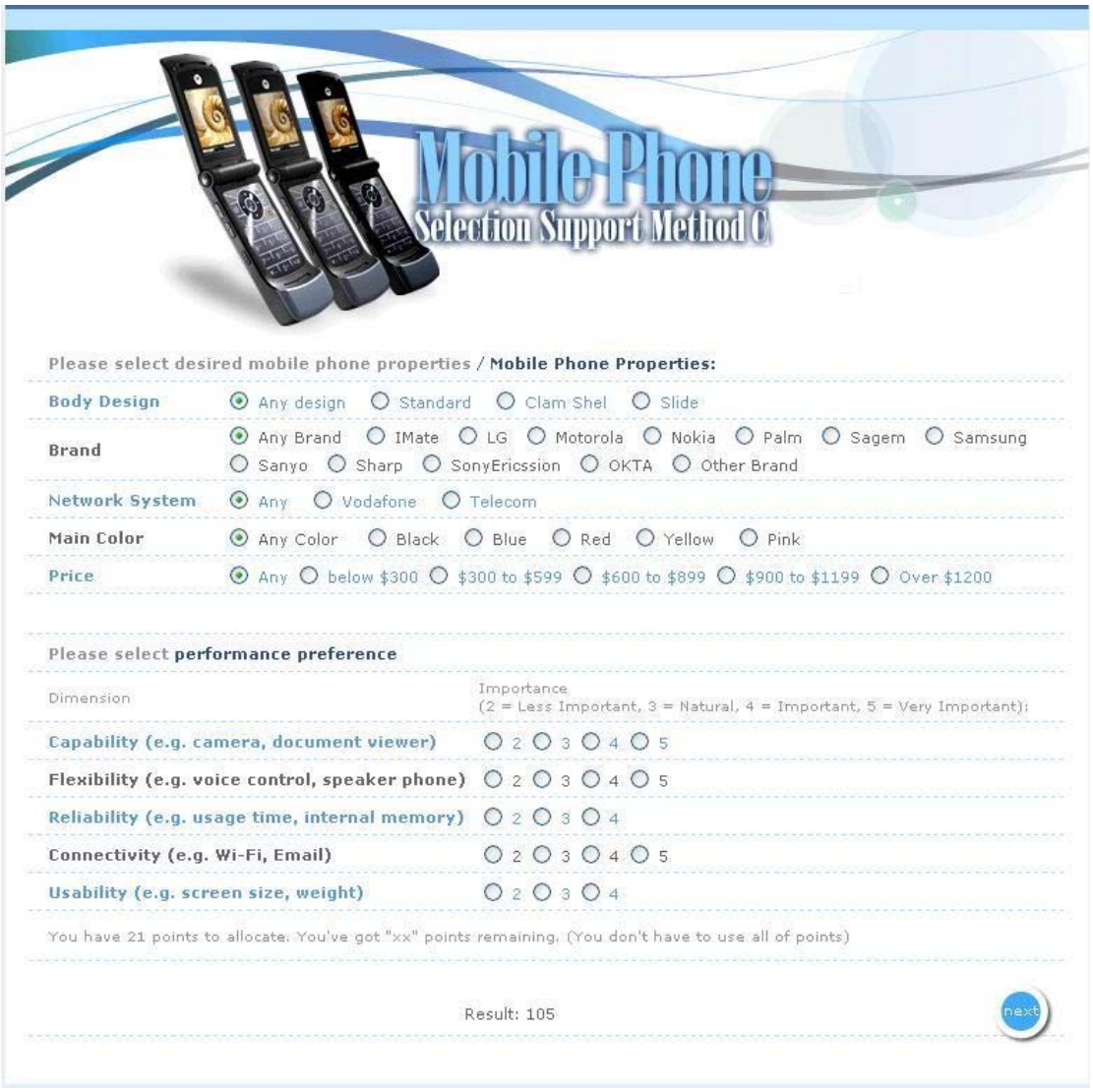


Figure 3.13 Properties and performance criteria page of system C

3. The result will come up based on the user's selection as shown in Figure 3.14.

Figure 3.14 Example of search results

4. When people click on "Specification" under any particular phone, a full list of mobile phone features and rating scores will be displayed, as shown in Figure 3.15.

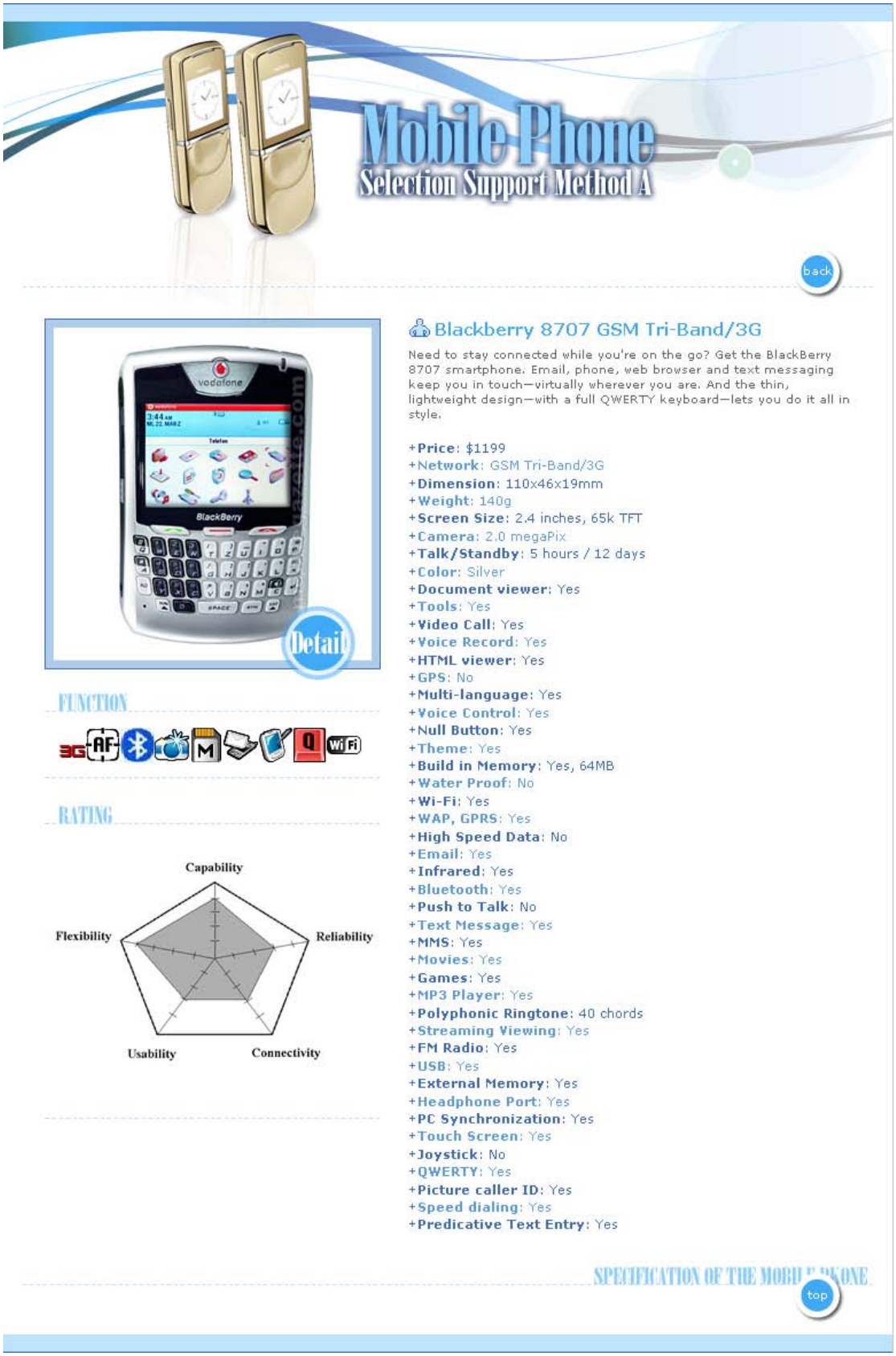


Figure 3.15 Specification of a mobile phone

3.3.2 Variables

As mention in previous chapter (section 2.7 and 2.8), the dependent and independent variable of this experiment as shown followed:

Dependent variable:

The independent variable is user's satisfaction with the online selection process for choosing a mobile phone.

Independent variable:

The independent variable is supporting for online selection of a mobile phone, with three levels of support as follows:

A. Mobile phone catalogue and description only.

B. Support A, plus selection by mobile phone properties.

C. Support B, plus selection by performance criteria.

The control for this experiment was the selection support method A. This provided a baseline for support, which many presented a description of the mobile phones. Selection support methods B and C were the main treatments as they explored, additional aspects of online support.

3.3.3 Subject Sample

Thirty males and thirty females from Massey University were selected to participate in the experiment. The reason that students were selected as subject sample was because they were more interesting in mobile phones rather than other age of society. These sixty subjects were divided into three groups. Each group of subjects would use one of the three supporting methods, which was randomly assigned using a random table. The

following question was used to estimate mobile phone experience levels of subjects:

How many phone have you bought in previous 5 years*?* ☐ None ☐ 1 ☐ 2 ☐ 3
☐ more than 3 _____

Random selection was used to pick the subjects. For example, every third person who came to the lab would be selected. The support method assigned to each subject was picked up by using random number. The resulting same demographics (see section 4.1 for more details) suggest that these subjects are experienced mobile phone users and nearly fifty percent were at the time considering to buy a new mobile phone.

3.3.4 Task

Subjects would assume that they were customers in a mobile phone shop and that they wished to select their next mobile phone. Their task was to select a mobile phone that they are satisfied with using supporting system.

3.3.5 Procedure

1. **Introduction:**

   People were selected to participate in the experiment. They were then asked to sign the consent form and were asked to complete a simple background questionnaire.

2. **Criterion understanding**

   Subjects were given the definition of each criterion (mobile phone feature), and asked to rate the explanatory statements. This phase was designed to ensure that subjects understood the criteria.

3. **Experiment:**

   Subjects evaluated their preference of mobile phone features by using the online

based mobile phone selection system.

4. **Outcome evaluation:**

   Subjects were asked to fill in the post-test questionnaires. Final results were collected after the experiment.

3.3.6 Questionnaire design

In this study, Davis's (1989) questionnaires were used in order to measure the overall satisfaction for three supporting methods by the following aspects: efficiency, usefulness, ease of selection and ease of use. The questionnaire was used the following seven questions to measure the satisfaction score for each selection support method (see Appendix E for more details):

1. Software Performance

Q1. Efficiency: This software would enable me to choose a phone more quickly.

Q2. Usefulness: I would find this software is useful in my mobile phone selection.

Q3. Ease of selection: Using this software would make my mobile phone selection easier.

Q4. Ease of use: I would find this software easy to use.

Q5. Satisfaction: Overall, I am satisfied with this software.

2. Confidence and Intention

Q6. Confidence: How confident are you that you have selected a good mobile phone for you?

Q7. Intention to use again: I would like to use this method for selecting my mobile phone in the future.

Chapter 4: Results

4.1 User background

There were 30 males and 30 females that participated in the experiment. At the time of the experiment 52 subjects were using only one mobile phone, and 8 of them were using two mobile phones. As shown in Figure 4.1, 18 subjects were highly frequent mobile phone users (bought over 5 mobile phones over the previous 5 years). 20 subjects were frequent mobile phone users (bought 4 to 5 mobile phones over the previous 5 years) and 22 were moderate experience mobile phone users (bought 1 to 3 mobile phones over the previous 5 years). As shown in Figure 4.2, 7 subjects were looking to buy a new mobile phone, 22 subjects wished to buy a new mobile phone and 31 of them did not want to buy a new mobile phone. All users had bought at least one phone (i.e. none of the subjects had no experiences).

