DETERMINING END USER BEHAVIOURS FOR WIRELESS TELECOMMUNICATION SERVICES

A dissertation submitted by

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Abstract

With the advent of numerous wireless telecommunication services, users are moving to 'any where, any time and any how' services. Yet the advantages of wireless telecommunication services are not fully realised due to inherent problems including difficulties encountered by end-users in adopting wireless networks, finding services that are suitable to meet their needs, current limitations on user mobility, limitations placed on terminal capabilities and system interoperability issues. Due to technical and regulatory limitations, network providers find it difficult to provide users with services that they demand as there are numerous challenges yet to be addressed. This has given the impetus to find factors that determine the adoption of wireless telecommunication services by end users. This research examined the behavioural characteristics of the end-users for their choice of wireless telecommunication services to address those issues with adoption of wireless services.

The study began with an initial exploration of existing literature including a review of theories such as TAM, WIMD, TPB and UTAUT to identify challenges that impact user behaviour and their influence on using wireless telecommunications services. Due to the relative newness of the topic, both qualitative and quantitative approaches involving convergent interviews and online surveys respectively were considered suitable for the study. Eight convergent interviews followed by an online survey with respondents having wireless usage experience have been conducted to determine the factors that influence the end user behaviours for their choice of wireless services. The findings revealed that mobility, system interactivity, wireless trust environment, system interoperability and user context play a significant role in determining the adoption of wireless services by end users.

Keywords: wireless device; wireless telecommunication services; user behaviour; wireless network; technology acceptance theories

Certification of Dissertation

I certify that the work contained in this dissertation is entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, except where otherwise acknowledged.

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Signature of Candidature

Date…….

ENDORSEMENT

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Signature of the Supervisor

Date…….

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Signature of the Associate Supervisor

Date…….

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List of Abbreviations

1G, 2G, 2.5G, 3G	First Generation, Second Generation, 2.5th Generation, and Third Generation - mobile networks
CA	Certification Authority
CDMA	Code Division Multiple Access
EDGE	Enhanced Data Rate for GSM Evolution
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile communications
HDSPA	High Speed Downlink Packet Access
ICQ	Instant Messaging Computer Program
Kbps/Mbps	Kilobytes per Second/Megabytes per Second
LAN	Local Area Network
MMS	Multimedia Messaging Services
PC	Personal Computer
PCMCIA	Personal Computer Memory Card International Association
PDA	Personal Digital Assistant
PKI	Public-Key Infrastructure
PTT	Push to Talk
RF	Radio Frequency
RFID	Radio Frequency Identification
SMS	Short Messaging Service
TAM	Technology Acceptance Model
TV	Television
UMTS	Universal Mobile Telecommunications System
UTAUT	Unified Theory of Acceptance and Use of Technology
UWB	Ultra-Wideband Bluetooth
VPN	Virtual Private Network
WAP	Wireless Application Protocol
W-CDMA	Wideband – CDMA
WLAN	Wireless Local Area Network
WSP	Wireless Service Provider
WTLS	Wireless Transport Layer Security
WWW	World Wide Web

Definitions

End Users: Refers to users who use telecommunication services. No distinction is made between individual users and organisations.

Mobility: A unique function of wireless systems and means the end-user's ability to move from one place to another (Sharma & Nakamura 2003).

Wireless Application: Application-level software that operates on a host server and/or on a host terminal (Ian 2003).

Wireless Communication: Data communication that does not require a wired connection between communicating peers, typically using radio or infrared transmissions.

Wireless Device: Electronic equipment that enables end users to access various telecommunication services through the wireless network (Beaulieu 2001). Typical wireless devices include laptops, mobile phones and Personal Digital Assistant (PDAs).

Wireless Internet: The network of radio-connected devices and servers using voice, information and other Internet services.

Wireless Network: The communication system of two or more computers or other devices using standard protocols, without using any physical cable connection.

Wireless Service Provider (WSP): A company that offers transmission services to users of wireless devices (handheld computers and telephones) through radio frequency (RF) signals rather than through end-to-end wire communication. Generally, a WSP offers either cellular telephone service, personal communication service (PCS), or both. The term also seems applicable to satellite television and Internet access providers (Alder 2003).

Wireless Technology: Allows information to be transmitted between devices without use of physical connections (Ian 2003).

Wireless Telecommunication Services (or Wireless Services): A set of various service functions offered as end-to-end services over a network to an end user's

terminal when requested (Furht & Ilyas 2003). Examples of wireless services are messaging services, transmission of text, digitised voice, video streaming, navigation services, mobile marketing, and multimedia.

1 Introduction

1.1 Background to the research problem

Wireless telecommunication services have proliferated in recent years. In 2008 the global wireless telecommunication services industry is expected to reach a value of US $635 billion, an increase of 54.7 percent since 2003 ('Global Wireless Telecommunication Services' 2004). With advancements in wireless technology, a large number of wireless service providers are now able to provide end users with a wide variety of services. These wireless services include broadband, transmission of text, voice, video, and multimedia to the end users on the move (Furht & Ilyas 2003). However, transition of web and wired telecommunication services to wireless services is slow due to limited screen size found on equipment, limited resolution resulting in poor output quality of images, and bandwidth restrictions prohibiting large volumes of data on to these wireless devices thereby impeding the rate of implementation of wireless services (Geiger et al. 2002). Wireless service providers have failed to focus on the end user acceptance of these services offered through such a stage of technology with premature standards and challenges (Balachandran et al. 2003; Garcia-Macias et al. 2003; Jain & John Wullert 2002). Specifically, concerns for the end user while using these services include:

i) In the wireless domain, end users have restricted access to bandwidth for communication and experience high error rates while communicating with others (Balachandran et al. 2003; Paelke et al. 2003). Examples of this include ‘wrong number’ calls. This phenomenon arises because of the lack of proper wireless infrastructure which, in turn, results in errors (e.g., data packets are being lost during transmission in wireless medium), problems in connectivity (e.g., users encounter connection problems with other mobile users or encounter ’wrong numbers’). Subjective norm, a user behaviour component, is a result of such communication problems.

ii) Cheap wireless devices may not be able to support all wireless services such as speedy information retrieval (Axiotis et al. 2004; Paelke et al. 2003). The impact of this is user frustration as it takes considerable time to download files onto wireless devices due to processing times resulting from lack of memory capabilities. This user frustration will often manifest in user

behaviours such as motivations, attitudes and perceived usefulness of service from such devices.

iii) Screen size dictates web browsing and impacts the user experience (Bergman 2000; Geiger et al. 2002; Pilioura et al. 2002, p .38). The screen size that can be shown in many wireless devices is small and users encounter difficulties in viewing complete web information on a single screen. This impact on operational sequences such as lengthy scrolling of screen pages. This also influences the ease of use of a service, which is a component of user behaviour.

iv) Limited computational power of wireless devices (Phan et al. 2002). The implication of this limitation is an adverse effect on video streaming, gaming etc that requires high computational power and results in poor user satisfaction levels, a factor of user behaviour.

The above four points highlight that end user behaviours are influenced by wireless services and associated issues. Due to the relative newness of this domain, limited information can be obtained from existing literature. Empirical investigation into this domain is worthwhile as wireless telecommunication services continue to proliferate. Further, there is limited research into the user acceptance of the wireless technology in information systems and this has given rise to this study. Thus, the following research question addresses the focus of this study:

What behavioural factors influence the choice of wireless telecommunication services for end users?

1.2 Research Methodology

Both qualitative and quantitative approaches were considered appropriate for the study. The justification of a two stage approach of data collection using qualitative and quantitative techniques is that research problem domain (i.e., context of wireless telecommunication services and related end user behaviours) is an under researched area and there is limited published empirical research on this topic. Qualitative technique was used in the initial stage to develop or suggest theoretical arguments

which were further tested by the quantitative approach in the second stage (Zikmund 2003, p .132).

1.2.1 Exploratory research

Convergent interviews in the initial stage is an appropriate method for conducting an exploratory study so as to reduce the uncertainty surrounding the research problem, to investigate issues in-depth and to arrive at a list of factors in achieving the objectives of the study. Individuals who have extensively used wireless services were selected for the convergent interview sessions. Purposeful sampling technique was employed in the participants' selection process due to researcher time and resources. The interview protocol for convergent interviews consisted of an overview of the study explaining the purpose and the process of the interviews. Data obtained from convergent interviews was analysed using pattern matching technique (Miles & Huberman 2002). The analysis of interview transcripts was guided by the interview protocol. The findings from the qualitative stage (i.e., using convergent interview technique) provided preliminary insights into the problem under investigation and a list of factors that were used as input to the quantitative stage using online surveys.

1.2.2 Descriptive research

During the second stage of the research, online surveys were used to quantify data to test the themes that the researcher began with. A questionnaire was developed from the literature and the exploratory stage. The online survey approach is justified in this stage of the research as it allowed the researcher to collect a large amount of information and is acknowledged to be less expensive than many other techniques (Kinnear & Taylor 1996). Samples were drawn using the convenience sampling technique. Justifications of the use of both this survey approach and the purposive sampling technique are detailed in Chapter 4. Data collected was analysed using statistical tools, specifically exploratory factor analysis. The outcome of the survey research helped to derive factors that determine end user behaviours. The research methodology and research findings of this online survey are discussed in greater detail in Chapters 4 and 5 respectively.

1.3 Motivations for the study

It is important to reflect on users' behavioural factors that influence the choice of wireless telecommunication services because the manner in which users avail themselves of telecommunication services impacts on various pricing and other policies that organisations implement. This implies that end users' behavioural factors have a profound impact on policies associated with pricing, the type of services offered for this pricing, the infrastructure required to implement these services to guarantee quality of service (QoS), and any other telecommunication regulatory issues (Palen et al. 2000). Further, end user behavioural factors for the acceptance of wireless telecommunication services from various wireless service providers differ as the settings and context vary from country to country in terms of wireless infrastructure, regulatory, billing and other management policies (Moon & Kim 2001). For example, Australia and other Asia Pacific countries follow different technology standards such as GSM/GPRS compared to European and American wireless service providers (Beaulieu 2001). These differences in the use of settings and context will have significant effect on the adoption of wireless services. Other socio-economic factors also play important role in the adoption of wireless technology for end users.