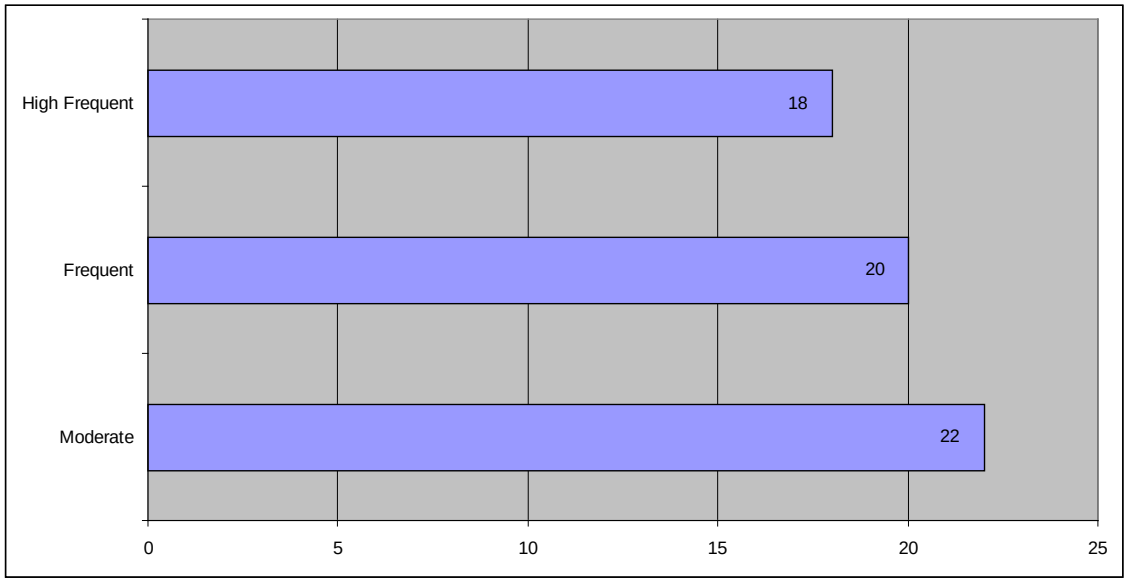


Figure 4.1 Experience levels of mobile phone users

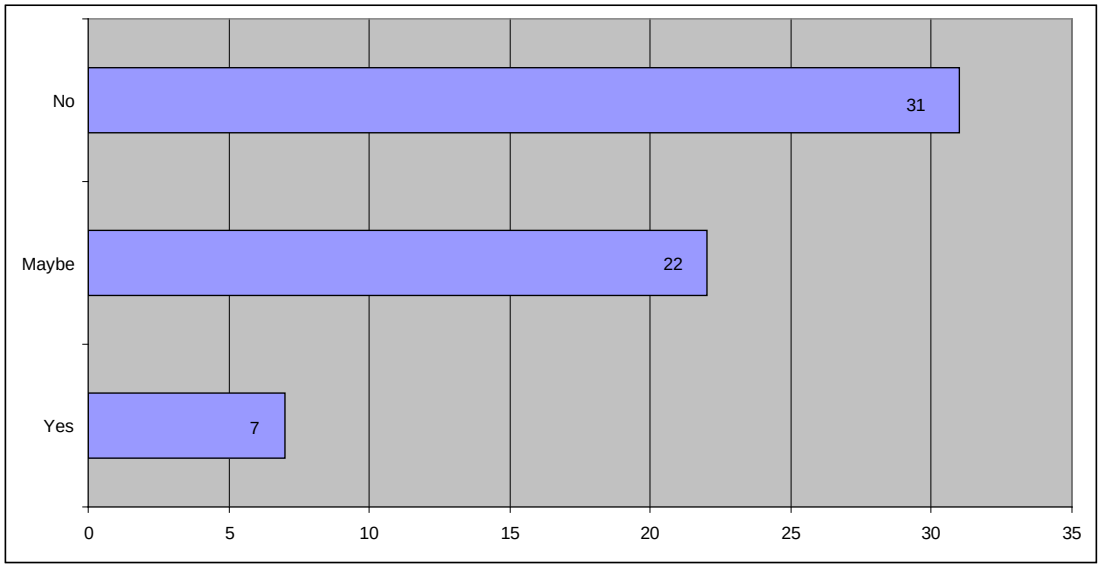


Figure 4.2 Are you currently looking to buy a new mobile phone?

4.2 Mobile phone properties

Mobile phone properties are simple features of the mobile phone. There were five properties that were used in selection support methods B and C. These mobile phone properties were: body design, brand, network system, main colour and price, with options as follows:

1. **Body Design**: standard, clam shell, and slider
2. **Brand**: Imate, LG, Motorola, Nokia, Palm, OKTA, Samsung, Sagem, Sanyo, Sharp, SonyEricsson, Other brand
3. **Network System**: Vodafone, Telecom
4. **Main Colour**: black, blue, red, yellow, pink
5. **Price**: below $300, $300-$599, $600-$899, $900-$1199, over $1200

There were forty people that participated using the selection support methods B and C. Subjects were asked to select their favourite mobile phone properties. Subjects who left the property set at the default option (e.g. “any”) were counted as taking that property as zero in the use frequency for that property. Subjects who left the property set to other

options than the default (e.g. “clam shell” under body design) were counted as taking that property as one in the use frequency for that property. For example, if subject A selected “clam shell”, this was counted as 1 for the use frequency of the body design property, but if he/she selected “Any” that would be counted as 0. The results of the mobile phone properties use frequencies are shown in Figure 4.3.

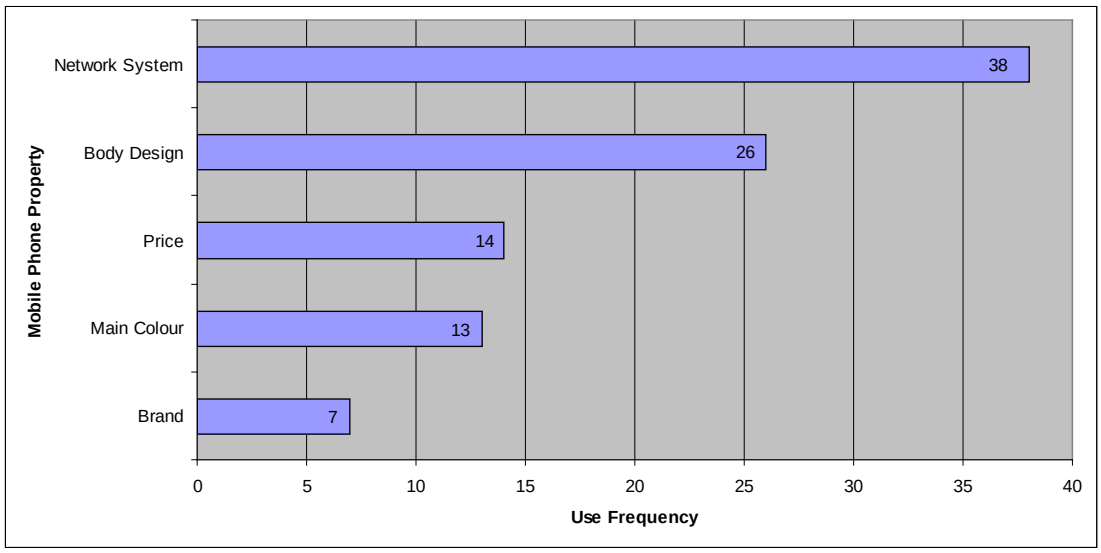


Figure 4.3 Use frequencies by phone property

As shown in Figure 4.3, network system had the highest property use frequency (38) which means that 95% of subjects used this property to select their desired mobile phone. Body design had the second highest property use frequency (26). Price and main colour showed a 35% of property use frequency. Only 18% of subjects (7 property use frequencies) used brand property.

Overall, subjects were more concerned with network system (95% of property use frequencies) and body design (65% of property use frequencies) than other properties. Price and main colour showed 35% property use frequencies. Brand had the lowest property use frequency which indicates that the subjects were less concerned with the brand when they are selecting a mobile phone.

4.2.1 Gender differences

As shown in Figure 4.4, both males and females have the same property use frequencies for network system. Females have higher property use frequencies in body design, main colour and price than males. In contrast, males have higher property use frequencies with brand than females.

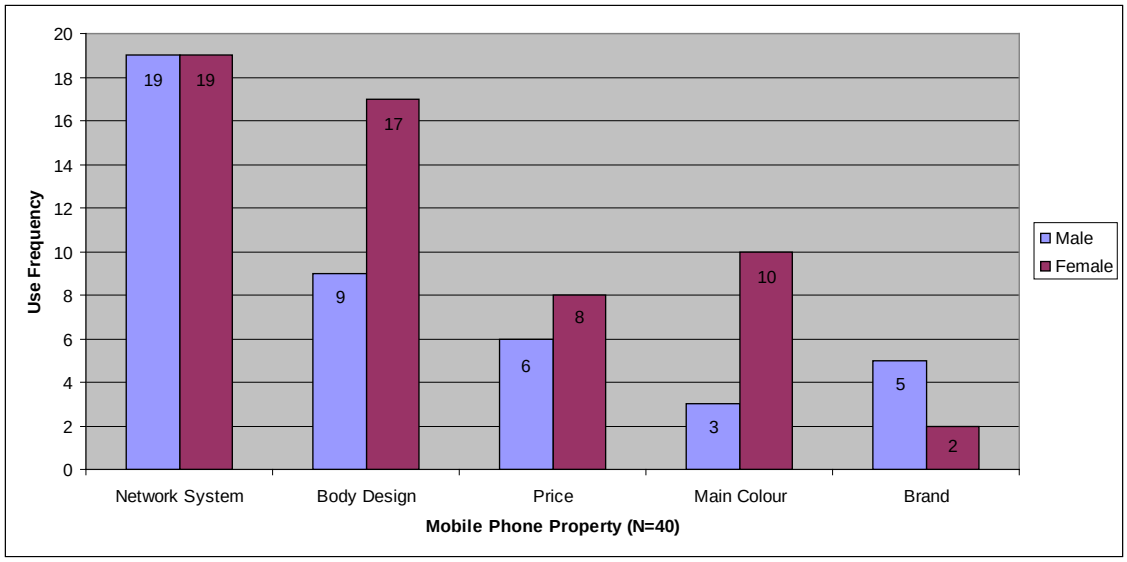


Figure 4.4 Use frequencies by phone property by gender

The chi-square test of independence was used to test the statistical significance in the differences between genders.

Table 4.1 Chi-square test by gender differences

Property	**Pearson Chi-Square**
Network System	p = 1 (Not Significant)
Body Design	p = 0.008 (Significant)
Price	p = 0.507 (Not Significant)
Main Colour	p = 0.018 (Significant)
Brand	p = 0.212 (Not Significant)

The chi-square test (as shown in Table 4.1) suggests that both males and females have the same point of view about network system, price, and brand ($p > 0.05$). Females were

more concerned with both body design ($p < 0.05$) and main colour ($p < 0.05$) than males.

4.2.2 Experience level differences

As shown in Figure 4.5, all levels of experience users have the same property use frequencies for network system. In the body design section, both frequent and moderate level experience users have higher property use frequencies than high frequent level experience users. In the price section, moderate level experience users have slightly higher property use frequencies than frequent and high frequent level experience users. In the main colour section, both frequent and moderate level experience users have higher property use frequencies than high frequent level experience users. In the brand section, high frequent level experience users have higher property use frequencies than frequent and moderate level experience users.

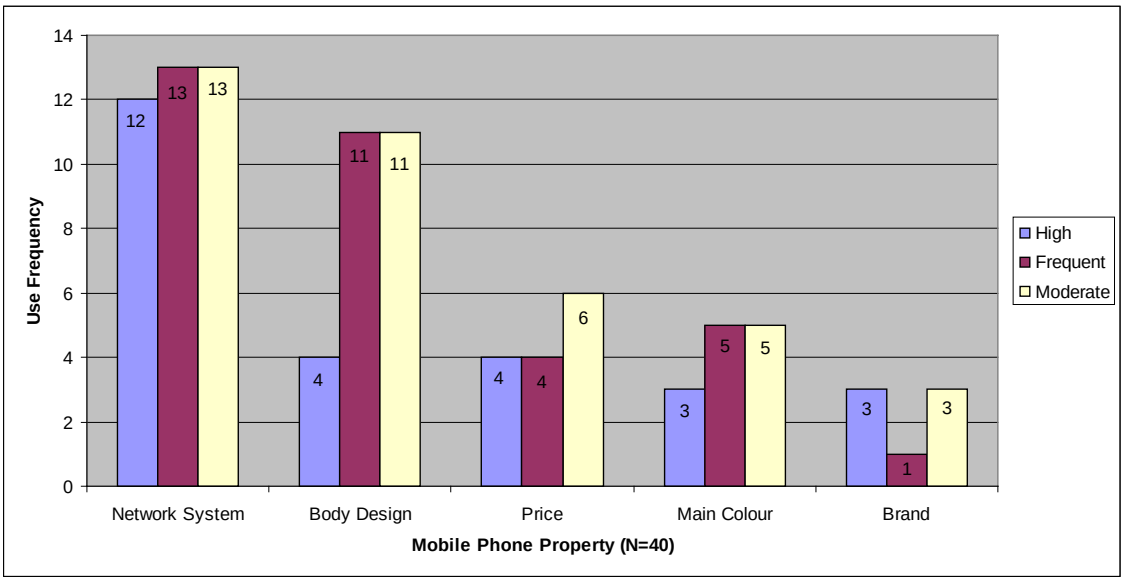


Figure 4.5 Use frequencies by phone property by experience level

The chi-square test of independent was used to test the statistical significance in the differences for experience levels.

Table 4.2 Chi-square test by experience differences

Property	**Pearson Chi-Square**
Network System	p = 0.173 (Not Significant)
Body Design	p = 0.019 (Significant)
Price	p = 0.770 (Not Significant)
Main Colour	p = 0.553 (Not Significant)
Brand	p = 0.374 (Not Significant)

The chi-square test (as shown in Table 4.2) suggests that there was no significant difference for network system, price, main colour and brand ($p > 0.05$). There was significant difference for body design ($p < 0.05$) that suggest that both frequent and moderate level of experience users were more concerned with body design than high frequent experience users.

4.3 Criteria importance ratings

Mobile phone criteria are made up of complex mobile phone features. There are approximately 60 features for mobile phones in the current market. In this research, these 60 mobile phone features are divided into five criteria, which include capability, flexibility, connectivity, usability and reliability (See Appendix D for more details). Sixty subjects were asked to rate the importance of the five mobile phone performance criteria. Results of overall criteria ratings are shown in the following section:

The average ratings of subjects' criteria importance are shown in Table 4.3. A paired-sample t-test was used to test the significant difference for all criteria (as shown in Table 4.4).

Table 4.3 Criteria importance ratings

Criteria	N	Mean	Std. Deviation
Reliability	60	5.37	0.84
Capability	60	4.92	1.17
Flexibility	60	4.73	1.21
Usability	60	4.40	1.39
Connectivity	60	4.13	1.51

According to Table 4.3, Reliability showed the highest average rating (5.37). Capability (4.92) and flexibility (4.73) were also important factors for subjects but their ratings were slightly lower than reliability. Usability (4.40) and connectivity (4.13) showed lower rating scores compared to other criteria. This suggests that subjects do distinguish the difference in performance criteria.

A paired-sample t-test was used (the same 60 subjects rated of the each criteria) to compare these five criteria.

Table 4.4 Paired-sample t-test for criteria importance

Comparisons	Sig. (2-tailed)
Reliability versus Capability	0.013 (Sig,)
Reliability versus Flexibility	0.000 (Sig,)
Reliability versus Usability	0.000 (Sig.)
Reliability versus Connectivity	0.000 (Sig.)
Capability versus Flexibility	0.291 (Not Sig,)
Capability versus Usability	0.003 (Sig,)
Capability versus Connectivity	0.000 (Sig.)
Flexibility versus Usability	0.067 (Not Sig.)
Flexibility versus Connectivity	0.004 (Sig.)
Usability versus Connectivity	0.175 (Not Sig,)

According to Table 4.4, the all the paired comparisons showed significant differences except for pair of capability versus flexibility, flexibility versus usability and usability

versus connectivity. The paired-sample t-test suggests that there were no statistically significantly different results between capability and flexibility, flexibility and usability, and usability and connectivity.

Overall, we can see that reliability was the most important factor when they select mobile phones. Capability and flexibility were important factors but slightly less important compared to reliability. Usability and connectivity showed lower rating scores compared to other criteria.

Results of overall criteria ratings and gender differences on criteria ratings are shown in the following sections 4.3.1 and 4.3.2.

4.3.1 Gender differences

The average ratings of the subjects for the five criteria are listed in Table 4.5. A Kruskal Wallis test was used to test the statistical significance of the differences between genders (as shown in Table 4.6).

Table 4.5 Criteria importance ratings by gender

		Mean (S.D.)	
Criteria	**N**	**Male**	**Female**
Capability	60	5.27 (1.11)	4.57 (1.14)
Flexibility	60	4.77 (1.04)	4.70 (1.37)
Connectivity	60	4.73 (1.39)	3.53 (1.41)
Usability	60	4.83 (1.23)	3.97 (1.43)
Reliability	60	5.50 (0.57)	5.23 (1.04)

According to Table 4.5, males have the higher ratings than females for all criteria. Capability, connectivity and usability showed larger rating differences and flexibility and reliability showed minor rating differences between males and females. This suggests that males were more concerned about capability, connectivity and usability

than females.

The Kruskal Wallis test was used to test the statistical significance in the differences between genders. A Kruskal Wallis test is a non-parametric method for comparing several independent random samples. In this case, the null hypothesis was that males and females would have the same importance ratings in all criteria.

Table 4.6 Kruskal Wallis chi-square by gender differences

Criteria	Capability	Flexibility	Connectivity	Usability	Reliability
P-Value	0.025	0.823	0.002	0.02	0.315

The Kruskal Wallis test suggests that capability, connectivity, and usability are significantly different (as shown in Table 4.6), so the null hypothesis was rejected. In contrast, the Kruskal Wallis chi-square suggests that flexibility and reliability are not significantly different, so the null hypothesis was not rejected.

Overall, males were more concerned about capability (M: 5.27 versus F: 4.57), Connectivity (M: 4.73 versus F: 3.53) and usability (M: 4.83 versus F: 3.97) criteria than females. Flexibility and reliability showed no statistically significantly different results between males and females, which suggests that males and females have similar point of views in flexibility (M: 4.77 versus F: 4.70) and reliability (M: 5.50 versus F: 5.23).

4.3.2 Experience level differences

Subjects in this experiment were categorised into three experience levels: high frequent (more than 6 mobile phones), frequent (4 to 5 mobile phones) and moderate (1 to 3 mobile phones). There were 18 high frequent experience users, 20 frequent experience users and 22 moderate experience mobile phone users. These subjects were asked to rated the importance of each criterion.

Table 4.7 Criteria importance ratings by experience level

Criteria	**Experience Level (Mean/S.D.)**		
	High Frequent (N=18)	**Frequent (N=20)**	**Moderate (N=22)**
Capability	5.39 (1.14)	4.60 (1.23)	4.82 (1.05)
Flexibility	5.00 (1.03)	4.70 (1.38)	4.55 (1.18)
Connectivity	4.78 (1.31)	3.75 (1.45)	3.95 (1.62)
Usability	4.89 (1.13)	4.10 (1.33)	4.27 (1.58)
Reliability	5.50 (0.71)	5.25 (0.97)	5.36 (0.85)

High frequent experience users had higher ratings than frequent and moderate experience users for all criteria, according to Table 4.7. The differences of average ratings between frequent and moderate experience users were quite small. A Kruskal Wallis test was used to test the statistically significant differences for experience levels (as shown in Table 4.8). The null hypothesis was that there would be no rating differences between high frequent, frequent and moderate experience users in all criteria.

Table 4.8 Kruskal Wallis chi-square by experience differences

Criteria	Capability	Flexibility	Connectivity	Usability	Reliability
P-Value	0.133	0.539	0.08	0.188	0.899

The Kruskal Wallis test suggests that there was no significant difference for any of the criteria. The null hypothesis was not rejected.

Overall, there was no difference in results between the different experience levels of mobile phone users when they were rating the importance of all criteria.

4.4 Selection support method results

There were seven questions were used to measure the satisfaction score for each selection support method (as shown in section 3.3.6). This section addresses the effects of selection support method. The following results show subjects' responses to the three selection support methods for each of the above questions. The Krusakal Wallis test was used because of large differences in variance between the three selection support methods. Afterwards, an independent sample T-test was used to compare the differences among the three selection support methods.

Q1. Efficiency: This software would enable me to choose a phone more quickly.

Table 4.9 Efficiency by selection support method

Selection Support	N	Mean (S.D.)
A	20	3.25 (1.12)
B	20	6.25 (0.55)
C	20	5.70 (1.54)

The average efficiency scores for the three mobile phone selection methods are shown in Table 4.9. Selection support method A showed the lowest average score (3.25), and selection support method B showed the highest average score of 6.25. The average satisfaction score of selection support method C (5.70) was higher than for selection support method A but slightly lower than method B.

A Kruskal Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same efficiency average scores.

Table 4.10 Kruskal Wallis test for Efficiency

	Efficiency
Chi-Square	40.37
df	2
Asymp. Sig.	.000

According to Table 4.10, these values indicate that the differences between the three selection supports (A, B and C) were statistically significant ($p < 0.05$). Therefore, H_0 was rejected, which means that the average efficiency score of the three selection support methods were not the same. As the Kruskal Wallis test suggested that the differences between the three selection support methods were statistically different, an independent sample T-test was used to measure the statistical significance of the differences between these three selection support methods.

Table 4.11 T-test for Efficiency differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		t	df	Sig. (2-tailed)	F	Sig.
Efficiency	Equal variance assumed	2.871	38	0.007	0.415	0.524
	Equal variance not assumed	2.871	36.863	0.007		

From the results shown in Table 4.11, the t-value of 2.871 with 38 degrees of freedom indicates a statistically significant difference ($p < 0.05$) between the average efficiency scores for selection support method B and selection support method C. Therefore, method B had statistically significantly higher average efficiency scores (6.25) than selection support method C (5.7).

Table 4.12 T-test for Efficiency differences between methods A and B

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		t	df	Sig. (2-tailed)	F	Sig.
Efficiency	Equal variance assumed	-10.767	38	0.000	5.527	0.024
	Equal variance not assumed	-10.767	27.691	0.000		

According to Table 4.12, a significant difference existed ($p < 0.05$) between selection support methods A and B. The results indicate that selection support method B had a statistically significantly higher average efficiency scores (6.25) than selection support method A (3.25).

Table 4.13 T-test for Efficiency differences between methods A and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		t	df	Sig. (2-tailed)	F	Sig.
Efficiency	Equal variance assumed	-8.449	38	0.000	3.422	0.072
	Equal variance not assumed	-8.449	30.723	0.000		

An independent sample t-test suggests (as shown in Table 4.13) that there was a significant difference ($p < 0.05$) between selection support methods A and C. This means that selection support method C had a statistically significantly higher average efficiency score (5.70) than selection support method A (3.25).

Overall, the highest average efficiency score was that of selection support method B (6.25). The second highest efficiency score was that of selection support method C (5.70) and selection support method A showed the lowest efficiency score (3.25).

H1. Online mobile phone selection support method affects selection time – ***supported****.*

Q2. Usefulness: I would find this software useful in my mobile phone selection.

Table 4.14 Usefulness by selection support method

Selection Support	**N**	**Mean (S.D.)**
A	20	3.75 (0.97)
B	20	6.05 (0.51)
C	20	6.10 (0.55)

The average usefulness scores for the three mobile phone selection methods are shown in Table 4.14. Selection support method A showed the lowest average score, and

selection support methods B and C showed the higher average score than method A

.

A Kruskal Wallis test was used to test the statistical significance of differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same average score in usefulness.

According to Table 4.15, these values indicate that the differences between the three selection supports methods (A, B and C) were statistically significant ($p < 0.05$). Therefore, the null hypothesis was rejected, which means that the average usefulness scores of the three selection supports methods were not the same.

Table 4.15 Kruskal Wallis test for Usefulness

	Userfulness
Chi-Square	42.220
df	2
Asymp. Sig.	.000

As the Kruskal Wallis test suggested that the difference between these three selection support methods were statistically different, an independent sample t-test was used to measure the statistical significance of the differences between the three selection support methods.

Table 4.16 T-test for Usefulness differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		t	df	Sig. (2-tailed)	F	Sig.
Usefulness	Equal variance assumed	1.881	38	0.068	3.430	0.072
	Equal variance not assumed	1.881	35.812	0.068		

The t-test shown in Table 4.16 does not show a significant difference ($p = 0.068$, $p > 0.05$) between the average usefulness score for selection support method B and selection

support method C. The null hypothesis was not rejected.

Due to the similarity of selection support methods B and C, the average scores of BC were used to be compared with selection support method A by using a t-test to examine the statistical significance of the differences.

Table 4.17 T-test for Usefulness differences between methods A and BC

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		t	df	Sig. (2-tailed)	F	Sig.
Usefulness	Equal variance assumed	-10.510	38	0.000	20.233	0.000
	Equal variance not assumed	-10.510	26.685	0.000		

The t-test shown in Table 4.17 shows a significant difference existed ($p < 0.05$) between selection support methods A and BC. The results revealed that selection support methods BC had statistically significantly higher average scores on usefulness (6.25) than selection support method A (3.25).

Overall, the selection support methods B and C were both useful for subjects. Selection support method A showed the lowest usefulness score compared to selections B and C.

H2. Online mobile phone selection support method affects perceived usefulness- ***supported***.

Q3. Ease of selection: Using this software would make my mobile phone selection easier.

Table 4.18 Ease of selection by selection support method.

Selection Support	**N**	**Mean (S.D.)**
A	20	3.30 (0.98)
B	20	6.10 (0.55)
C	20	5.35 (0.67)

The average scores for Ease of selection for the three mobile phone selection methods

are shown in Table 4.18. Selection support method A showed the lowest average score and selection support method B showed the highest average score.

A Kruskal-Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same average score on Ease of selection.