In addition, prior studies have employed technology acceptance theories differently over time. These studies were likely to develop their research models based on the investigations on the behavioural factors for the adoption of specific technology in context such as internet, intranet, spreadsheets, e-mail, and the World Wide Web (Agarwal & Prasad 1998a; Chau & Hu 2001; Horton et al. 2001; Hu & Chau 1999). For example, social influence processes and cognitive instrumental processes significantly influenced user acceptance of four different systems in four organisations (Venkatesh & Davis 2000). Moderating effects of the variables age, computer skills, mobile technology readiness and social influence proved to be relevant in the context of the user acceptance of wireless finance (Kleijnen et al. 2004).

However, a research model developed by these prior studies was unlikely to be a complete model due to the lack of other key influential characteristics, in particular Australian wireless technology and wireless telecommunication services. With this

limitation, prior studies were unlikely to be able to provide a clear portrait of end user choice of wireless services in Australia.

While many studies have addressed the issue of adoption behaviour, no studies, in the Australian context, have attempted to investigate in-depth of user behavioural factors for wireless telecommunication services. Therefore, there is a necessity for enhanced understanding of the current state of user acceptance of wireless services offered through various service providers in Australia which unravels a comprehensive delineation of current scenario of choice and actual practice, and the reasons for their behaviour. Further, an enhanced understanding will provide increased knowledge, forming a base for future strategic decisions for wireless service providers, telecommunications industry, policy makers and regulators.

1.4 Contribution

This research is assumed to be a first rigorous and in-depth study in the paradigm of Australian wireless service providers as limited information can be found in the Australian domain. Through literature review, it was found that prior studies attributed less significance to user behavioural factors in consideration with wireless technology (Chang & Kannan 2006; Cheong & Park 2005; Gururajan, Hafeez-Baig et al. 2005; Margherita 2004). This study examined the current issues concerning the end users and services, formulated a list of factors related to their behaviours, and investigated the relationship between behavioural factors and their influence on the choice of wireless telecommunication services.

Outcomes realised through this study will contribute to the existing body of knowledge. By doing so, this study fill gaps in the literature and provide insights into those factors that need to be given priority while using wireless services. Further, as the field of wireless technology is growing faster, and wireless service providers are looking to improve their quality of service while simultaneously trying to retain the end-users, the results derived may directly benefit them. In addition, the literature survey conducted for this study indicated that limited information can be extracted as to the suitability of technology models in regard to the behavioural aspects specific to the wireless technology.

1.5 Outline of thesis

This thesis consists of six chapters. Chapter 1 delineates the broad directions of this research and introduces the research question and research issues. This chapter justifies the importance of this research and presents an introduction to the methodology used. Finally, Chapter 1 makes clear the delimitations of this study.

Chapter 2 reviews and synthesises the relevant literature on Australian wireless service providers and end user acceptance of wireless services. From this review, gaps in the literature are identified and a conceptual model is developed as a background for this research.

Chapter 3 describes the research methodology used in this research. Both qualitative and quantitative approaches using convergent interviews and online surveys were used in the study. The philosophical justification for this research is explained and the research methods that are used are described and justified.

Chapter 4 presents the data collection procedures followed for both the qualitative and quantitative approaches. Section 1 describes the interview participants' selection criteria, interview protocol, convergent interview process and data analysis technique followed during the qualitative approach. Sampling strategy, sample size, questionnaire design and administration and quantitative data analysis are described in section 2.

Chapter 5 reports the analysis of data collected using the combined methodology. In the first section, pattern matching technique was employed to analyse the qualitative data collected through eight convergent interviews. A brief summary highlighting the list of important factors emerging from the convergent interviews was proposed. The next section begins with data examination and screening, followed by descriptive statistics. Exploratory factor analysis was used to study the relationships of variables and grouped together multiple items belonging to the same construct. The six factors extracted from the factor analysis are discussed in detail.

Chapter 6 provides a brief summary of the dissertation report and discussion on the findings and conclusions of the research problem. This is followed by conclusion, limitations and recommendations for future research in this area.

1.6 Delimitations of scope

This study focuses on wireless telecommunication services to investigate the behavioural factors of end users at a detailed level within the time and cost constraints of the research study. The goal of this research is to develop a qualitative initial understanding of underlying factors for behaviours or other outcomes, but does not attempt to determine specific causal relationships. Moreover, measures of choice of wireless services and related behaviours are subjective and therefore the findings of the sample are not able to be generalised to the population.

Judicious planning of the research, careful and unbiased collection and analysis of the data, and adequate scrutiny of reporting shall reduce standard sources of error (Davis & Cosenza 1985). Therefore, the researcher and the reader may have confidence in the accuracy, validity, and reliability of the research project and the information it produces.

1.7 Conclusion

This chapter introduced the research problem area and framed the research question. The study has been justified from theoretical and practical stances. The research method was briefly described and justified, a list of key definitions used in this dissertation was provided, and the structure of the dissertation was outlined by giving an overview of each of the thesis chapters. Finally, the scope of the study has been defined.

2 Literature review

2.1 Introduction

The previous chapter gave an overview of this study by identifying the research problem in the context of information systems and the specific research question under investigation. The purpose of this chapter is to review the relevant literature in addressing the research question. The main research areas of interest to this research are summarised in Figure 2.1.

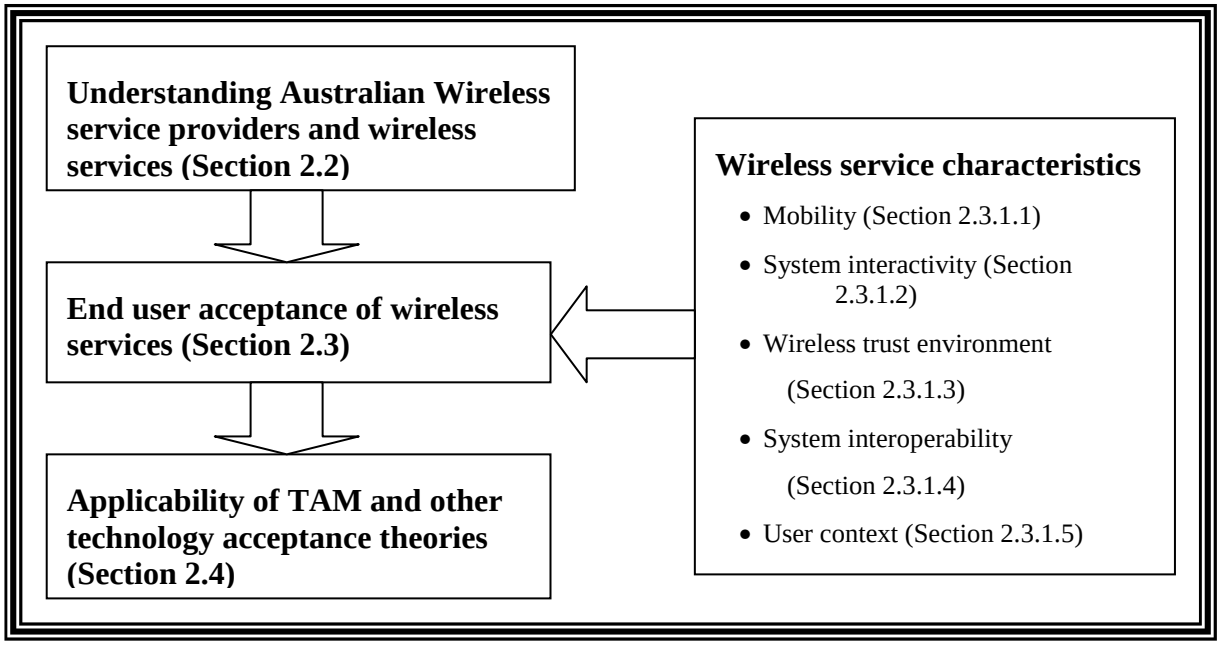


Figure 2.1: Literature review stages

2.2 Australian wireless service providers and wireless services

This section begins with a brief background on wireless technology in general, wireless service providers and the use of wireless services within Australia. Wireless technology is a broad term and encompasses networks, standards, devices, services, and applications (Furht & Ilyas 2003). These are considered to be technical infrastructure and form the backbone through which delivery of a wide variety of wireless services to the end users is possible.

The stages of development of wireless telecommunication services are commonly described in generations – 1G, 2G, 2.5G, 3G and 4G. These generations refer to the technologies that were in use such as analog, GSM, GPRS, and EDGE (Beaulieu

2001; Furht & Ilyas 2003). While 4G is still in infant stage, it is believed the features and the opportunities that 4G provide will soon bypass the current 3G generation before realising its full potential. With the availability of wireless technology, numerous application areas are possible and realised through the use of wireless services. The notable application areas of the wireless telecommunication services include households, the healthcare sector, and the business environment. For example, the Queensland Smart Home initiative project in Australia will be the first of its kind of project to integrate the wireless technology, telecare and telehealth solutions to provide co-ordinated and proactive assistance to senior citizens. With the advantages of the wireless technology and its services, such as flexibility and mobility, the initiative of this project is aimed at improving the quality of life for seniors and the health sector overall.

Similarly, in a business environment wireless telecommunications services enable companies to increase efficiency and consequently reduce costs through a wide variety of applications/services. Apart from the competitive advantage that these wireless services have to offer businesses, the increased convenience also attracts new users and boosts revenue (Phillips 2002; Ravi & Marcia 2000; Rees 2000). For example, the use of RFID and other wireless assistive technology, such as smart tags and Bluetooth, assists business organisations to coordinate their various organisational function units and therefore enhances productivity and overall efficiency. In a nutshell, wireless technology influences informative, transactive, operative, and collaborative aspects of business (Unhelkar 2006).

In Australia, wireless telecommunication services are considered important by offering niche capabilities to services industries in a way that will enhance the Australian economy. In relation to the wireless telecommunication industry, professional bodies such as the Department of Information and Communication Technology and the Arts (DICTA) and the Australian Communication Media Authority (ACMA) provide significant information on wireless telecommunication services statistics. There are approximately 40 registered wireless service providers and another 20 wireless service providers who offer a wide variety of wireless services to users, according to sources from the Australian Bureau of Statistics (ABS), ACMA and DICTA. The major wireless service providers in Australia are

Telstra, Singtel Optus Pty. Ltd., Vodafone, Hutchison – "3", IBurst and AAPT. Typical wireless services offered by these service providers include voice, data and video services including mobile telephony, push to talk (PTT), SMS, MMS, email, and internet. Apart from the basic services, other services are also becoming increasingly prominent such as content services (e.g., ringtones, wallpapers etc), location based services (e.g., map, GPS) and other information and entertainment related services. The majority of the wireless service providers also offer traditional fixed line (or) wired services such as telephone and internet (dial-up and broadband) in addition to the wireless services.