Table 4.19 Kruskal Wallis test for Ease of selection

	Ease of selection
Chi-Square	40.416
df	2
Asymp. Sig.	.000

According to Table 4.19, the Kruskal Wallist chi-square suggests that the differences between the three selection support methods were statistically significant ($p < 0.05$). Therefore, the null hypothesis was rejected, which means that the average ease of selection scores for the three selection support methods were not the same. Afterwards, an independent sample t-test was used to measure the statistical significance of the differences between the three selection supports.

Table 4.20 T-test for Ease of Selection differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Ease of Selection	Equal variance assumed	3.859	38	0.000	2.581	0.116
	Equal variance not assumed	3.859	36.654	0.000		

The t-test shown in Table 4.20 indicates a significant difference ($p < 0.05$) between the average score for selection support method B and selection support method C.

Table 4.21 T-test for Ease of Selection differences between methods A and B

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Ease of Selection	Equal variance assumed	-11.142	38	0.000	4.461	0.041
	Equal variance not assumed	-11.142	29.993	0.000		

According to Table 4.21, a significant difference existed ($p < 0.05$) between selection support methods A and B which indicate that selection support method B had a statistically significantly higher average score on ease of selection than selection support method A.

Table 4.22 T-test for Ease of Selection differences between methods A and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Ease of Selection	Equal variance assumed	-7.727	38	0.000	1.012	0.321
	Equal variance not assumed	-7.727	33.624	0.000		

According to Table 4.22, a significant difference existed between selection support methods A and C, which means that the selection support method C had a statistically significantly higher average score on ease of selection than selection support method A.

Overall, the highest average score on ease of selection section was of selection support method B. The second highest score was of selection support method C and selection support method A showed the lowest score.

H3. Online mobile phone selection support method affects perceived an ease of selection process- ***supported***.

Q4. Ease of use: I would find this software easy to use.

Table 4.23 Ease of use by selection support method

Selection Support	N	Mean (S.D.)
A	20	6.25 (0.55)
B	20	6.35 (0.59)
C	20	5.65 (0.93)

The average scores of Ease of use for the three mobile phone selection methods are shown in Table 4.23. Selection support method C showed the lowest average score and selection support methods A and B showed the highest average score.

A Kruskal-Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same average score for Ease of use.

Table 4.24 Kruskal Wallis test for Ease of use

	Ease of use
Chi-Square	8.734
df	2
Asymp. Sig.	.013

According to results of the Kruskal Wallist test (as shown in Table 4.24), the differences between the three selection support methods were statistically significant. Therefore, the null hypothesis was rejected. An independent sample t-test was used to measure the statistical significance of the differences between three selection support methods.

Table 4.25 T-test for Ease of use differences between methods A and B

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Ease of use	Equal variance assumed	-0.556	38	0.582	0.655	0.423
	Equal variance not assumed	-0.556	37.840	0.582		

The t-test shown in Table 4.25 indicates a statistically insignificant difference ($p = 0.582$, $p > 0.05$) between the average score on Ease of use for selection support method A and selection support method B.

Due to the similarity of selection support methods A and B, the average scores of methods AB were used to compare with selection support method C by using a t-test to examine the significance of the differences.

Table 4.26 T-test for Ease of use differences between methods AB and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Ease of use	Equal variance assumed	2.782	38	0.008	3.598	0.065
	Equal variance not assumed	2.782	28.060	0.010		

Table 4.26 shows a statistically significant difference ($p = 0.008$, $p < 0.05$) between the average score on Ease of use for selection support method C and selection support methods AB.

Overall, the highest average scores on ease of use section were for selection support methods A and B. Selection support method C showed the lowest scores (5.35).

H4. Online mobile phone selection support method affects perceived an ease to use software system- ***supported.***

Q5. Satisfaction: Overall, I am satisfied with this software.

Table 4.27 Satisfaction by selection support method

Selection Support	N	Mean (S.D.)
A	20	4.00 (0.65)
B	20	6.05 (0.51)
C	20	5.95 (0.80)

The average satisfaction scores for three selection support methods are shown in Table 4.27. Selection support method A showed the lowest average score and selection support method B showed the highest average score.

A Kruskal-Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same satisfaction average score.

Table 4.28 Kruskal Wallis test for Satisfaction

	Satisfaction
Chi-Square	39.815
df	2
Asymp. Sig.	.000

According to Table 4.28, these values indicate that the differences between the three selection support methods were statistically significant ($p < 0.05$). Therefore, the null hypothesis was rejected. An independent sample t-test was used to measure the statistical significance of the differences between the three selection support methods.

Table 4.29 T-test for Satisfaction differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Satisfaction	Equal variance assumed	0.489	38	0.628	1.495	0.229
	Equal variance not assumed	0.489	33.263	0.628		

Table 4.29 indicates a statistically insignificant difference ($p = 0.628$, $p > 0.05$) between the average satisfaction scores for selection support method B and selection support method C. Therefore the average satisfaction scores between selection support methods B and C were the same.

Due to the similarity of the scores for selection support methods B and C, the average satisfaction scores of methods BC were used to be compared with selection support method A by using an independent sample t-test to examine the significance of the differences.

Table 4.30 T-test for Satisfaction differences between methods A and BC

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Satisfaction	Equal variance assumed	-11.831	38	0.000	0.194	0.662
	Equal variance not assumed	-11.831	35.330	0.000		

The t-test shown in Table 4.30 indicates a statistically significant difference ($p < 0.05$) between the average satisfaction scores for selection support method A and selection support methods BC.

Overall, selection support methods B and C both had the highest satisfaction scores. Selection support method A showed the lowest satisfaction scores compared with selection methods B and C.

H5. Online mobile phone selection support method affects user satisfaction – ***supported****.*

Q6. Confidence: How confident are you that you have selected a good mobile phone for you?

Table 4.31 Confidence by selection support method

Selection Support	N	Mean (S.D.)
A	20	2.30 (0.73)
B	20	3.65 (0.75)
C	20	4.00 (0.72)

The average confidence scores for the three selection support methods are shown in Table 4.31. Selection support method A showed the lowest confidence score, and selection support methods B and C showed the higher confidence scores than method A.

A Kruskal-Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same confidence score.

Table 4.32 Kruskal Wallis test for Confidence

	Confidence
Chi-Square	30.630
df	2
Asymp. Sig.	.000

According to Table 4.32, the Krusakl Wallis test suggested that the differences between the three selection support methods were statistically significant ($p < 0.05$). Therefore, the null hypothesis was rejected. An independent sample t-test was used to measure the statistical significance of the differences between the three selection support methods.

Table 4.33 T-test for Confidence differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Confidence	Equal variance assumed	-1.505	38	0.141	2.669	0.111
	Equal variance not assumed	-1.505	37.973	0.141		

The t-test results shown in Table 4.33 which indicates that there is no statistically significant difference ($p = 0.141$, $p > 0.05$) between the average confidence scores for selection support method B and selection support method C.

Due to the similarity of the scores for selection support methods B and C, the average confidence score of methods BC were used to be compared with the scores for selection support method A by using an independent sample t-test to examine the significance of the differences.

Table 4.34 T-test for Confidence differences between methods A and BC

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Confidence	Equal variance assumed	-9.378	38	0.000	6.973	0.012
	Equal variance not assumed	-9.378	31.431	0.000		

According to Table 4.34 shows a statistically significant difference ($p < 0.05$) between the average confidence scores for selection support method A and selection support methods BC.

Overall, the selection support methods B and C were both the highest score on confidence. Selection support method A showed the lowest confidence score compared to selection methods B and C.

H6. Online mobile phone selection support method affects perceived confidence in the phone selected – ***supported****.*

Q7. Intention to use again: I would like to use this method for selecting my mobile phone in the future.

Table 4.35 Intention by selection support method

Selection Support	N	Mean (S.D.)
A	20	2.30 (0.73)
B	20	3.90 (0.72)
C	20	4.00 (0.56)

The average scores for intention to use again for the three selection support methods are shown in Table 4.35, where selection support method A showed the lowest average score compared to selection support methods B and C.

A Kruskal-Wallis test was used to test the statistical significance of the differences between the three selection support methods. In this case, the null hypothesis was that all selection support methods would have the same Intention score.

Table 4.36 Kruskal Wallis test for Intention

	Future attitude
Chi-Square	33.345
df	2
Asymp. Sig.	.000

According to Table 4.36, the Krusakl Wallis test suggests that the differences between the three selection support methods were statistically significant ($p < 0.05$). Therefore, the null hypothesis was rejected. An independent sample t-test was used to measure the statistical significance of the differences between the three selection support methods.

Table 4.37 T-test for Intention differences between methods B and C

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Future attitude	Equal variance assumed	-0.490	38	0.627	2.680	0.110
	Equal variance not assumed	-0.490	35.922	0.627		

According to Table 4.37, the t-value of 0.49 with 38 degrees of freedom indicates a insignificant differences ($p = 0.627$, $p > 0.05$) between the average scores of Intention for selection support method B and selection support method C.

Table 4.38 T-test for Intention differences between methods BC and A

		T-test for Equally of Means			Levene's Test for Euality of Variances	
		T	df	Sig. (2-tailed)	F	Sig.
Future attitude	Equal variance assumed	-9.438	38	0.000	0.320	0.575
	Equal variance not assumed	-9.438	34.376	0.000		

The t-test shown in Table 4.38 shows a significant difference ($p < 0.05$) between the average Intention scores for selection support method A and selection support methods BC.

Overall, the selection support methods B and C both the highest score for Intention. Selection support method A showed the lowest intention scores compared to selection methods B and C.

H7. Online mobile phone selection support method affects perceived willingness to use the software system in the future – ***supported****.*

In section 4.3.1, the results of gender preferences for the three selection support methods were tested by using Kruskal Wallis test. Section 4.3.2 shows the difference in preferences in the three selection support methods for the different levels of experience that users have with mobile phones. Section 4.3.3 shows the overall comments from subjects.

4.4.1 Gender differences

In the following sections, the results of gender preferences for the three selection

support methods are analyzed by taking the average scores of software performance (e.g. the total scores of Q1+Q2+…+Q5 divided by 5). A Kruskal Wallis test was used to test the statistical significance of the differences for the three selection support methods by gender.

Table 4.39 Software performance means by gender and selection support method

Software Performance	**Gender**	
	Male (N=10)	Female (N=10)
A	4.35 (0.74)	3.86 (0.38)
B	6.14 (0.51)	6.11 (0.26)
C	5.81 (0.25)	5.62 (0.73)

According to Table 4.39, males had higher ratings than females for all scores of software performance. Selection support method A showed the lowest score in both males (4.35) and females (3.86). Selection support method B showed the highest score (M: 6.14; F: 6.11). Selection support method C (M: 5.81; F: 5.62) was higher than method A, but slightly lower than method B.

A Kruskal Wallis chi-square was used to test the statistical significance of the differences between genders for each method (A, B and C). Therefore, the null hypothesis was that males and females would have the same score on software performance for all selection support methods.

Table 4.40 Kruskal Wallis chi-square by gender differences

Method	A	B	C
Chi-Square	1.884	0.013	0.575
df	1	1	1
Asymp. Sig.	0.17	0.908	0.448

A Kruskal Wallis chi-square (as shown in Table 4.40) suggests that the average scores for software performance are not significantly different for different genders, so the null

hypothesis was not rejected. There was no gender difference between the three selection support methods.

HB1. Gender affects the mobile phone selection support method preference - ***rejected****.*

4.4.2 Experience level differences

In the following sections, the results of gender preferences for the three selection support methods are analyzed by taking the average scores for software performance (e.g. the total scores of Q1+Q2+…+Q5 divided by 5). A Kruskal Wallis test was used to test the statistical significance of the differences between the three selection support methods for different experience levels.

Table 4.41 Software Performance means by experience and selection support method

Software Performance	**Experience Level**		
	High frequent	Frequent	Moderate
A	3.87 (0.35) (N=6)	4.09 (0.62) (N=7)	4.33 (0.80) (N=7)
B	5.98 (0.18) (N=5)	6.40 (0.36) (N=6)	6.02 (0.44) (N=9)
C	5.81 (0.35) (N=7)	5.56 (0.83) (N=7)	5.78 (0.29) (N=6)

The average software performance scores for the three selection support methods for the different experience levels are shown in Table 4.41. Selection support method A showed the lowest score in all experience levels (High frequent = 3.87, Frequent = 4.09, Moderate = 4.33). Selection support method B showed the highest score (High frequent = 5.98, Frequent = 6.4, Moderate = 6.02). Selection support method C (High frequent = 5.81, Frequent = 5.56, Moderate = 5.78) was higher than method A, but slightly lower than method B.

A Kruskal Wallis chi-square was used to test the statistical significance of the

differences between genders for each method (A, B and C). Therefore, the null hypothesis was that all experience levels of mobile phone users would have the same score on software performance in all selection support methods.

Table 4.42 Kruskal Wallis chi-square by experience differences

	A	B	C
Chi-Square	0.991	4.463	1.034
df	2	2	2
Asymp. Sig.	0.609	0.107	0.596

The Kruskal Wallis chi-square (as shown in Table 4.42) suggested that the average scores of software performance are not significantly different for different experience levels, so the null hypothesis was not rejected. There was no gender difference for the three selection support methods.

HB2. Experience level affects mobile phone selection support method preference- ***rejected****.*

4.4.3 Overall comments

There were 13 comments from subjects as shown in the following section:

Selection support method A:

A1. It has a very good user interface, but this website is not supportive for me to select the mobile phone.

A2. It would be better if mobile phone models can be displayed in categories such as different Brands.

Selection support method B:

B1. Pictures and texts should be bigger. Details should be split into 2 columns and website should be able to compare the phones.

B2. It is very ease to use and go through.

B3. It is very ease to go through by selecting the requirement I want. It saves me a lot of time to browse through all of the phones.

B4. I didn't know what the different "body design" were. It would be good to include pictures or descriptions. It would also be good to have the ability to pick two designs rather than just one (same as Brand).

Selection support method C:

C1. The mobile phone suggested from the system is exactly the one I've lost 3 month ago.

C2. Very good website, but it would be better to add more functions, like "comparison". Rating scales are really useful for knowing the differences between mobile phones.

C3. A little bit difficult to search the phone at the beginning, especially when selecting the rating score. However, I still get the phone I am happy with in the end.

C4. Rating scores of the phone is really useful for me to select the phone. However, it is a bit difficult to select the phone by selecting the scores. For example, when I selected 5 5 3 4 3, only 2 or 3 models of mobile phones were found.

C5. Very good support method, I really like it. The rating scale enables me to know the ability of the mobile phones.

C6. The layout is very simple, creative, and colorful. All these aspects make it a easy website to use. I like the idea that you can find a mobile phone that meets my needs without dealing with a sales person whose advice you might not trust because it the end of day they only want to make a sale.

Comments A1 and A2 suggest that selection support method A was not supportive and should be categorised as brand. Comments B2 and B3 suggest selection support method B was very easy to go through and useful for users selecting mobile phones. However, comment B1 suggests that the description of each mobile phone was too long and

should be displayed as two columns. Comment B4 suggests that select options for “body design” or “brand” should allow them to multi-select it (using a check box instead of a radio box). In selection support method C, comments C2, C5 and C6 suggest that subjects were happy with the rating scales for the mobile phones. However, comments C3 and C4 reveal that subjects found it difficult when they were selecting the performance criteria.

4.5 Summary

The results can be summarised into three sections:

1. Properties use frequency

Overall results suggest that subjects were more concerned network system and body design. There were 35% of subjects who would be concerned with price and main colour when they select a mobile phone. Brand had the lowest use frequency which indicates that the subjects were less concern with brand when they select a mobile phone.

In gender differences (as shown in Figure 4.4), both males and females had the same point of view about network system, price and brand. Females were more concerned with both body design and main colour than males.

In experience level differences (as shown in Figure 4.5), all level experience users had similar property use frequencies in all mobile phone properties sections except body design. Both frequent and moderate level experience users were more concerned with body design property than high frequent experience users.

2. Criteria importance rating

Overall results (as shown in Figure 4.5) suggest that reliability was the highest average rating. Connectivity and usability showed the lowest average ratings. Capability and flexibility showed moderate average rating score.

In gender differences, males were more concerned about capability, connectivity and usability than females. Males and females had equal points of view about flexibility and reliability.

For the different of experience levels of mobile phone users (as shown in Figure 4.6), results suggest there was no significant difference exists between mobile phone experience levels.

3. Selection support method

The results suggest that selection support method A showed a lower average score on efficiency, usefulness, ease of selection, satisfaction, confidence and intention compared to selection support methods B and C. However, selection support method A had higher average scores on ease of use compared to selection support method C, and also had similar average scores (no significant differences) compared with selection support method B (as shown in Table 4.43). Selection support methods B and C had similar average scores (no significant differences) on usefulness, ease of use, satisfaction, confidence and intention. However, selection support method C showed a lower average score on efficiency, ease of use, and ease of selection than selection support method A.

Table 4.43 Summary of statistics analysis (N = 60) (ns = not significant)

	Kurskal Wallis Test			Independent Sample T-test		
Question	A	B	C	B vs C	A vs B	A vs C
Efficiency: This software would enable me to choose a phone more quickly.	p < 0.05 (Sig.)			p < 0.05 (Sig.)	p < 0.05 (Sig.)	p < 0.05 (Sig.)
Usefulness: I would find this software is useful in my mobile phone selection.	p < 0.05 (Sig.)			p > 0.05 **(ns)**	p < 0.05 (Sig.)	p < 0.05 (Sig.)
Ease of selection: Using this software would make my mobile phone selection easier.	p < 0.05 (Sig.)			p < 0.05 (Sig.)	p < 0.05 (Sig.)	p < 0.05 (Sig.)
Ease of use: I would find this software easy to use.	p < 0.05 (Sig.)			p < 0.05 (Sig.)	p > 0.05 **(ns)**	p < 0.05 (Sig.)
Satisfaction: Overall, I am satisfied with this software.	p < 0.05 (Sig.)			p > 0.05 **(ns)**	p < 0.05 (Sig.)	p < 0.05 (Sig.)
Confidence: How confident are you that you have selected a good mobile phone for you?	p < 0.05 (Sig.)			p > 0.05 **(ns)**	p < 0.05 (Sig.)	p < 0.05 (Sig.)
Intention: I would like to use this method for selecting my mobile phone in the future.	p < 0.05 (Sig.)			p > 0.05 **(ns)**	p < 0.05 (Sig.)	p < 0.05 (Sig.)

In addition, the Kruskal Wallis chi-square (Table 4.40 and Table 4.42) suggests that there were no gender or experience level differences for the three selection support methods. However, in either gender and for all experience levels, selection support methods B and C had higher ratings than selection support method A.

4.6 Conclusions

The property use frequencies suggest that subjects were more concerned with network system and body design than price and main colour when they were selecting a mobile phone. Brand showed the lowest property use frequencies which indicate that subjects are less concerned with brand when they select a mobile phone. Results also showed that both males and females have the same point of view about network system, price

and brand. Females were more concerned about body design and main colour than males. In experience level differences, all levels of experience users had the same property use frequencies with network system, price, main colour and brand. Both frequent and moderate level of experience users were more concerned with body design than high frequent experience users.

Results of criteria importance ratings showed that there were statistically significant differences for the 60 subjects (including both genders and all levels of mobile phone experience users). Results showed that reliability had the highest average ratings; capability and flexibility had the second highest average ratings. Usability and connectivity showed the lowest average ratings. Results also suggest that males and females rated the criteria differently. Males were more concerned about capability, connectivity and usability than females. In contrast, both males and females had similar points of view about flexibility and reliability. However, results showed that there was no difference between mobile phone users of different experience levels when they were rating the importance of all criteria. They had similar points of view about rating criteria importance.

Results of the selection support methods showed that there were statistically significant differences for the 60 subjects (including both genders and all levels of experience mobile phone users). Selection support method A showed the lowest average score in all software performance criteria except in ease of use (6.1). Selection support method A also showed the lowest ratings for confidence and intention compared to other selection support methods. Selection support methods B and C showed no significant differences for usefulness, ease of selection and satisfaction. Selection support method B showed higher average ratings for efficiency and ease of use than selection support method C.

Selection support methods B and C showed the same ratings for both confidence and intention. All of the hypotheses arising from research main question were supported. However, the results also suggest that there were no statistically significant differences for both gender and mobile phone experience. There was no difference for males and females when they were rating the three selection support methods. Different levels of experience mobile phone users also gave similar scores for the three selection support methods. Therefore all of the hypotheses arising from research sub-question B were rejected.

The final hypotheses outcomes were as follows:

H1. Online mobile phone selection support method affects selection time – ***supported****.*

H2. Online mobile phone selection support method affects perceived usefulness- ***supported****.*

H3. Online mobile phone selection support method affects perceived an ease of selection process- ***supported****.*

H4. Online mobile phone selection support method affects perceived an ease to use software system- ***supported.***

H5. Online mobile phone selection support method affects user satisfaction – ***supported****.*

H6. Online mobile phone selection support method affects perceived confidence in the phone selected – ***supported****.*

H7. Online mobile phone selection support method affects perceived willingness to use the software system in the future – ***supported****.*

HB1. Gender affects the mobile phone selection support method preference - ***rejected****.*

HB2. Experience level affects mobile phone selection support method preference- ***rejected****.*

Chapter 5: Discussion

5.1 Research findings

In section 5.1.1, the findings of the property use frequencies and performance criteria that subjects choose will be discussed. In section 5.1.2, the findings of comparisons between the selection support methods comparison will be discussed.

5.1.1 Property use frequencies and performance criteria

Finding one: Overall differences

Mobile phone properties

The results showed that network system had the highest property use frequencies compared to other mobile phone properties. Body design had the second highest property use frequency. Price and main colour both had similar property use frequencies but were lower than body design. Brand had the lowest property use frequency. Therefore, it was concluded that subjects are more concerned about network system (95% of property use frequency) and body design (65% of property use frequency) than other properties. Price and main colour showed 35% of property use frequency and subjects were less concerned about the brand when they select mobile phones.

Mobile phone performance criteria

Subjects were asked to rate the importance of the five performance criteria (please refer to Appendix D for more detail). Results suggest that subjects rated these five criteria differently.

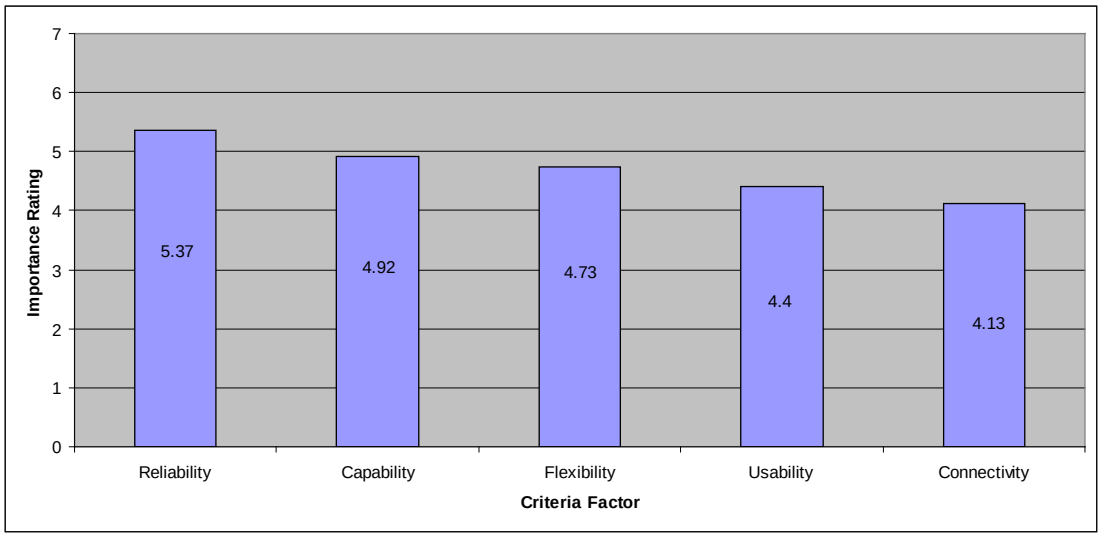


Figure 5.1 Overall criteria importance ratings

According Figure 5.1, reliability had the highest average ratings compared to others. Capability and flexibility had the second highest ratings but slightly lower than reliability. Usability and connectivity had the lowest ratings when compared to other criteria. This may suggest that subjects' current mobile phones did not meet their requirement of reliability. For example, subject A might have a mobile phone with a very short usage time. Therefore, he/she rated reliability higher than other criteria. On the other hand, usability and connectivity had the lowest importance ratings, suggesting that subjects' current mobile phones did meet their requirements for these two criteria. For example, subject B's current mobile phone had Bluetooth and Infrared functions. Therefore, he/she rated connectivity lower than other criteria because the mobile phone he/she used already met this requirement. Although connectivity and usability had lower average ratings compared to other criteria, this does not mean that it is not important at all. It reveals that their current mobile phones already met this requirement. Therefore, we may conclude that most of the subjects' current mobile phones did not meet their needs in reliability. The capability and flexibility of their current phone somewhat met their needs whereas usability and connectivity already meet their needs.

Finding two: Gender differences

Mobile phone properties

The results suggest that females are more concerned with body design and main colour aspects of mobile phone properties than males. It seems that females are more concerned with aesthetic factors of mobile phone than males. However, body design may also be involved with other factors such as reliability. For example, people may select body design as a reliable factor because they would not accidentally press the bottom when they are walking. In contrast, males had slightly higher property use frequencies in brand than females. However, there is no significant difference ($p < 0.05$) exist so these results cannot be show that males were more concerned with brand than females. In addition, both males and females had similar property use frequencies for network system and price, so they had similar views on these mobile phone properties.