A more detailed categorisation of wireless services can be found from Axiotis et al (2004), who classifies wireless services into six major categories:

- person-to-person communications – SMS, MMS, email, and messengers (e.g., ICQ);
- mobile entertainment – on-demand video streaming (e.g., TV, radio), on-demand background class video/audio (e.g. MP3, Online games), and Chat rooms etc;
- mobile information – directory (e.g., business, residential), news, financial, traffic and weather reports;
- location based services – location-aware information (e.g., local media marketing, GPS etc) and community services;
- mobile transactions – mobile banking, mobile shopping and mobile user care etc; and
- business solutions – corporate information services such as VPN and specific data solutions.

Although all of these service categories do not apply to the majority of the wireless service providers, most of these wireless service providers offer important sub-sections of the service categories described above. They offer these wireless services using different connection types such as fixed wireless, mobile wireless and satellite technologies and are usually available within hotspot locations or wireless local loops (Varshney & Vetter 2000).

Of the wireless services, SMS and email have received the predominant share of usage. Wireless internet is also gaining rapid momentum. In regard to this aspect, research statistics show that there is rapid growth in the number of wireless internet users. That is, within the past 18 months there is approximately 400 percent growth in internet using wireless broadband technology (Australian Bureau of Statistics 2006). From these statistics, it is evident that the Australian wireless telecommunication service industry has mirrored the strong international growth of the industry. In further justification of the above statements, an ABS report on internet users states that "*Wireless connected nearly 5% (186,000) of all Australian broadband subscriptions (mobile and fixed) at the end of September 2006, up from 38,000 in the March quarter 2005*".

The statistics on the number of users indicate that wireless service users, specifically mobile phone users, will grow by 7.4 percent to 19.2 million this year, with 100 percent penetration by 2008 (Fisher 2005; The Allen Consulting Group 2005). According to these predictions, this trend will sustain and even increase due to the increased adoption of the wireless technology. This is possible as many Australian households and businesses are looking to add some elements of wireless connectivity into their networks either through fixed wireless or wireless hotspots. Other forms of wireless connectivity include automated transmission technologies such as radio frequency identification (RFID), UWB (Ultra-Wideband Bluetooth), and smart tags.

In Australia, Telstra leads the wireless service provider market. With the partial sale of Telstra in 2005, the telecommunication services profoundly impacted on regional Australia. The company's main focus is on wireless communications such as mobile telephony, SMS and wireless internet. The company has also developed a technology platform to help wireless operators and other partners such as the Nine Television Network and games developers to provide wireless entertainment services such as mobile TV episodes and games. In order to be competitive in the telecommunications market, Telstra has recently launched the third generation Next-G mobile network replacing its old CDMA network to cover large parts of Australia, especially the rural sector. Next-G uses High Speed Downlink Packet Access (HSDPA) as a platform to deliver a wide variety of services at turbo-charged speeds and downloads

primarily focusing on wireless broadband technology with the intention of extended coverage range that lets isolated residents stay in touch (Flynn 2006). While HSDPA offers a lot for users compared to CDMA, such as increased bandwidth for internet and audio/video streaming users and greater capacity and reliability of the technology in terms of its performance, the current picture shows that Telstra is enjoying the benefits of its new network (Howarth 2007; LeMay 2006).

The other major wireless service provider Vodafone partnering with Optus has recently launched its new 3G (UMTS) network using both HSDPA and W-CDMA technologies (LeMay 2005). Vodafone's services are based on its Vodafone Live! Multimedia platform which deploys 3G services such as video calling, video messaging, music downloads, music videos, movie trailers, mobile TV episodes, games, and live news to its customers at data rates of 384 kbps to maximum of 10 mbps. With an ever increasing clientele base and quality of services, Vodafone is expected to occupy major share of the Australian telecommunications market.

As other wireless service providers are on their way to improving their quality of services and customer base, there is no doubt that the wireless telecommunications industry in Australia is moving toward the new generation, which enables end users to enjoy a wide variety of wireless services. These wireless service providers compete to differentiate themselves on price services and design in an attempt to convince end users. Well-established business strategy in telecommunication services will deliver great success to the service providers. However, no amount of promotion will reverse popular opinion and word of mouth if end users do not desire a particular service offered from these wireless service providers. Therefore, it is important to understand the behavioural intention that drives end users to choose between and use the wireless services.

2.3 End user acceptance of wireless telecommunication services

The first public mobile telephony service in Australia was launched in early 1980s. Decades after the inception of the wireless technology in Australia, wireless services are still finding their way into the mainstream as technology solutions applied to

various fields such as health care, business and education. In the recent years, positive trends in the development of wireless technology and services indicate widespread usage of wireless services. However, there is a need to evaluate the determinants that contribute to the end user acceptance of wireless technology to design the wireless services that the user accepts.

In this regard, prior studies pertaining to acceptance of wireless technology provide details on issues associated with user perceptions and behaviours while using wireless services (Atwal 2001; Axiotis et al. 2004; Balachandran et al. 2003; Bevan 2001; Bouwman et al. 2007; Geiger et al. 2002; Ho et al. 2004; Kun 2001; Mason 1994; Nysveen et al. 2005; Palen et al. 2000; Phillips 2002; Thai et al. 2003; Toms 2000). The main purpose of these studies was to examine how the technology impacts end users as information systems has established that users have to accept technology to use it (Agarwal & Prasad 1998b; Al-Gahtani & King 1999; Davis 1989; Livingstone et al. 2002; Venkatesh et al. 2003). This examination has revealed that several factors which contribute to acceptance of wireless technology include lower bandwidth rates, high delay, loss of data during transmission of information across wireless networks and high error rates (Balachandran et al. 2003; Geiger et al. 2002). In addition to these challenges, prior studies have also indicated that challenges related to end users' devices, such as size of the screen, cheaper wireless devices and their inability to support various wireless services, and lower computational power of wireless devices, influence user behaviours (Axiotis et al. 2004; Bergman 2000; Geiger et al. 2002).

Further, Kun (2001) identified mobility and interactivity to be the two important factors affecting the usage of wireless telecommunications services for end users. Prior studies have also highlighted other factors such as security, authentication, and location services driving widespread adoption of wireless telecommunication services (Balachandran et al. 2003; Ho et al. 2004). Their reported findings however, are restricted to a discussion of design outcomes, with little description about the nature of use. In addition to the above challenges, literature also suggests that various other factors such as demographics, technology-related skills, and culture were identified as important determinants influencing the implementation and acceptance of wireless services.

2.3.1 Wireless service characteristics

For this study, based on the summary of the above challenges, the following wireless service characteristics were found to be influencing the user behaviour intention. These wireless services characteristics are classified into mobility, system interactivity, system interoperability, and user context based on the literature review.

2.3.1.1 Mobility

The primary factor that influences widespread adoption of wireless services is mobility. Prior studies such as Akyildiz and Wang (2004), Brodie & Perry (2001), Di Stefano & Santoro (2000), Kakihara & Sorensen (2001), Perry et al (2001) and Thai et al (2003) discussed mobility as an important wireless service characteristic and as a key consideration for the future developments of networks and services as it enables individuals and organisations to work away from the office and on the move. These studies discussed user mobility in terms of being able to contact other people and access data and applications from anywhere at anytime with convenience (Kakihara & Sorensen 2001; Kobayashi et al. 2000; Lyytinen & Yoo 2002). Another study extended the concept of mobility into terminal mobility and personal mobility. Terminal mobility refers to the ability of the wireless network to locate a wireless device and personal mobility refers to the ability of users to access defined services from any terminal in the network while maintaining their personal environment settings (Di Stefano & Santoro 2000). In terms of the mobility aspect, Thai et al (2003) discussed the need for improvement of technology for successful implementation of terminal mobility and personal mobility schemes. However, this study focuses on mobility from the perspective of the end user i.e., personal mobility rather terminal mobility.

Essentially, coverage and real time connectivity aspects have been instrumental in the mobility factor of wireless telecommunication services. While, in general, the coverage refers to the reception area in which the end user's device is able to access the services, this coverage area is strongly correlated with the strength of the signal and power of the wireless device (Furht & Ilyas 2003). Coverage is usually limited to specific public hotspots such as airports, recreational centres, universities and other important locations, hence, wireless devices need to rely on networks to acquire

greater degree of continuous coverage (Furht & Ilyas 2003). This aspect is considered to have influence on the user behaviour as it impacts the end user's overall job/work productivity.

Studies related to mobility also highlight a lack of real time connectivity as one such important aspect of wireless services characteristics (Gururajan et al. 2004; Rockhold 2000; Sextro 1998). Lack of real time connectivity is a consequence of the connectivity problems with device and users' mobility i.e., getting access to people, data and applications from remote locations becomes problematic (Stevenson 2001). Individuals who are highly mobile demand to always be connected and use wireless services to get their daily work done. Users would feel frustrated or inconvenienced if there are problems with the wireless connectivity. For example, Rockhold (2000) discusses the environmental challenges faced by wireless telecommunication service providers and the impact on their ability to provide real time data to the users. In this regard, Mohammad & Syed (2005) commented that performance of wireless networks suffers significantly in closed environments such as office locations and interior buildings as the wireless signal gets weakened as the distance increases. Sextro (1998) discussed the issue of frequent interferences and the inability to connect reliably on the first attempt when the user is mobile as an alarmingly universal problem for database access. Considering the above challenges and their possible influence on the end user behavioural intent, it would be worthwhile to study this factor for their acceptance of wireless services.

2.3.1.2 System interactivity

System interactivity refers to the capability of wireless devices with suitable interface design to access wireless services with convenience and ease of use. Thus, the system interactivity in terms of ability to interact and the capability of wireless devices is considered to be another important factor as it has influence on the wireless services (Atwal 2001; Bevan 2001; Mason 1994; Toms 2000).

From the review of prior studies, it appears that the majority have focused on the device's capability factor as a central theme because the wireless device's capability is mainly an issue of hardware implementation and usability of wireless technology

(Atwal 2001; Bevan 2001; Mason 1994; Sarker & Wells 2003b; Toms 2000). Due to the relative newness of wireless technology, this aspect appears to be playing a crucial role in influencing end user behaviours. There are several issues and challenges relating to this scenario which come from the fact that wireless devices have much lower processor power, limited bandwidth, less memory, limited display, restricted input devices and a finite battery power when compared to fixed/wired devices such as desktops.

The following, summarised from the prior literature, are some of the challenges relevant to interactivity in terms of the capability of wireless devices. For example, Toms (2000) discussed the size of the screen and hence the problems that may be encountered in displaying data due to small screen size while capturing data. A similar study on the potential problems of capturing data using wireless devices due to the 'hard-to-see display' nature of these devices is discussed by Bevan (2001). Correspondingly, Atwal (2001) highlighted the problems that may be encountered due to the lack of provision for high quality graphic display on wireless devices and their inability to support access to multimedia content at a high end value to the end users. It seems that the above described particularities and limitations of wireless devices pose considerable barriers to the adoption of the technology.

Other studies reviewed the system interactivity from the point of complexity i.e., complexity with the interactivity enabled by the interface design, functionality, and usability of wireless services (Lu et al. 2003). In general, users have the facility to select between a wide variety of wireless services and applications with varied user interfaces and functionalities depending on the context and job/work that user may need to attend. As an example of the scenarios of wireless services with different user interfaces and functionalities, Apple's iPhone has touch screen buttons which enable users to point and click on the screen with a finger or using a stylus. For this iPhone, there is a least number of physical buttons and it is very useful for applications that require minimal input selection (Elgan 2007; Martin 2007). Similarly, for internet access, wireless devices including laptops, PDAs and mobile phones have specific micro as well as regular browsers. The user interfaces for these browsers vary significantly with the device, manufacturer and the model in use. The text entry, selection and navigational aspects enabled by these applications or service

user interfaces can have significant influence on user's satisfaction of performance and mental effort resulting in the impact on overall behavioural intent for their acceptance of wireless services.

Some of the challenges in regard to system interactivity have been examined in prior studies. For example, Bergeron (2001) discussed the issues with user interface and their role in the application and content delivery. Other studies discussed navigation, text input and other forms of user interface elements as a major effort for the users from a novice to an expert who engages in high volume text exchange. Sarker & Wells (2003b) argue that flaws in the logical interface of the wireless devices is a major factor affecting the implementation and acceptance of wireless phones. Similarly Gururajan, Murugesan & Soar (2005) quote that in health and aged care, capture and delivery of the clinical information at the point-of-care using wireless hand-held devices is always critical. Inability to interact with the evidence-based information repositories as a result of the inferior interface functionality of the wireless devices may impose significant barriers for offering decision-support functionality to clinicians. Therefore, from the perspective of users, wireless services need to deal with device limitations and interface characteristics and be optimised to run on the wireless devices.

According to Davis (1989), system characteristics such as those described above exhibit indirect consequences on end users' usage intentions or behaviours. Perceived ease of use and perceived usefulness attributes of user behaviours are influenced as a result of end users' use and experience of device limitations and interface characteristics of wireless services. For the above reason, the study further seeks to identify system interactivity impact on the end user adoption and behaviour for their choice of wireless services.

2.3.1.3 Wireless trust environment

Prior studies such as Lu et al (2003) explain trust as a complex social phenomenon that reflects the behavioural aspects of user interactions with the wireless system. Fogg & Tseng (1999) define trust as an indicator of a positive belief about the perceived reliability of, dependability of, and confidence in a person, object or process. User trust in a wireless environment includes perceived reliability of the

technology and the information and functions provided, reliance on the service in planned usage situations, and the user's confidence that he/she can keep the service under control and that the service will not misuse his/her personal data (Eija 2003; Kaasinen 2005).

In a wireless environment, users need to supply their credentials in order to authenticate themselves and be able to access the wireless services. For example, when users are using wireless services that are provided to them using complex wireless networks, wireless service providers do not know the identity of the user that they are interacting with. End users may need to identify themselves before receiving the information or accessing the wireless services from these wireless service providers. Users increasingly rely on wireless services for their daily activities and wireless services and the service providers increasingly collect and use information about the usage environment and the users. In such circumstances, the reliability of the technology and conveying information about reliability to the users become more important, especially in ensuring the security and privacy of the user (Ashley et al. 2001; Balachandran et al. 2003; Furht & Ilyas 2003; Gururajan, Hafeez-Baig et al. 2005).

The main factors that encompass trust environment are security and privacy (Lu et al. 2003). Studies related to trust discussed the threats in the form of security and privacy in a wireless environment and ways to improve the trust environment for the acceptance of wireless technology (Maximilian & Alfred 2004; Mayer et al. 1995; Pedersen 1999). From these studies, it appears that trust has significant impact on the user behavioural intent as trust is associated with risk, generally the higher the risk the less people trust.

Studies related to security risks in a wireless environment discussed m-commerce and m-health as the key areas because numerous applications of wireless technology can be seen in those areas (Gururajan, Hafeez-Baig et al. 2005; Gururajan, Murugesan et al. 2005; Gururajan et al. 2004; Phillips 2002). While these studies discussed that the above described areas are subjected to more security risks due to the dynamic structure of the wireless technology, that is prone to several interception risks such as intrusion, leeching and exploitation including man-in-the-middle

attacks, rogue access point, data alteration, exposure of confidential data, and denial-of-service attack (Ashley et al. 2001). However, in recent years these have been addressed by several security mechanisms such as wireless transport layer security (WTLS), public-key infrastructure (PKI), certificate authority (CA), device independent smart card, and wireless biometric services to protect and safeguard users' information (Lu et al. 2003).

Despite the availability of various security protection mechanisms, there are other security concerns that were highlighted by prior studies. Hayton & Moody (1996) discussed security issues while using the wireless services with premature standards and protocols. Gururajan, Murugesan & Soar (2005) note that security risks in the healthcare sector increases with the increasing numbers of users. Any alterations in the medical information will have serious repercussions on the patient. Ghosh & Swaminatha (2001) commented that malicious hackers and attackers have more opportunities in a wireless environment when compared to wired environment, there are new security and privacy risks particular to the wireless medium. Ashley, Hinton & Vandenwauver (2001) note that users' perceived lack of security in the wireless environment has delayed many initiatives in providing e-commerce applications from wireless devices.

On the other hand, privacy is a multi-dimensional construct encompassing physical and social judgments (Pedersen 1999). Trust and privacy are inter-related constructs – the more user trust, the more information the users are prepared to reveal about themselves (Maximilian & Alfred 2004). Prior studies discussed privacy in terms of four dimensions namely physical, informational, psychological and social (Pedersen 1999). However, the discussion in this study focuses only on privacy as a key aspect rather than in terms of its four dimensions. In a wireless environment, privacy protection concerns the right to collect, use, store and forward the personal information (Kaasinen 2005; Lu et al. 2003). Many of the wireless services/applications use personal preferences to provide value-added services. The information collected about the end user's use and behaviour by these services/applications can be misrepresented, misjudged, and sometimes even disclosed or sold to third party without user's knowledge and consent. When the user

becomes aware that his/her confidential information is compromised, the result could have a serious impact on their decision for future use of any of the wireless services. As trust is multi-faceted, several factors are important when understanding wireless services use and need to be addressed for successful adoption of these services.

2.3.1.4 System interoperability

System interoperability is yet another factor critical in ensuring adoption of wireless telecommunication services. System interoperability refers to the ability of different wireless systems and application services to communicate, to exchange data accurately and consistently, and to use the information that has been exchanged (Joseph et al. 2004).

The following are some of the scenarios that emphasise system interoperability as an important factor. Firstly, different users may use various types of wireless services depending on the context of the task or even for tasks that were not anticipated in the design. For example, users in a university or in a business environment would prefer to use applications and services (e.g. VPN) that support and are compatible with his/her workplace environment, whereas the same user may use different kinds of services (e.g., email and internet) in his/her home or personal environment. Secondly, the variety of wireless devices and interfaces are growing (e.g., laptops, mobile phones and Personal Digital Assistants – PDAs) and users expect to be able to use the same or the similar kind of services on different devices. For example, on a laptop fitted with both CDMA wireless modem and PCMCIA wireless LAN card, the internet can be accessed through either of the interfaces, depending on user constraints and current network conditions (Joseph et al. 2004). Thirdly, the technical and service infrastructure may differ and may even change in the middle of a usage session. For example, the wireless network (WLAN) or the positioning system (GSM) may change when the user moves from one location to another. Correspondingly, the service infrastructure, i.e. the available services and applications, may change along with the technical infrastructure to suit to the usage environment. All these scenarios explain the need for seamless connectivity and interchangeable communication between the devices, applications and services even in changeable and unpredictable environments (Churchill & Munro 2001).

System interoperability issues have been discussed to some extent in academic research (Akyildiz & Wang 2004; Bargh et al. 2004; Joseph et al. 2004). From the review of these studies, the main challenges such as uniform standards and protocols and the expected performance are considered to be playing role in the system interoperability as a factor. Kun (2001) discussed the relative immaturity of the technology and its adverse impact on the provision of services as protocols and devices are not standard and the networks are not uniform. For example, currently there are numerous standards (e.g., WAP, 2G, 3G, and CDMA) available offering the same functionality of wireless service with different performance. These aspects may have influence on the geographical location of users and the availability of wireless services at that location, which may influence end users' satisfaction and performance negatively in terms of compatibility and interoperability of devices and network standards.

Prior studies discussed the outlook of expected performance while interconnecting the devices and applications. For example, Stathes Hadjiefthymiades (2003) and Yang et al (2003) note that in a wireless environment, wireless networks can have high packet loss rates which can degrade web browsing performance on wireless systems and hence influence user choices. Further, the current standard for data throughput for wireless transmission supports a maximum of 54 mbps which may not supply sufficient quality of service for time sensitive client/server applications. At present, several new wireless standards are emerging, such as IEEE 802.11e, 802.11f, and 802.11g, offering different quality of service controls, but this will only add to the currently present increased complexity of implementation and interoperability of existing applications issues (*IEEE 802.11 LAN/MAN Wireless LANS* 2006). From the above discussion it can be summarised that the available network coverage area of wireless service providers and performance factors of the wireless networks such as throughput and load balancing while serving the user requests are some of the challenges related to system interoperability that users face (Joseph et al. 2004).

2.3.1.5 User context

Understanding the issue of user perceptions and behaviours in influencing the choice of wireless telecommunication services is important because this will enable wireless service providers to offer appropriate services to the end user. Such understanding includes the perceptions of end users for social appropriateness and their behaviour and practice, wireless service usage patterns and behaviours in a wireless environment and user experiences in handling difficulties with the wireless services and devices (Balachandran et al. 2002; Palen et al. 2000; Roto & Kaikkonen 2003). These factors have profound implication on user choices and hence should be considered when user behaviours are determined.