Mobile phone performance criteria

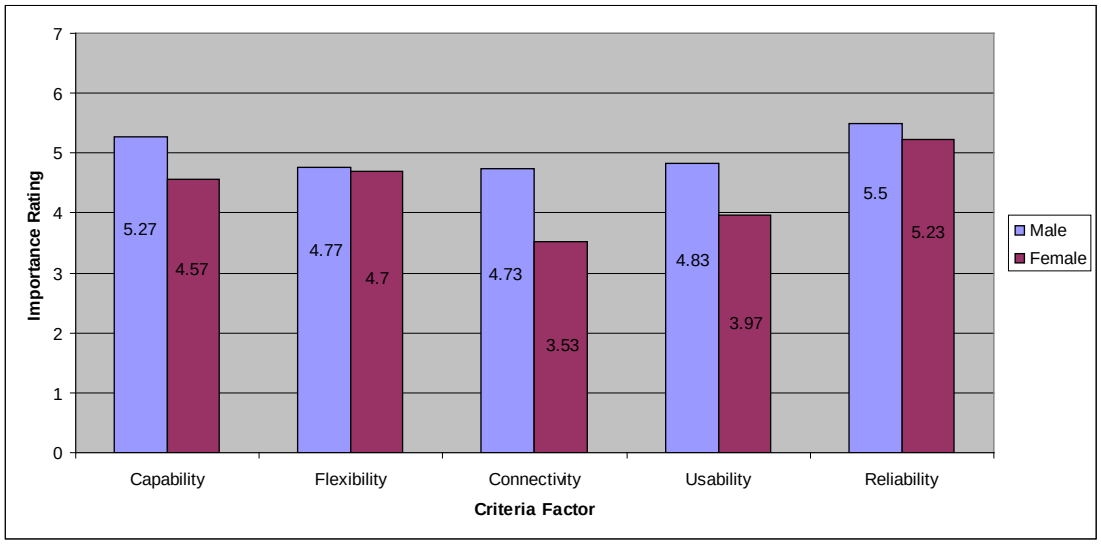


Figure 5.2 Criteria importance ratings by gender

For males, reliability was the most important criteria, and the second most important was capability. Usability, flexibility and connectivity were equally important and should

be regarded as the third most important criteria. Results suggest that males were not satisfied with reliability and capability in their current mobile phones, but usability, flexibility and connectivity somewhat met their requirements. For females, reliability was also the most important criteria. The second most important criteria were both flexibility and capability. Usability and connectivity showed the lowest ratings. Therefore, results suggest that the mobile phones males and females used did not meet their requirements for reliability. They were not satisfied with flexibility and capability, but more so than for reliability. Their current mobile phones already satisfied their needs in both usability and connectivity. Overall, males were more concerned about capability, connectivity, and usability than females. Both males and females had similar views on flexibility and reliability.

Finding three: Experience level differences

Mobile phone properties

According to previous chapter (Figure 4.5), all experience levels of mobile phone users had similar views about network system, brand, price and main colour. Both frequent and moderate level experience users were more concerned with body design than high frequency level experience users.

Mobile phone performance criteria

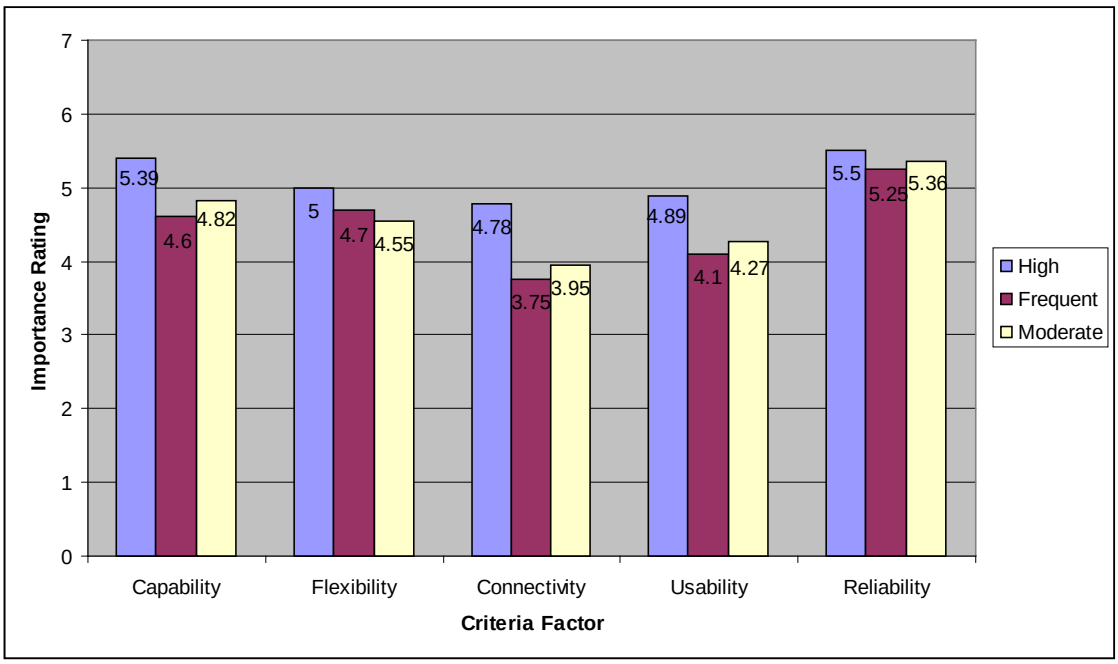


Figure 5.3 Criteria importance ratings by experience level

According to Figure 5.3, high frequency experience level mobile phone users gave slightly higher scores in all performance criteria than experienced users of other levels. Frequent and moderate experience level mobile phone users gave similar rating scores for all performance criteria. However, a Kruskal Wallis chi-square suggested that there was no statistically significant difference between them so the null hypothesis was not rejected. Overall, we may conclude that there was no experience level difference when they were rating the importance of different criteria.

5.1.2 Selection support method comparison

Finding one: Overall differences

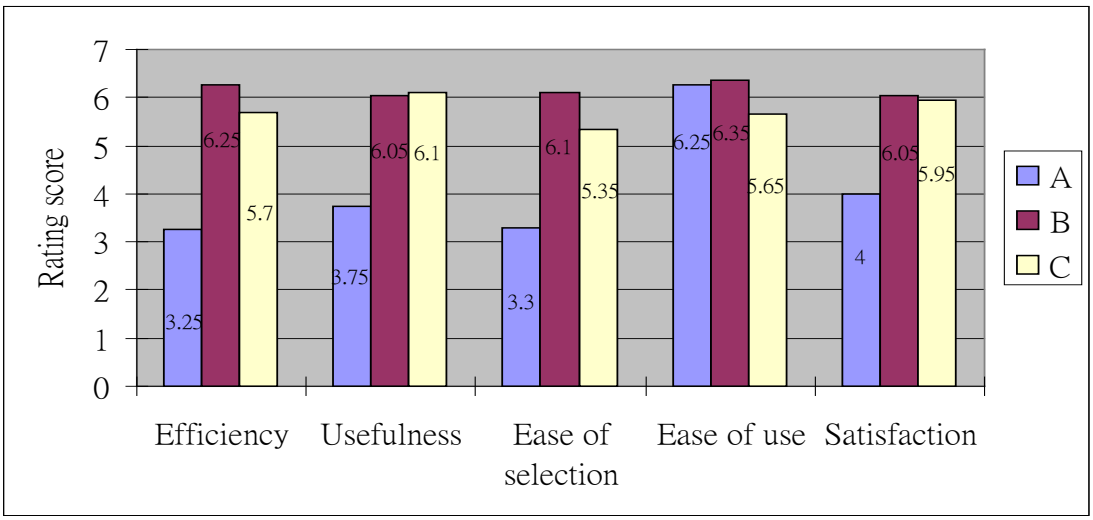


Figure 5.4 Software Performance means by selection support method

For efficiency (as shown in Figure 5.4), subjects who used method A required a longer time to choose the mobile phones they liked. For example, a subject needed to choose a phone that he/she preferred by browsing all 105 mobile phone models. Results of selection support method B suggest that subjects who were using method B would spend less time to finding mobile phones that they liked. For example, people who wished to select phones with a clam shell design could simply select option “clam shell”. Selection support method C had lower efficiency scores than selection support method B (B: 6.25 versus C: 5.7) but higher than selection support method A (A: 3.25 versus C: 5.7). The reason for this was that selection support method C had an additional “performance criteria” section compared to selection support method B. Therefore, subjects who were using selection support method C required more time to select these additional options. For example, subjects needed to select options for both the “mobile phone properties” (5 options) and “performance criteria” (5 options) sections. Therefore a problem would occur when people perceived too many information.

For usefulness, the results suggest that selection support method A had the lowest average scores for usefulness compared to selection support methods B and C. Selection support method A was not useful and supportive for subjects to select mobile phones. The reason is that selection support method A only provided mobile phone catalogues and descriptions which were not supportive for subjects when they were selecting the phones. Selection support methods B and C had insignificant results for usefulness (B: 6.05 versus C: 6.10) which indicates that both selection support methods were useful and supportive. Both selection support methods B and C provided search options for users to setup their parameters (such as body design and main colour) of mobile phones. People could easily find phones they preferred by selecting mobile phone properties. Selection support method C provided performance criteria ratings for each individual mobile phone. This would be useful and helpful for subjects to know the differences between different mobile phones. In addition, both selection support methods B and C had a “Results” function which was displayed on the bottom part of the website. The “Results” function allowed subjects to know how many mobile phones matched their requirement. For example, subjects who selected “clam shell”, “Nokia”, and “Vodafone” would get a result of 5, which meant that there were 5 mobile phone models matching their requirement. Subjects would find them useful because selection support methods B and C provided more accurate search results than browsing through all of the phones.

Subjects who were using selection support method A (3.30) found it more difficult during the selection process than subjects using selection support methods B (6.10) and C (5.35). The reason for this was that subjects needed to pick their desired mobile phones by browsing through all mobile phone models. Selection support method B had

the highest scores on ease of selection which suggests that subjects would think that method B had the easier selection process compared to methods A and C. The reason for this was that method B reduced the number of mobile phone models by selecting mobile phone properties. For example, subject C selected “standard”, “Nokia”, and “Telecom” and got a result of 6 mobile phone models. He/she could then easily browse through these 6 mobile phone models instead of 105 models. Selection support method C had higher scores than method A but lower than method B. The reason for this is that method C had the same mobile phone properties function as method B, which allowed users to reduce the number of mobile phone models, so method C had higher scores than method A. However, selection support method C had an additional “performance criteria” section for subjects to select. Therefore, with too many requirements (mobile phone properties and performance criteria), subjects would find it difficult to browse through mobile phones. For example, subject D who selected “standard”, “Motorola”, “Vodafone” and performance criteria “4,4,3,4,3” got no result. People would be frustrated when there was no result. Therefore, selection support method C had lower average scores for Ease of selection

In the ease of use aspect, results suggest that selection support methods A and B had higher average scores than selection support method C. There were several reasons that explain this result. Firstly, selection support method A did not require users to take any actions (such as select any options) in order to make a mobile phone selection. Therefore, method A was very straightforward to use without any action required. Secondly, selection support method B required the users to select five mobile phone properties. These five properties were easy to select, and without too many options for users. Therefore method B was very easy to use too. Thirdly, selection support method C had both “mobile phone properties” and “performance criteria” which users were

required to select. Problems would occur (such as no result could be found) when too many options (10 options in total) were given. It would be difficult for users to find out the mobile phone they preferred by using method C. Therefore, selection support method C had the lowest scores for Ease of use.

For satisfaction, results suggest that selection support method A had the lowest satisfaction score. The reason for this was that selection support method A had the lowest scores on efficiency, usefulness and ease of selection. Therefore these low software performance scores affected user satisfaction. Selection support methods B and C had the same satisfaction score. The reason was that both methods B and C had similar average scores, so therefore the user satisfaction scores were also similar.