In general, the context can be defined *as any information that can be used to characterise the situation of an entity. An entity is a person, place, or object that is considered relevant to the interaction between a user and an application, including the user and applications themselves* (Dey 2001, p. 3). The extant literature surrounding the user and the context of use suggests that individual characteristics, tasks and the environment in which the wireless system is used plays an important moderating role on the effect of the factors discussed earlier (ISO-13407:1999). Individual characteristics include demographics, technology-related knowledge and education, skills and experience. Whereas the wireless environment includes the technological infrastructure such as networks, technology, service/applications, and the resources used. In addition to the above, the relevant standards and external environmental factors, such as legislative policies and regulations, become part of the wireless environment.

The following are the some of the scenarios that explain user context of use (e.g., interactions, communications and collaboration) as an important factor in a wireless environment. Firstly, users' economic considerations can have significant influence on the usage behaviour. For example, for individuals on a limited budget, such as students, use patterns and behaviour were highly influenced by the pricing plans (Sarker & Wells 2003b).

Secondly, the social context in which the user collaborates and shares information with others using wireless technology has significant influence on the user behaviour.

In a workplace environment, individuals may require assistance from their colleagues or depend on their superiors to perform the desired tasks/duties using wireless services, and the attitude and willingness of the superiors and colleagues towards assisting the user can have significant influence on the behaviour for their acceptance of wireless technology (Gururajan 2005).

Thirdly, the quality, availability, and accessibility of technological infrastructure (e.g., telecommunications) at the user's convenience also have major role in the user behaviour. For example, quality of service – wireless networks that have lower bandwidth than fixed networks may impose restrictions on usage; availability of service – the user can be out of network coverage or have bad network coverage; accessibility – the user needs to get feedback on the progress of data transfer and, moreover, he/she may need to estimate beforehand how long certain operations may take (Väänänen-Vainio-Mattila & Satu 2000). All of the above aspects related to technological infrastructure may have influence on the user's behavioural intent.

Furthermore, critical mass of subscribers for a particular service can also have impact on the user behaviour. An example of this aspect can be where, for an individual to use a wireless service (e.g. video call), a significant number of members of the subject's social network needed to be users of the same service (Sarker & Wells 2003b). Other environmental factors such as variable lighting conditions, noise and varying climate may affect the usage situation. Therefore, from the above scenarios the user context is considered to be an important factor as the context affects the usage situation similarly to the user and the technology in use.

In this study, the above factors are broadly classified and discussed into facilitating conditions, policies and regulations, training and resources, and social influences and are considered to be having impact on the end user decision for their acceptance of the wireless services. Facilitating conditions is the availability of resources such as time and money and other technological factors such as compatibility issues that may constrain usage (Lu et al. 2003). Several studies related to technology acceptance related theories have found empirical evidence on facilitating conditions as an important element that has influence on the user for their adoption of the new technology. Wireless access availability, training and provision of support, policies

and regulations, supporting personnel, cost, and existing infrastructure are some of the elements that constitute the facilitating conditions factor (Agarwal & Prasad 1998b; Davis 1989; Lu et al. 2003; Venkatesh et al. 2003). The individual aspects of some of these facilitating conditions are discussed briefly.

Wireless access availability is considered to be interchangeably used with the connectivity aspect of mobility. However there is a difference between the availability of wireless access to services at a desired location and lack of real time connectivity. While the hotspots or wireless access points are limited, the availability of wireless services at those desired hotspots is different to the lack of connectivity to wireless services at these hotspots although there is an existence of wireless services previously. The following example further clarifies the distinction between the two. The 3G services such as video call offered in metropolitan cities cannot be operational in rural areas due to the lack of necessary wireless infrastructure to support such services. However, lack of real time connectivity refers to the connectivity issues such as restriction in the bandwidth usage or signal strength that may change from strong to weak interrupting user operations. This aspect can influence the user behaviour and must also be addressed to accomplish smart information management (Gururajan et al. 2004).

Another aspect of facilitating conditions, training and resources, is important to the end users as it improves overall knowledge and literacy for wireless system users (Donald & Donna 1990). An inexperienced user would have a daunting task to gain access to, and use, wireless services. Venkatesh (2000) notes that training is one of the essential components to consider when trying to enhance a user's self-efficacy and overall perceptions about the specific system and their general beliefs about new information technologies.

Lu et al (2003) note that the policies and regulations aspect of facilitating conditions can be viewed as external controls related to the environment that have effect on the user behaviour. According to the authors, policies, regulations and legal environment are critical to technology acceptance. Legal protection, competition policies and regulatory schemes from telecommunication industries, service providers, local government, and other standardisation bodies are responsible for promoting

innovation in a fast-growing wireless telecommunication service industry (Bourreau & Doan 2001). They control all the restrictions and usage of wireless services to the end users. This will have an impact on the end user behaviour for their wireless services usage.

Social influence is the measure of people's support in adopting the technology. This element is often interchangeably used with subjective norm, however social influence in general constitutes the social status, image, credibility, workplace culture, working relationships, and other people's opinions and influences such as peer and superior influences (Al-Gahtani & King 1999; Davis 1989; Venkatesh & Morris 2000). A person with high social status, image and credibility may influence and persuade others in understanding and accepting new technology implementation (Venkatesh & Morris 2000). End users in a wireless environment are usually in social situations and their behaviour tends to be affected by such persuasive people. Further, symbolism or image is another subjective norm that has impact on the user perceptions. Where the penetration of wireless technology is not substantial, people may view the devices and services as "a young thing", "a rich thing", and "a cool thing"(Sarker & Wells 2003b).

Prior studies have also examined the pricing plans and quality of service being offered to end users as users started demanding cost effective high quality services to realise their data transmission using wireless services (Akyildiz & Wang 2004; Garcia-Macias et al. 2003; Lindgren et al. 2003). Jain & John Wullert (2002) discussed the importance of understanding the cost factors and its influence on choices of device availability for wireless services. Further, Shroeder (1999) discussed the issue of relative high costs on end users to initially set up wireless services. End users may not be able to afford this cost and hence this may have an influence on the behavioural aspects.

Collectively the wireless service characteristics in terms of mobility, system interactivity, wireless trust environment, system interoperability, and user context issues appear to be influencing end user behavioural factors. Therefore, this study will conduct an investigation into the factors of end user behaviours that influence the choice for wireless telecommunication services.

2.4 Applicability of current approaches to studying user acceptance of wireless telecommunication services

Several theories exist providing theoretical frameworks for research in acceptance of information systems (IS). The most frequently used theories for studying behavioural intention for acceptance of technology were the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), the Diffusion of Innovation and the Theory of Reasoned Action (TRA). However, the extant literature surrounding the context of IS acceptance emphasised the use and application of technology acceptance theories among various other theories such as Innovation – Diffusion Theory (IDT), Theory of Reasoned Action (TRA), and Theory of Planned Behaviour (TPB) (Agarwal & Prasad 1998a, 1999; Al-Gahtani & King 1999; Chau & Hu 2001; Horton et al. 2001; Hu & Chau 1999; Pedersen 2005; Venkatesh 2000; Venkatesh et al. 2003). These studies proposed theoretical models to suit recent trends and technologies that include Internet, WLAN, World Wide Web, in prediction and explanation of behavioural factors such as attitudes, satisfaction and usage factors.

The following Table 2.1 summarises prior studies on the acceptance of wireless technology. However, limited research can be found on the adoption of wireless telecommunication services particularly in the Australian domain (Lu et al. 2003). This study proposes a research model based on gaps in the prior literature as discussed in the next section.

Table 2.1: Literature review on IS acceptance of wireless technology

Author/ Date	Keyword	Targeted Users	Theory/ Scale used	Objective of study	Research Methodology/ Sample	Findings	Limitations/Gap
(Mirella Kleijnen 2004)	Consumer adoption of wireless services	Gaming	Innovation Diffusion Theory (IDT)	Explain the adoption of mobile gaming based on a refined model of Rogers' adoption theory among three customer segments: Value seekers, Risk avoiders, and Game players	Personal interviewing/ pseudorandom sample of 99 respondents	Perceived risk followed by complexity and compatibility have a significant effect on adoption process	Research area not in Australian context
(Gera & Chen 2003)	Evolution model for wireless services		Wireless Technology Diffusion Model (WITD)	Determining diffusion of wireless technologies to the end users in four phases: knowledge acquisition, user-assessment, decision & actual use and adoption process	Four case studies/ each case study is divided into four stages of diffusion	WITD model to provide basis for understanding end-user needs and requirements; Advantage, compatibility, ease of use and subjective norms to be found significant in three of four cases.	Research area not in Australian context.
(Palen et al. 2000)	Behaviour and practise of new mobile phone users	New mobile phone users		Understand how and why people use mobile phones in a range of situations, and to understand their processes of discovery and integration of mobile telephony in their daily life	Interviews and voice-mail "diaries"/ 19 new mobile phone users	New users tend to rapidly modify their perceptions of social appropriateness around mobile phone use	Research area not in Australian context Research not specific to wireless services
(Gururajan, Hafeez-Baig et al. 2005)	Adoption of Wireless Handheld Technology	Healthcare sector		Investigate factors that determine the adoption of wireless handheld applications in hospitals for data management by nurses; Four broad themes namely documentation, information management, advantages and benefits were investigated	Purposive sampling; Literature review in stage1 and 30 interviews with nursing staffs in stage 2	Access to information and the management of volumes of information are two factors emerged strongly as facilitators; Security, confidentiality and policy framework appear to be inhibiting the adoption	Research not specific to wireless services

(Kaasinen 2005)	User acceptance of location-aware mobile guides	Mobile users	Extended TAM	Investigate factors that affect the user acceptance of location-aware guidance services.	Seven field studies with approximately 437 respondents	Factors of usability, utility and user trust affect the user acceptance of location-aware mobile guides; location-awareness can provide the users with easy-to use and situational relevant mobile guides	Research area not in Australian context
(Sarker & Wells 2003b)	Mobile handheld device use and adoption	Rural public University	Input-Process-Output model (IPO)	Understanding key factors affecting the use and adoption of handheld hybrid mobile devices.	Interviews with 21 respondents in 5 different groups	Interface characteristics and network capabilities found to be key factors affecting the implementation and acceptance of wireless phones	Representativeness of the sample; Research area not in Australian context; Research not specific to wireless services
(Lu et al. 2003)	Technology acceptance model for wireless internet		Wireless Internet via mobile devices (WIMD) from revised TAM	To develop a conceptual framework that examines and explains the factors influencing user acceptance of WIMD; User acceptance is examined by attitude toward use and intention to use rather than actual use	Sample tested on MBA students in a regional university	Twelve propositions are developed to promote and facilitate future empirical research relating to WIMD	Model needs to be adaptive to local environment
(Ai-Mei & Kannan 2006)	Employee technology readiness and adoption of wireless technology and services	Government employees	Technology Readiness Index (TRI)	Examine the relationship between users' technology readiness (specifically employees) and their adoption of wireless technology and services in a longitudinal setting.	Survey/ 204 respondents	Discomfort and insecurity have a positive impact of technology use on user technology readiness and comfort with technology; No significant	Representativeness of the sample; Research area not in Australian context;

						difference found on technology optimism and innovativeness	
(Margherita 2004)	Consumer adoption of third generation mobile multimedia services	Mobile Users in Italy	Extended TAM	Understanding consumer adoption of mobile multimedia services that are likely to emerge with the roll out of third generation mobile services	Pilot study with random sample of 56 young mobile users, aged 21–28; 24 focus groups in six markets	Perceived usefulness, ease of use, price, and speed of use are the most important determinants of adoption of multimedia mobile services	Research area not in Australian context
(Chin Chin & Pang Leang 2005)	Adoption of Mobile Entertainment	Malaysian Entertainment among young people between 18 to 25 years old		Examine drivers and barriers that could be used to derive architecture for entertainment service provision to guide Telco's to outline suitable approaches to encourage mass market adoption of mobile entertainment in Malaysia	Survey of 384 respondents	Perceived benefit of mobile entertainment is strong determinant compared to issues of pricing, product and technological standardization, peers and community as well as privacy and security.	Research area not in Australian context
(Kleijnen et al. 2004)	Consumer acceptance of wireless finance	Finance (Netherlands)	Extended TAM with constructs: perceived cost, system quality and social influence	Explores the factors contributing to the adoption of mobile services in the context of wireless finance.	Questionnaire survey/ 105 respondents	System quality and social influence found to be significant determinants of the acceptance of wireless finance. Moderating effects of the variables age, computer skills, mobile technology readiness and social influence proved to be relevant in the context	Research area not in Australian context
(Pedersen 2005)	Adoption of mobile internet	early adopters of mobile	Decomposed theory of planned	An empirical study of early adopters of mobile commerce services	Questionnaire survey/ Sample of 232 respondents	Study shows that the extended and modified model has	Research area not in Australia context.

	services	commerce services	behaviour			good fit to the early adopter data and that it explains 49% of the early adopters' intentions to use mobile commerce services	
(Ofir et al. 2007)	User acceptance of wireless short messaging services	Young–adult SMS users	Model revised from UTAUT and other TAM studies	Determine whether the perceived value of short messaging services (i.e., the consumer's overall assessment of the utility of SMS based on perceptions of what is received and what is given) positively affect an individual's intentions to use them? Also examine the key value components that drive the adoption of short messaging services.	Empirical survey of 222 respondents using convenience sampling technique	Intentions to use IT were influenced by performance expectancy, effort expectancy, and facilitating conditions. Perceptions of positive emotions and price were the key factors influencing usage intentions towards SMS	External validity, since the population of SMS users were from only one university in one country and a convenience sampling method was utilised
(Anderson & Schwager 2004)	Adoption of WLAN technology	Small to Medium Enterprises (SME)	UTAUT model	Determine whether UTAUT hold up in the context of small business? And also determine the factors adoption of WLANs by SMEs	Survey/ approximately 1200 SME companies	Study in progress. Yet to find the results	Research area not in Australia context. Research not specific to wireless services
(Cheong & Park 2005)	User acceptance of mobile internet services	Mobile Internet subscriber	TAM	Determine human motivations underlying individual behavioural intention to use M-internet in Korea	Online survey; random sample of 1279 respondents	Attitude toward M-internet is the most significant factor in predicting the behavioral intention to use M-internet	Research area not in Australian context.

The above Table 2.1 summarised literature review on wireless technology acceptance. As seen from the table, the majority focused on technology acceptance theories such as TAM, extended TAM or TAM2, UTAUT, and WIMD model in the prediction and explanation of user behavioural intention for their acceptance of wireless technology.

While technology acceptance theories provided significant contribution to this study, other theories such as TRA, TPB, and IDT relating to user adoption of technology have also been influential in prediction and explanation of behavioural factors. Attitudes, the primary behavioural determinant as a result of beliefs and their subsequent influence of behaviour are first cited and developed in the Theory of Reasoned Action by Fishbein & Ajzen (1975). According to TRA, behavioural intention leads to actual behaviour and also that it determines end user's attitudes toward choice or using a particular service by influencing the normative value or subjective norm (Fishbein & Ajzen 1975). Whereas Theory of Planned Behaviour (TPB) developed by Ajzen (1985), is an extension to TRA that accounts for other conditions, where individuals do not have complete control over their behaviours. TPB suggests that in addition to attitudes towards use, subjective norms, and perceived behavioural control such as skills, opportunities and resources needed to use the system also influence behaviour. On the other hand, Diffusion of Innovation Theory (IDT) developed by Rogers (1995) concerns about the specific settings and other external factors that influence the information technology adoption. However, this line of theory focused more on the adoption of the technology and the prediction of the rate of innovation adoption rather than focusing on the use of technology.

Technology acceptance model (TAM) was developed by Davis (1989), and is assumed to be the root of other technology acceptance theories. TAM was basically adapted from TRA, specifically tailored to the needs of the user acceptance of Information technology. Mainly two of its components i.e., perceived usefulness and perceived ease of use, are recognised as the fundamental determinants of user acceptance in information systems (Davis 1989). Perceived usefulness can be defined as the degree of user belief that using a particular system would enhance the job or performance, and perceived ease of use is defined as the degree of user belief that using a particular system would be free of mental effort. Factors such as motivations, perceptions and relative advantages leads to perceived ease of use and perceived

usefulness (Lu et al. 2003). The purpose of any variations of the original TAM (i.e., for its extension or revision) is to provide a basis for investigating the factors that influence attitude[1] which, in turn, can influence the intention to use the particular technology leading to the actual determination of usage behavioural factors. On contrast to TRA, Technology Acceptance Model does not require detailed specification of the time frame or conditions under which behaviour must take place.

This study focuses on prediction and explanation of end user behaviours for wireless telecommunication services, an important IS application. Such behavioural factors are measured from factors such as usefulness, motivations, satisfactions, and attitudes (Venkatesh 2000). For these reasons, determinants obtained from various technology acceptance theories are considered to be most suitable in providing a theoretical framework for the study in predicting and explaining the end user behaviours for wireless services. Further, technology acceptance theories were believed to be most robust, parsimonious and influential in explaining information systems adoption behaviour and received extensive empirical support through validations, applications and replications in predicting the use of information systems (Al-Gahtani & King 1999; Bouwman et al. 2007; Davis & Cosenza 1985; Davis 1989; Venkatesh & Davis 1996).

In addition to the above behavioural factors, other factors may also impact on the choice of wireless telecommunication services such as the wireless service characteristics of mobility, interactivity, system interoperability, wireless trust environment and user context including social influences, and facilitating conditions. Therefore, it can be argued that, when it comes to emerging technology such as wireless telecommunication services, technology acceptance theories may not be fully sufficient to predict the acceptance of technology because the context becomes quite different (Gururajan et al. 2004).

In investigating the end user behavioural factors for wireless telecommunication services, literature related to technology acceptance theories, wireless technology and other technology adoption related theories are studied in detail to come up with a

[1] Attitude is experience of some issue or object in terms of an evaluative dimension. Davis, F 1989, 'Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology', *MIS Quarterly*, vol. 13, no. 3, p. 318.

range of other factors. Thus, the research model for the study integrates determinants obtained from the technology acceptance theories, wireless technology and other adoption related theories for identifying end user behaviours for wireless services in an attempt to fill the gap of IS literature within the Australian domain.

2.5 Research model

The following figure represents an integrated research model which guides this study to investigate and find the behavioural factors of users involved in using wireless telecommunication services.

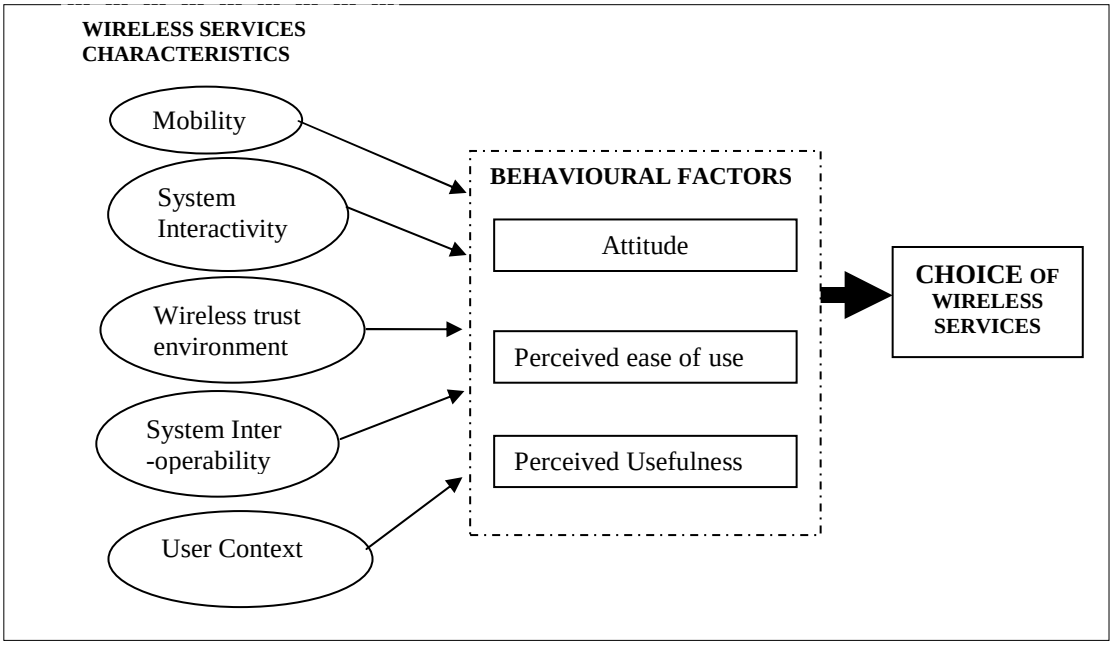


Figure 2.2: Research model

Based on the prior literature on technology acceptance theories, and from the studies of IS literature on technology acceptance, technology adoption and theoretical reasoning, the above hypothesised research model is presented in order to examine behavioural factors of end users on using wireless services. It is anticipated that behavioural factors such as perceived ease of use, perceived usefulness and attitude are identified as the some of key factors that are influencing the choice of wireless services. The choice of these wireless telecommunication services refers to the actual use or the preference given while accessing services through wireless devices among various types of services or applications available. Examples of such services include voice (mobile telephony), messaging services (SMS, MMS, and Unified), e-mail, video call and wireless internet. Similarly, from the review of wireless technology,

issues such as mobility, interactivity, capability of wireless devices and system interoperability are identified as the factors that are influencing the behavioural factors discussed earlier. Thus, these factors are considered to be evaluation criteria for measuring the choice of wireless services (Venkatesh & Davis 1996; Venkatesh et al. 2003; Venkatesh & Morris 2000). Although TAM suggests that perceived ease of use and perceived usefulness can lead to the attitudes, it can be inferred from the prior technology acceptance studies that there are several other mediating factors specific to technology play significant role on the perceived ease of use and perceived usefulness. Therefore, this study excludes the investigation into the causal relationships between the behavioural determinants due to time and budget constraints.