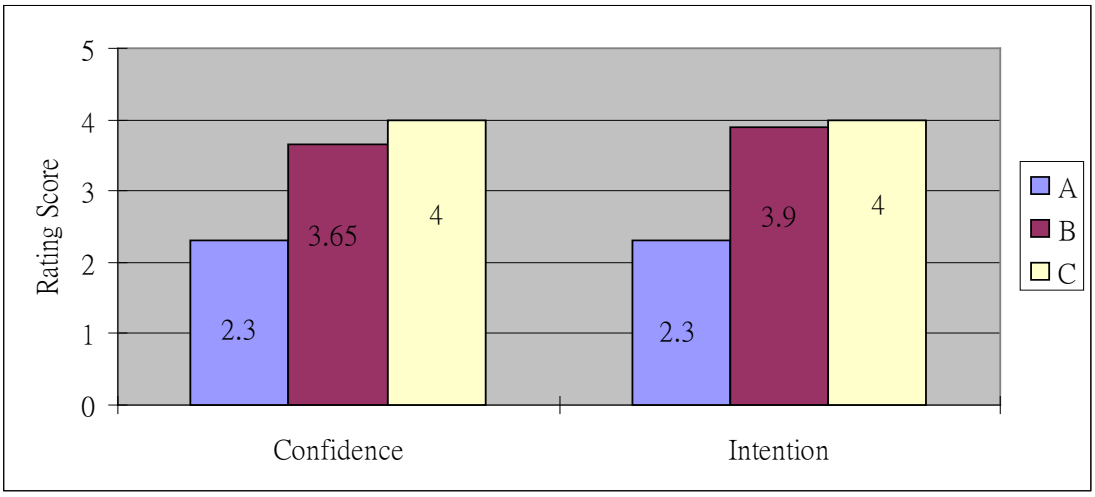


Figure 5.5 Confidence and Intention means by selection support method

For confidence (as shown in Figure 5.5), subjects were not confident with the mobile phones they had selected using selection support method A. The reason for this was that selection support method A only provided mobile phone catalogues and descriptions. Subjects perceived an information overload when browsing through the mobile phone catalogue, so they were not confident with the mobile phone they had selected. Subjects who were using selection support methods B and C had higher confidence with the

mobile phones they had selected. The reason for this was that selection support methods B and C provided mobile phone properties and performance criteria to support the selection process. Mobile phone properties allowed subjects to set their requirements and performance criteria, and provided rating scales for each mobile phone. Ratings of mobile phones provided supportive information for subjects. Therefore, subjects were more confident with the mobile phones they had selected using selection support methods B and C.

Subjects did not intend to use selection support method A in the future. The reason for this was that method A only provided mobile phone catalogue and descriptions. It was difficult for subjects to select a mobile phone from 105 mobile phone models. Method A was not supportive and very time consuming, so subjects showed low willingness to use it in the future. In contrast, subjects did intend to use both selection support methods B and C in the future. The reason for this was that both selection methods were supportive, efficient and useful for subjects.

Overall, the online selection support does improve the process of mobile phone selection based on user preferences. Both selection support methods B and C had high overall satisfaction scores, which indicate that subjects preferred to use these two methods to reduce the number of mobile phone models. However, the overall satisfaction scores between selection support methods B and C showed no differences. Therefore, the results also suggest that selection support method C did not provide any significant improvement over selection support method B.

5.1.3 Individual differences in selection support method

There was no statistically significant difference between males and females, which indicates that there was no difference between males and females when they were selecting mobile phones. Also, there was no statistically significant difference between mobile phone users of high frequent, frequent and moderate experience levels. Results suggest that mobile phone users of all experience levels showed no differences when they were selecting mobile phones.

5.2 Implications of the results

5.2.1 Priorities of mobile phone features

The findings for priorities of mobile phone properties are not inconsistent with Wilaka (2004), Fortunati (2005), and Katz & Sugiyama, (2006), showing that fashion has become one of the key factors for customers when selecting mobile phones. The fashion statement made by a mobile phone was not considered in this research because there was no standardised measurement for it. However, one interesting finding of this research was that females were more concerned about main colour and body design of mobile phones than males. One of our findings differs from the study by Karjauluto et al.'s (2003) study, which showed that price was the most important factors for purchasing a new mobile phones in Finland. Our findings suggest that network system was the top priority while customers were choosing new mobile phones. In addition, brand had the lowest property use frequencies, which shows that brand was not an important factor for customers when choosing mobile phones.

From the findings for priorities of mobile phone performance criteria, it is surprising that people were more concerned with reliability than other criteria. Capability had the

second highest ratings, which indicates that people are still concerned about the functionality of mobile phones. This is consistent with the study by Isiklar and Buyukozkan (2005) showing that reliability and capability were the top two most priorities factors for young people when choosing phones. Usability and connectivity showed the lowest ratings, which suggests that people were less concerned with these two performance criteria. One likely explanation is that their current mobile phones may have already been meeting their requirements for usability and connectivity. However, this finding of ours differs from the study by Han and Hong (2003), which showed that people were more concerned about capability and usability than reliability.

5.2.2 Comparison of selection support methods

Results from the comparison between the three selection support methods show that selection support methods B and C had higher satisfaction scores than selection support method A. This suggests that selection support methods B and C reduced information overload on mobile phone models and that people were satisfied with this. Results also suggest that selection support method C did not provide any significant improvement over selection support method B. One likely reason is that selection support method C provided too many options for users, resulting in the problem of information overload. This is consistent with the definition of Jinwon and Rong's study in 2001 showing that the problems would occur when people face so much information that they are unable to attend to all of it. Our findings also suggest that people would find selection support method B (mobile phone properties) easier to use and more useful and more efficient than selection support method A (mobile phone catalogue) when they were choosing mobile phones. This suggests that the current online shops of Vodafone is easier to use, more useful and more efficient than the ones of Telecom.

5.3 Limitations

One limitation is that the sample size, which could be increased. There were sixty people who participated in the experiment; and ten males and ten females experienced each selection support method, as the subjects were divided into three groups. This may have affected the accuracy of the results when analysing gender preferences for selection support methods. The second limitation is that all the subjects were selected from Massey University. The results may only reflect university students rather than the whole society. However, students are quite suited in this research as they are experienced mobile phone users and also more interested in mobile phones than other age groups. The third limitation is that the experiment was performed in New Zealand. Therefore, the results may only reflect western culture rather than being globally applicable. The last limitation is the lack of mobile phone models. This research only included models of mobile phones available in New Zealand (105 models of phones). Therefore, the small number of models of mobile phones would make selection support methods B (mobile phone property) and C (mobile phone property and performance criteria) more difficult to use, as fewer results could be found.

5.4 Future development

Future research could be firstly conducted on only mobile phone performance criteria (without mobile phone properties) that affect selection satisfaction. It would be interesting to see whether people are more concerned about mobile phone properties or performance criteria when they are selecting mobile phones online. For example, the satisfaction scores between person A who is using mobile phone properties (method B) and person B who is using performance criteria only could be compared. Secondly,

future research could be conducted based on social activities, such as allowing people to jointly to select a mobile phone online. For example, if there was a couple who wants to find matching mobile phones with different colours, they can select mobile phones together through the selection support system online. Thirdly, future development of the system could provide feedbacks from customers. For example, a user could select some particular mobile phone properties (such as slider, Telecom, and below $300) or performance criteria (such as “5 5 5 4 3”) that would generate no results. This could lead to phones being developed on demand when a particular combination is not available. Manufacturers could be made for the customers. This information could be transmitted back to the server and stored automatically. This would also be valuable information for mobile phone manufacturers developing new mobile phone models in the future.

5.5 Research contribution

From this research, mobile phone shops/designers may gain insights into which mobile phone property features users use more frequently, and which mobile phone performance criteria users are more concerned about. This research would also beneficial for online mobile phone shops (or sales) by examining user preference with the online selection support process. This research also adds value by examining user preference factors for different genders and experience levels when they were select mobile phones.

References:

Adachi, F. (2001). Wireless Past and Future-Evolving Mobile Communications Systems. *IEICE Trans. Fundamentals, 84*(1), 55-60.

Aoki, K., & Downes, E. J. (2002). An analysis of young people's use of and attitudes toward cell phones. *Telematics and Informatics 20*, 349-364.

Chae, M., & Kim, J. (2004). Do size and structure matter to mobile users? An empirical study of the effects of screen size, information structure, and task complexity on user activities with standard web phones. *Behaviour & Information Technology, 23*(3), 165-181.

Chuang, M. C., Chien, C., & Hsu, S. H. (2001). Perceptual factors underlying user preferences toward product form of mobile phones. *Industrial Ergonomics, 27*, 247-258.

CIA -The World Factbook. (2007). Retrieved March 12, 2007, from https://www.cia.gov/library/publications/the-world-factbook/

Davie, R., Panting, C., & Charlton, T. (2004). Mobile phone ownership and usage. *Telematics and Informatics, 21*, 359–373.

Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly, 13*, 319-340.

Fortunati, L. (2005). Mobile phones and fashion in post-modernity. *Telektronikk, 4*, 35-48.

Funk, J. L. (2007). The future of mobile shopping: The interaction between lead users and technological trajectories in the Japanese market. *Technological Forecasting & Social Change, 74*, 341-356.

Han, S. H., Kim, K. J., Yun, M. H., Hong, S. W., & Kim, J. (2004). Identifying Mobile Phone Design Features Critical to User Satisfaction. *Human Factors and Ergonomics in Manufacturing 14*, 15-19.

Han, S. H., & Hong, S. W. (2003). A systematic approach for coupling user satisfaction with product design. *Ergonomics, 46,* 1441-1461.

IEA. (2000). What is Ergonomics? Retrieved June 10, 2007, from www.iea.cc/index.php

Ingrid, M., Henk de, P., Carla, V., Ruud, J., & Marcel, B. (2006). *An information overload study: using design methods for understanding*. Paper presented at the Proceedings of the 20th conference of the computer-human interaction special interest group (CHISIG) of Australia on Computer-human interaction: design: activities, artefacts and environments.

Ishii, K. (2004). Internet use via mobile phone in Japan. *Telecommunications Policy, 28*(1), 43-58.

Isiklar, G., & Buyukozkan, G. (2005). Using a multi-criteria decision making approach to evaluate mobile phone alternatives. *Computer Standards & Interfaces 29*, 265-274.

Ito, M. (2005). Mobile Phones, Japanese Youth, and the Re-Placement of Social Contact. In *Mobile Communications* (pp. 131-148). London: Springer.

Jinwon, H., & Rong, T. (2001). *Towards an optimal resolution to information overload: an infomediary approach*. Paper presented at the Proceedings of the 2001 International ACM SIGGROUP Conference on Supporting Group Work.

Karjaluoto, H., Pakola, J., Pietila, M., & Svento, R. (2003). *An Exploratory study on Antecedents and Consequences of Mobile Phone Usage in Finland.* Paper presented at the AMA Summer Marketing Educator, Chicago, USA.

Katz, J. E., & Sugiyama, S. (2005). Mobile phones as fashion statements: The co-creation of mobile communication's public meaning. *Mobile Communication*, 63-80.

Katz, J. E., & Sugiyama, S. (2006). Mobile phones as fashion statements: evidence from student surveys in the US and Japan. *New Media & Society, 8*(2), 321-337.

Krishnan, M. S., & Subramanyam, R. (2004). Quality Dimensions in E-Commerce Software Tools: An Empirical Analysis of North American and Japanese Markets. *Organizational Computing and Electronic Commerce, 14*(4), 223-241.

Kwon, H. S., & Chidambaram, L. (2000). *A Test of the Technology Acceptance Model: The Case of Cellular Telephone Adoption*. Paper presented at the Hawaii International Conference on System Sciences.

Lai, H. H., Lin, Y. C., Yeh, C. H., & Wei, C. H. (2004). User-oriented design for the optimal combination on product design. *Production Economics, 100*, 253-267.

Lai, V. S., Wong, B. K., & Cheung, W. (2002). Group decision making in a multiple criteria environment: A case using the AHP in software selection. *European Journal of Operational Research, 137*(1), 134-144.

Leung, L., & Wei, R. (2000). More than Just Talk on the Move: Uses and Gratification of Cellular Phones. *Journalism and Mass Communication Quarterly, 77*(2), 308-320.

Ling, R., & Yttri, B. (2001). Nobody sits at home and waits for the telephone to ring: Micro and hyper-coordination through the use of the mobile telephone. *International Journal of Urban and Regional Research, 25*(2), 227-252.

Magura, B. (2003). What Hooks M-Commerce Customers? *MIT Sloan Management Review, 44*(3), 9.

Mercer, D. (2006). *The telephone: the life story of a technology*. Westport: Greenwood Press.

Mahatanankoon, P., Wen, H. J., & Lim, B. (2004). Consumer-based m-commerce: exploring consumer perception of mobile applications. *Computer Standards & Interfaces 27*, 347-357.

Mark, R. N. (1994). We have the information you want, but getting it will cost you!: held hostage by information overload. *Crossroads, 1*(1), 11-15.

Nagamachi, M. (2002). Kansei Engineering in Consumer Product Design. *Ergonomics in Design, 10*(2), 5-9.

Nystedt, D. (2007). China Mobile subscribers top US population in 2006. Retrieved February 15, 2007, from http://reseller.co.nz/reseller.nsf/news/2C301D5C27FA6251CC25726B0016045C

Oliphant, M. W. (1999). The mobile phone meets the Internet. *IEEE Spectrum, 36*(8), 20-28.