2.6 Summary of research problem

The literature review highlighted the research issue of how wireless telecommunication services and their characteristics influence the end user behaviours. Following this, end user acceptance of technology was reviewed to understand what behavioural factors impact the choice of wireless services. Therefore, as stated earlier, this study will address the research question:

> *What behavioural factors influence the choice of wireless telecommunication services for end users?*

2.7 Conclusion

This chapter provides a context for understanding the background, usage factors and importance of wireless telecommunication services by reviewing previous literature. Most previous studies focused on the adoption of functions or technologies rather than on the adoption of wireless services. Gaps in the literature are identified in the areas of wireless services and end user behaviours related to wireless services. There appears to be no study that focuses on factors influencing end user behaviour intention when using wireless services in Australia. The findings from this study will provide a good theoretical foundation for further investigation or studies on wireless telecommunication services.

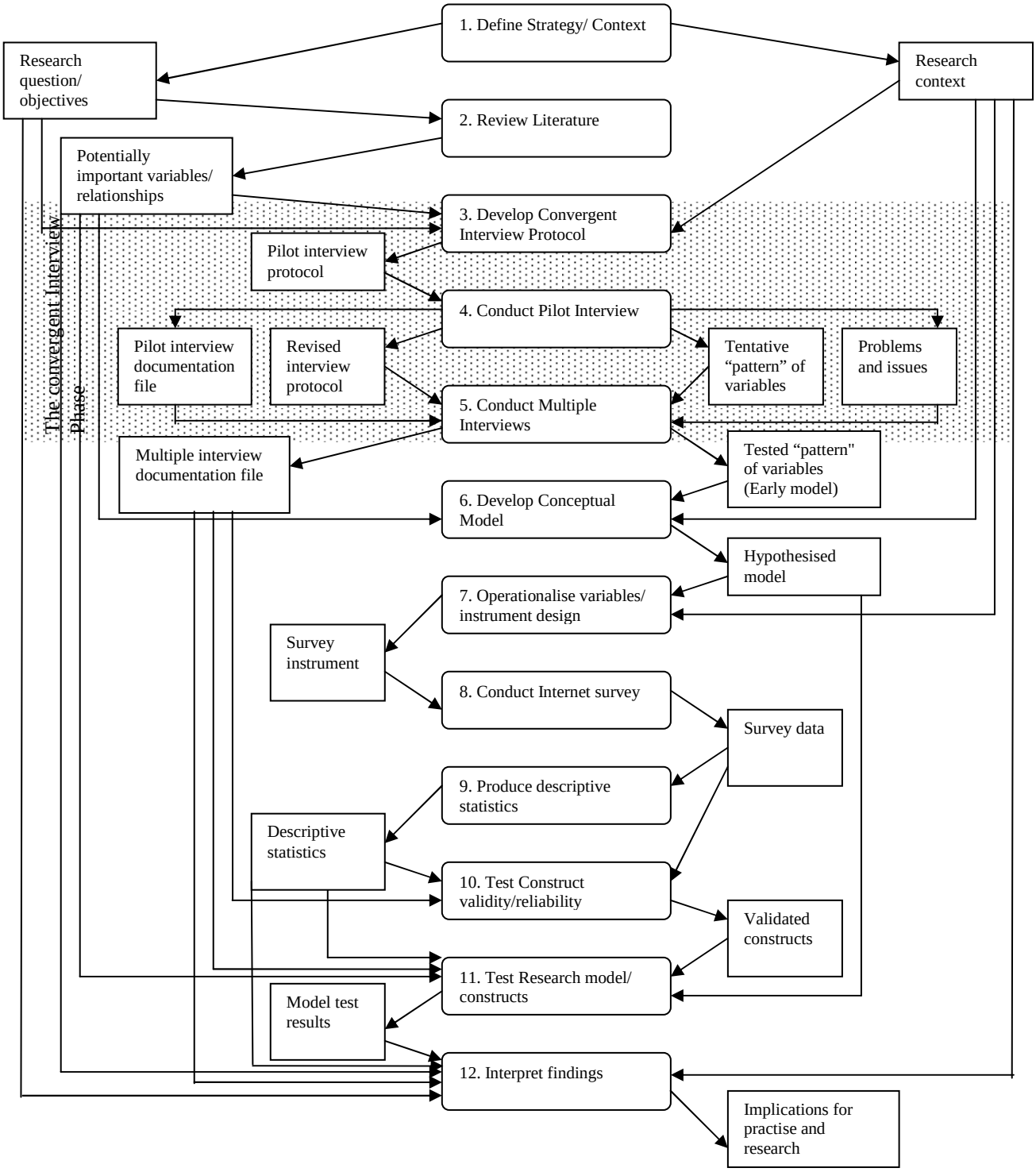
3 Research Methodology

3.1 Introduction

In this chapter, a description of the approach for conducting research to achieve its objectives is provided. It is followed by a discussion on scientific paradigm, namely scientific realism in the context of the discipline of information systems on which this research is based. This chapter further discusses the research methodology and research design in order to explain the process of data collection technique required to investigate the research objective. This chapter then reviews two types of research methods employed for this study, qualitative and quantitative, and justifies selection of these methodologies. Next, the research design with two distinct stages is discussed, each using a different method and also with a particular focus i.e., exploratory and descriptive. The convergent interviews conducted for the exploratory stage of investigation are described and justified, and the quantitative survey methodology is described followed by a justification of the survey stage of the research.

3.2 Research approach

The research incorporates qualitative and quantitative methods, each using a different research approach: qualitative convergent interviews – interpretive and quantitative online surveys in achieving research objectives. Figure 3.1 is a flow diagram of the research plan.



(Source: Adapted from Gable (1994) and developed for this research)

Figure 3.1: Integrated convergent interview and online survey methods: a flow diagram

The above figure provides a comprehensive research approach and phases of the research followed in the study. As shown in the figure, two phases of the research

include convergent interview and online survey and their flow of sequence of operations involved. The key steps and the process involved in each of the two phases are detailed further in the data collection Chapter 4. The primary objective of using multiple methods of approach for the research is to supply rich, detailed information on the qualitative research results, to aid in interpretation of results, to set themes for investigation, and to serve as further test of validity/reliability through statistical analysis of survey data.

Due to the relative newness of the topic in information systems research, the limited prior research on the technology usage behaviour in wireless context, specifically in Australia, and considerable interest for service providers, both qualitative and quantitative approaches are considered appropriate for this research. Due to the lack of adequate prior literature, the idea of using both qualitative and quantitative methodologies in research is more prevalent in information systems research as it provides rigour and strength (Mingers 2000; Zikmund 2003).

During the qualitative stage, a pilot interview and eight convergent interviews with end users with experience in using various wireless services were conducted. The primary purpose of this qualitative stage is theory-building and to gain a better understanding of the contemporary problem under investigation. A set of factors were developed after an analysis of data from the convergent interviews in conjunction with the literature review, which lead to finalisation of the scope of the research question. These factors were then explored in the second and major stage of the research, namely the quantitative phase. The primary purpose of this stage is to test the factors related to wireless services and end user behaviours that influence their choice of wireless services after garnering sufficient data which depicts the exact scenario of the current state of end user behaviours.

3.3 Scientific paradigms

This section provides a brief outline of the approach taken for this research in the context of scientific paradigms to information systems research. The nature of the research in information systems primarily considers two competing theoretical frameworks or paradigms, namely positivism and interpretivism based on the

different philosophical assumptions about the purpose of science and social reality. A paradigm for the research accentuates basic belief system or world view that guides the researcher in developing overall conceptual and philosophical framework (Guba & Lincoln 1994, p. 107). The preference of suitable design and methodologies for conducting research is clarified upon proper understanding of philosophical assumptions on which the two competing paradigms of information systems rely. A post-positivist paradigm critical realism is considered as a suitable paradigm for this research because of the ontological perspective of the researcher – that is, there is a reality of behaviour that, while not likely to be perfectly understood due to its complexity, can be usefully understood to some degree (Guba & Lincoln 1994).

Research in information systems provides various frameworks in classifying research paradigms, yet the suitability of the particular paradigm for the research is dependent on the research issues and ontological perspectives of the researcher. Positivism, a dominant philosophical framework in social science research involves statistical quantification or measurement of objective world or phenomena through systematic observation, surveys, experiments and statistical analysis. Burrell & Morgan (1979, p. 87) describes positivism as "*seeking to explain and predict what happens in the social world by searching for regularities and causal relationships between it s consistent elements*".

On the other hand, interpretivism framework or paradigm is concerned with social behaviour and activities of real people. Interpretivism draws on various subjective techniques for the deep understanding of such social behaviours. This often involves garnering qualitative data using participant observation, field research, case studies, and interviewing. Neuman (2003, p. 71) defines interpretivism as: "*the systematic analysis of socially meaningful action through the direct detailed observation of people in nature settings in order to arrive at understandings and interpretations of how people create and maintain their social world*".

Prior studies such as Healy & Perry (2000) and McPhail (2003) further classified interpretivism or phenomenology into critical theory, constructivism and realism based on their three characteristics: Ontology (reality), Epistemology (relationship between reality and the researcher), and Methodology (how the researcher discovers

reality?). A brief summary of three characteristics or elements on which the four paradigms of positivism and interpretivism approach are classified on Table 3.1.

Table 3.1: Distinguishing characteristics of the three philosophical dimensions for the four key research designs

	Positivist approach	**Interpretative approach**		
Three elements or characteristics of paradigms	**Positivism paradigm**	**Realism paradigm**	**Critical Theory paradigm**	**Constructivism paradigm**
1. Ontology	Naïve realism – reality that is apprehendable	Critical realism – a reality that is only imperfectly and probably apprehendable	Historical realism – virtual reality shaped by social, political, cultural, economic, ethnic and gender values crystallised over time	Relativism – local and specifically constructed realities
2. Epistemology	Dualist objectivist: findings are true as seen through a 'one way mirror'	Modified dualist objectivist: critical tradition community findings probably true seen through a 'open window'	Transactional subjectivist: value meditated findings by a 'transformative intellectual'	Transaction/ subjectivist created findings by a 'passionate participant'
3. Methodology	Experimental/ manipulative; verification of hypotheses: chiefly quantitative methods (Surveys and experiments)	Modified experimental/ manipulative: critical multiplism; falsification of hypotheses; may include qualitative and quantitative methods (Case studies, interviews, convergent interviews)	Dialogic dialectical (Action Research)	Hermeneutical dialectical (In-depth Interviews)

(Source: adapted from Guba & Lincoln 1994, p.112 modified with input from Easterby-Smith et al 1991; Parhke 1993; Perry 1998)

As this research primarily focuses on end user behaviours involving various complex and real life experiences, a pure positivist approach involving quantification of such behaviours ignores their ability to reflect on the problem situations and act upon this (Robson 1993, p. 60). On the other hand, the pure interpretivism approach involves subjective techniques thus emphasising the need for understanding the reality

surrounding the artefact or phenomena (i.e. wireless services) without being concerned with reproducibility of an explanation (Neuman 2003). Such an approach is not sufficient in its entirety to meet the requirements of this study.

Upon evaluation of various strengths and weaknesses of two approaches, a critical realism paradigm incorporating both qualitative and quantitative methods of data collection was considered as a suitable approach thus providing rigour and strength for the research. Realism paradigm is chosen from the interpretivism approach as it implies that there is existence of reality which is understandable because of basically flawed human intellectual mechanisms and the fundamental intractable nature of phenomena (Guba & Lincoln 1994). Such perspective eventually guides the choice of a methodological approach to conducting research. Critical realism paradigm is justified for this research based on the fact that it is widely acknowledged as the suitable paradigm for information systems research and strengthened through the use of multiple methods for data collection and analysis (Guba & Lincoln 1994). The following Table 3.2 provides a brief summary of the interpretative and positivism approaches based on which the appropriate research method for this research is selected.

Table 3.2: Selection criteria for an appropriate research method

	Scientific Paradigm	Research Method	Type of Research Question	Requires control over behavioural events	Focuses on contemporary Events	Theory building or theory testing	Aim of the inquiry	Type of generalisation
Positivist approach	**Positivism**	Experiment	How, Why	Yes	Yes	Testing	Prediction and Control	Statistical
		Surveys	Who, What, Where, how many, how much	No	Yes	Building	Prediction and Control	Statistical
Interpretative approach	**Realism**	Case Studies	How, Why	Yes	Yes	Building	Explanation-confirm /disconfirm	Analytical
		Convergent Interviews	How, Why	Yes	Yes	Building	Explanation /Exploratory	Analytical
	Critical Theory et al.	Archival analysis	Who, What, Where, How many, How much	No	Yes/No	Building	Critique/ Transformation	Analytical

	Constructivism	History	How, Why	No	No	Building	Understanding and reconstruction	Analytical

Source: Guba & Lincoln (1994); Perry, Riege & Brown (1999).

3.4 Research design

Neuman (2003) states that the nature of the research design can be categorised into exploratory research, descriptive or explanatory research and causal research depending on the purpose of the research. The nature of this study is considered to be both 'exploratory' and 'descriptive' involving qualitative interviews and quantitative surveys. The research is primarily intended to be descriptive as it presumes clearly testable themes/factors (Zikmund 2003). The study is also considered to be exploratory as initially a total of nine interviews, including eight in-depth personal convergent interviews and a pilot interview, were carried out with end users having experiences on usage of wireless services from various leading Australian wireless service providers to provide face validity to the multi-items measures of the variables in use in this study.

3.4.1 Exploratory research compared with descriptive research

The exploratory phase for this research aims to gain an understanding of the main research problem and surrounding themes and issues on wireless telecommunication services characteristics and related end user behaviours. In this study, exploratory research is conducted as a preliminary step prior to data collection i.e., online surveys. The central focus of this exploratory phase is theory-building and development of the factors to be investigated thoroughly. The findings from the exploratory phase served as input for the secondary stage of data collection i.e., explanatory research. For this research, the exploratory phase included literature review and convergent interviews. The research methodology for convergent interviews is described in section 3.7.2.

On the other hand, descriptive research is also practised in information systems research. The goal of descriptive research is stated by Sekaran (2000, p. 126) as to *describe relevant aspects of the phenomena of interest to the researchers from an individual, organisational, industry, or other perspective. Descriptive studies that*

present data in a meaningful form thus help to (1) understand the characteristics of a group in a situation of interest, (2) aid in thinking systematically about aspects in a given situation, (3) offer ideas for further probing and research, and/or (4) help make certain simple decisions.

The descriptive phase for this research aims to analyse and describe the outcomes of exploratory research. This phase tests the factors related to wireless services and end user behaviours that influence their choice of wireless services. Online surveys are conducted as a part of descriptive research. Online survey methodology is discussed in section 3.8.2.

3.4.2 Qualitative compared with quantitative approach

This research utilises a pluralistic method approach combining both qualitative and quantitative methods upon evaluation of the philosophical assumptions of the researcher, nature of the project and type of the information needed in the context of study and the availability of resources including time, cost and human. Such a pluralistic approach for the research is justified in this section.

Qualitative and quantitative methods are two broad approaches to the research and are considered complementary rather competitive (Neuman 2003). In this study, qualitative methods were used at a preliminary stage to develop or suggest theoretical arguments rather than testing them and generalising to the population. Such an approach involved a comprehensive exploration of a range of key factors surrounding the milieu of wireless realm that, in turn, provides deeper insights into end user behaviours which could then be strengthened or weakened by the quantitative support (Zikmund 2003, p .132). Qualitative research for the study involved collecting, analysing and interpreting data through the semi-structured convergent interviews technique. The purpose of the qualitative methods for this research is to reduce the uncertainty surrounding the research problem at the initial stage. Such a method produces findings without the use of statistical procedures.

On the other hand, the quantitative method is used as a second and final step in the research design. The findings from the qualitative stage obtained through the

convergent interview technique were used as input to the quantitative stage i.e., online surveys. The quantitative method for this research attempts to quantify data and uses statistical analysis to test the themes that the researcher begins with. Furthermore, the quantitative method for this research generalises the insights to a population thus establishing cause-and-effect relationships while the qualitative research tries to provide insights and understanding.

A brief comparison between the characteristics of two approaches is provided in this section to explore why both techniques are appropriately used for this research. The main differences between two methodologies are summarised in Table 3.3.

Table 3.3: Comparison of qualitative and quantitative approaches

Comparison dimension	Qualitative research	Quantitative research
Type of research	Exploratory	Descriptive or causal
Purpose		
Ability to replicate	Low	High
Objective	• To develop theory • To gain a qualitative understanding of the underlying reasons and the motivations • Discovery, description, understanding, shared interpretation	• To test theory • To quantify the data and the generalise the results from the sample to the population • Data reduction, control, precision
Orientation	Process-oriented	Outcome-oriented
Control	Facts are value-laden and subjected to bias	Facts are value-free and unbiased
Data collection		
Administration	Special skills and training required	Fewer skills required
Types of data gathered	Real, rich and deep	Hard and replicable
Types of questions	Probing	Limited probing
Information per respondent	Much	Varies
Data collection process	Unstructured	Structured
Sample size	Small	Large
Data Analysis		
Type of analysis	Non Statistical: Subjective and interpretative	Statistical, summarisation
Outcome	• Develop an initial understanding • Report rich narrative, individual; interpretation • Basic element of analysis is words/ideas	• Recommend a final course of action • Report statistical analysis • Basic element of analysis is numbers

(Source: Adapted and developed for this research from Malhotra, McDaniel, C. & Gates, R. 1999)

In brief, the pluralistic approach combining qualitative and quantitative methods for this research suggest the following advantages:

- research development;
- increased validity through overcoming weaknesses in specific techniques;
- complementary evidence through sequential triangulation (Neuman 2003); and
- creating new lines of thinking by the emergence of fresh perspectives and contradictions.

Qualitative technique for the exploratory stage has been justified based on the following primary reasons. Due to the relative newness of the topic and limited literature available in the context of wireless telecommunication services and their related end user behaviours, there is a need for enhanced understanding of such behaviours. As such, user behaviours involve complex situations and investigating such situations is usually a complex process (often presumed to be a dynamic reality). In such a dynamic setting it is best to use qualitative research methodology i.e., using convergent interviews to understand the situations (McPhail 2003; Nair & Riege 1995; Rao & Perry 2003; Yin 1994).

The other reason for using the qualitative method is the type of information that this research is intended to gain during the first stage of the data collection process. The qualitative research method is appropriate and consistent with the exploratory nature of this area of inquiry as this study requires in-depth and detailed qualitative data interpreting the respondent's experiences and beliefs, which can only be obtained by getting psychologically close to the phenomena under study. Thus, qualitative technique for the exploratory stage attempts to generate rich, detailed and valid data that contributes to in-depth understanding of the context (i.e. end user behaviours in relation to wireless services).

Further, using the qualitative method as a first stage in a multi-data collection process reduces the uncertainty surrounding the research problem by controlling the interactions among the constructs of interest and focuses on contemporary situations

in which behavioural factors related to wireless services can be explored through interview process.

Therefore, the qualitative research method using convergent interview technique is chosen for this research in order to help the researcher to understand people and the social and cultural contexts related to wireless telecommunication services. The research method is looking for agreements and disagreements with the collected data through interview process and allows data and theory to interact at the early stages of the research (Neuman 2003) (for example, the relationship between the wireless trust environment and their corresponding end user behavioural factors pinned down upon evaluation of agreements and disagreements through qualitative interview process).

3.4.3 Convergent interviews

The first phase of the research employed exploratory convergent interviews and focused on general exploration of the overall research problem to discover the research dimensions of a research area, and finally to arrive at clear set of themes/factors which can be tested through questionnaire. This phase is similar to a phenomenological study as it aims to understand individuals' perceptions, perspectives and understanding of the particular situation (Leedy & Ormrod 2005, p .139)