Ozcan, Y. Z., & Kocak, A. (2003). Research Note: A Need or a Status Symbol? Use of Cellular Telephones in Turkey. *European Journal of Communication*, *18*(2), 241–254.

Pattie, M. (1994). Agents that reduce work and information overload. *Commun. ACM, 37*(7), 30-40.

Palen, L., Salzman, M., & Youngs, E. (2000). Going Wireless: Behavior & Practice of New Mobile Phone Users. *ACM CSCW*, 201-210.

Rice, R. E., & Katz, J. E. (2003). Comparing internet and mobile phone usage: digital divides of usage, adoption, and dropouts. *Telecommunications Policy 27*, 597-623.

Sarker, S., & Wells, J. D. (2003). Understanding Mobile Handheld Device Use and Adoption. *Commun. ACM, 46*(12), 35-40.

Senn, J. A. (2000). The emergence of m-commerce. *IEEE Spectrum, 33*(12), 148-150.

Sheriff, R. E. (2001). *Mobile satellite communication networks*. New York: Wiley.

Smith, M. (2007). Worldwide cellular connections exceeds 2 billion. Retrieved March 1, 2007, from http://www.gsmworld.com/news/press_2005/press05_21.shtml

Snellman, S. (2003). A movies can be the best commercial. *Helsingin Sanomat, Business and Finance* Retrieved 4 September, 2007, from http://www.helsinki-hs.net/news.asp?id=20030204IE2

Swett, C. (2002). Cell-phone accessories market booms as devices become fashion statements. *The Sacramento Bee*.

Telecom Mobile Online Store. (2007). Retrieved 14 November, 2007, from https://www.telecom.co.nz/mobile/shop/front/0,,204449-201928,00.html?action=/mshop_handsets&setNav=Y?text=mhp2

Vodafone NZ Online Shop. (2007). Retrieved 14 November, 2007, from http://store.vodafone.co.nz/mobile_search.aspx

Whitworth, B., Bañuls, V., Sylla, C., & Mahinda, E. (2007). Expanding the criteria for evaluating social-technical software. *IEEE SMC*.

Whitworth, B., & Zaic, M. (2003). The WOSP Model: Balanced Information System Design and Evalution. *Communications of the Association for Information Systems, 12*, 258-282.

Wilska, T. A. (2004). Mobile Phone Use as Part of Young People's Consumption Styles. *Journal of Consumer Policy, 26*(4), 441-463.

Yun, M. H., Han, S. H., Hong, S. W., & Kim, J. (2003). Incorporating user satisfaction into the look-and-feel of mobile phone design. *Industrial Ergonomics, 46*, 1423-1440.

Zhang, Y. B., & Harwood, J. (2004). Modernization and tradition in an age of globalization: Cultural values in Chinese television commercials. *Journal of Communication, 54*, 156-172.

Appendix A: Pilot study survey questions

Survey of mobile phone selection requirements

Dear Sir/Madam,
My name is Frank Yang, I am currently studying a Master of Information Science at Massey University in Albany Campus. My research is investigating how people select cell phones, and so I would just like to ask you a few questions on why you selected your current mobile phone, and what you would look for in selecting your next mobile phone. Your name will not be recorded, you can withdraw at any time, and this will only take 2-5 minutes. Thank you for your help!

Gender. M/F
Age range: Teenager Young Adult (20-30) Experienced(30-40) Mature(40+)

Do you have your own mobile phone? ☐ Yes ☐ No
How long ago did you buy your mobile phone? Yrs months
Never

Mobile Phone Criteria

1. What top three things did you look for to choose your current mobile phone?
   ☐ Clam Shell ☐ Camera ☐ Video Camera ☐ WAP ☐ Speaker Phone
   ☐ Network System ☐ Wi-Fi ☐ Bluetooth ☐ Infrared ☐ MP3 Player
   ☐ Game ☐ Color Screen ☐ FM Radio ☐ Downloadable Ringtones
   ☐ Changeable Cover ☐ Memory Card ☐ Weight ☐ Brand ☐ Battery Life
   ☐ Large Screen

☐ Other_____
☐ Other_____
☐ Other_____

2. What top three things will you look for to choose your next mobile phone?
   ☐ Clam Shell ☐ Camera ☐ Video Camera ☐ WAP ☐ Speaker Phone
   ☐ Network System ☐ Wi-Fi ☐ Bluetooth ☐ Infrared ☐ MP3 Player
   ☐ Game ☐ Color Screen ☐ FM Radio ☐ Downloadable Ringtones
   ☐ Changeable Cover ☐ Memory Card ☐ Weight ☐ Brand ☐ Battery Life
   ☐ Large Screen

☐ Other_____
☐ Other_____
☐ Other_____

Appendix B: Results of pilot study

Preliminary Survey Results of mobile phone selection requirements

Table A.1 User Background

1. Gender	
Male	11
Female	5
n	16

2. Age group	
Teenager	1
Young Adult	10
Experienced	4
Mature	1
n	16

3. Do you have your own mobile phone?	
Yes	16
No	0
n	16

4. How long have you had your phone?	
Month/es	1
	2 1
	3 3
	4 2
	5 3
	6
	7 1
	8
	9 1
	10
	11
	12 4
	Over 12 1
	n 16

Table A.2 Priority scores of Technical Features when consumers chose theircurrent mobile phone

		1=3pts		2=2pts		3=1pt	
Technical Feature		**1**	**2**	**3**		**Total**	**Score**
Price		5		1		6	16
Clam Shell		4				4	12
Camera		2	1	1		4	9
Brand		1	1	4		6	9
MP3 Player		1	3			4	7
Style		1	2			3	7
Bluetooth		1	1	1		3	6
Weight				5		5	5
Color Screen			2			2	4
Making a Phone Call			2			2	4
Touch Screen (Handwriting)		1				1	3
Video Camera			1			1	2
Speaker Phone			1			1	2
Battery Life				2		2	2
Size			1			1	2
Watch Movies			1			1	2
FM Radio				1		1	1
Memory Card				1		1	1
WAP						0	0
Network System						0	0
Wi-Fi						0	0
Infrared						0	0
Game						0	0
Downloadable Ringtone						0	0
Changeable Cover						0	0

Table A.3 Priority score of technical features when consumers were to choose their next mobile phone

	1=3pts, 2=2pts, 1=1pt					
Technical Feature	**1**	**2**	**3**		**Total**	**Score**
Price	5	1	1		7	18
Clam Shell	3	1			4	11
Camera	1	2	1		4	8
Brand	1		5		6	8
Video Camera	1	2			3	7
Size		2	3		5	7
Weight		3			3	6
Style	1	1			2	5
Wi-Fi		2			2	4
Network System	1				1	3
Bluetooth	1				1	3
MP3 Player		1	1		2	3
Downloadable Ringtone	1				1	3
Looks fashion	1				1	3
Speaker Phone		1			1	2
Memory Card			2		2	2
Color Screen			1		1	1
Battery Life			1		1	1
Watch Movies			1		1	1
WAP					0	0
Infrared					0	0
Game					0	0
FM Radio					0	0
Changeable Cover					0	0

Appendix C: Background questionnaire

Experiment of mobile phone selection

Thank you for taking part in my experiment. Firstly, I would like to ask four simple questions.

Gender: ☐ Male ☐ Female

How many mobile phone/s do you use at moment? ☐ None ☐ 1 ☐ 2 ☐ 3 ☐ more than 3

How long ago did you buy your last mobile phone? Yrs months

How many phone have you bought in previous 5 years? ☐ None ☐ 1 ☐ 2 ☐ 3 ☐ more than 3 _____

Are you currently looking to buy a new mobile phone? ☐ Yes ☐ Maybe ☐ No

Now, please imagine that you are going to buy your next mobile phone, and your task is to select this mobile phone.

Start Time: _____

Finish Time: _____

Appendix D: Performance criteria ratings

Dear Sir/Madam,

A mobile phone has many features. I would like you have a look some of them to refresh your memory. I've grouped the mobile phone features into 5 groups: "Capability", "Flexibility", "Connectivity", "Usability" and "Reliability".

Please look down the list and circle how important of each group to you.

CU_CAP: Please circle the importance of the group of mobile phone features below:

1	2	3	4	5	6	7
Not important at all	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important

1. **Capability:** Functionality of the mobile phone.

Features	**Description**
Camera	Allow users to take photos by using the mobile phone.
Video Call	Allow users to make 2-way face to face conversations.
Video Camera	Allow users to record a video by using the mobile phone.
Document Viewer	Allow users to open and edit Word, Excel and/or PDF file.
Voice Recorder	Allow users to record voice.
HTML	Allow users to browse the Internet by using their mobile phones.
MP3 Player	Allow users to listen to music in MP3 format.
FM Radio	Allow users to listen to the FM Radio.
Movies	Allow users to watch movies on the phone.
Game	Allow users to play a game on the phone.
Multi-Media Message	Allow users to send/receive photo & short sound media.
USB	Allow users to connect the phone with a computer.
External Memory	Allow users to extend the memory of the phone.
Head phone port	Allow users to insert earphones.
PC Synchronization	Allow users to synchronise their phones with a computer.

CU_FLX: Please circle the importance of the group of mobile phone features below:

1	2	3	4	5	6	7
Not important at all	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important

2. **Flexibility:** mobile phone can support the new and changing environment as users require.

Features	**Description**
Speaker Phone	Allow users to use speaker phone while they are driving.
Voice Control	Allow users to use voice to make/receive the phone call.
Multi-language	Allow users to switch the menu into different languages.
Null Button	Allow users to turn on/off the silent mode by pressing a button.
SIM Card	Allow users to transfer the phone contact from one to another.
Customizable Theme	Allow users to change their favourite wallpaper of the phone.

CU_CON: Please circle the importance of the group of mobile phone features below:

1	2	3	4	5	6	7
Not important at all	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important

3. **Connectivity:** mobile phone that can connect to other people or system wirelessly.

Features	**Description**
Infrared	Allow users to transfer file wirelessly through other device.
WAP	Mobile phones which have WAP function.
GPRS	Mobile phones which have GPRS function.
WIFI	Allow users to access the Internet through wireless LAN.
Email	Allow users to write the email.
HSDP	Allow users to download/upload a file wirelessly in 3.5Mbps.
Push to Talk	Allow users to use their mobile phone as "Walkie-Talkie".
Bluetooth	Allow users to connect to Bluetooth devices such as earphones.

CU_USB: Please circle the importance of the group of mobile phone features below:

1	2	3	4	5	6	7
Not important at all	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important

4. **Usability:** the ease of use of the mobile phone

Features	**Description**
Touch Screen	A mobile phones that has touch screen enabled function.
Joystick	Allow users to scroll and select the menu by using joystick.
QWERTY	Allow users to write emails or messages by using a mini keyboard.
Picture Caller ID	Allow users to see the caller's photo when receiving a call.
One Touch Emergency	Allow users to make emergency calls by pressing a button.
Speed Dialling	Allow users to make a quick call by pressing a button.
Predictive Text Entry	Allow users to type their message in faster way.
Screen Size	Screen size of the mobile phone.
Size	Dimension of the mobile phone (width x length x height).
Weight	Weight of the mobile phone.
Button Type	Button type of mobile phone. e.g. normal, flat, keyboard

CU_REL: Please circle the importance of the group of mobile phone features below:

1	2	3	4	5	6	7
Not important at all	Slightly important	Somewhat important	Moderately important	Quite important	Very important	Extremely important

5. **Reliability**: the reliability of mobile phone, despite internal part failure.

Features	**Description**
Talk Time	The maximum talk time which allows users to call.
Standby Time	The maximum standby time of a mobile phone.
Battery Replacement	Allow users to replace the battery of the mobile phone.
Internal Memory	Internal memory of a mobile phone.
Water Proof	A mobile phone that has water resistance function.
Operation System	Operating system of mobile phone, e.g. Windows, Symbian

Appendix E: Post-test questionnaires

What do you think about this software?

Q1. This software would enable me to choose a phone more quickly.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Q2. I would find this software is useful in my mobile phone selection.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Q3. Using this software would make my mobile phone selection easier.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Q4. I would find this software easy to use.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Q5. Overall, I am satisfied with this software.

1	2	3	4	5	6	7
Strongly Disagree	Disagree	Slightly Disagree	Neutral	Slightly Agree	Agree	Strongly Agree

Q6. How confident are you that you have selected a good mobile phone for you?

1	2	3	4	5
Not Confident at all	Very Little Confidence	Somewhat Confident	Confident	Very Confident

Q7. I would like to use this method for selecting my mobile phone in the future.

1	2	3	4	5
Definitely Not	Possibly	Probably	Very Likely	Definitely Yes

Any Comments on this mobile phone selection method: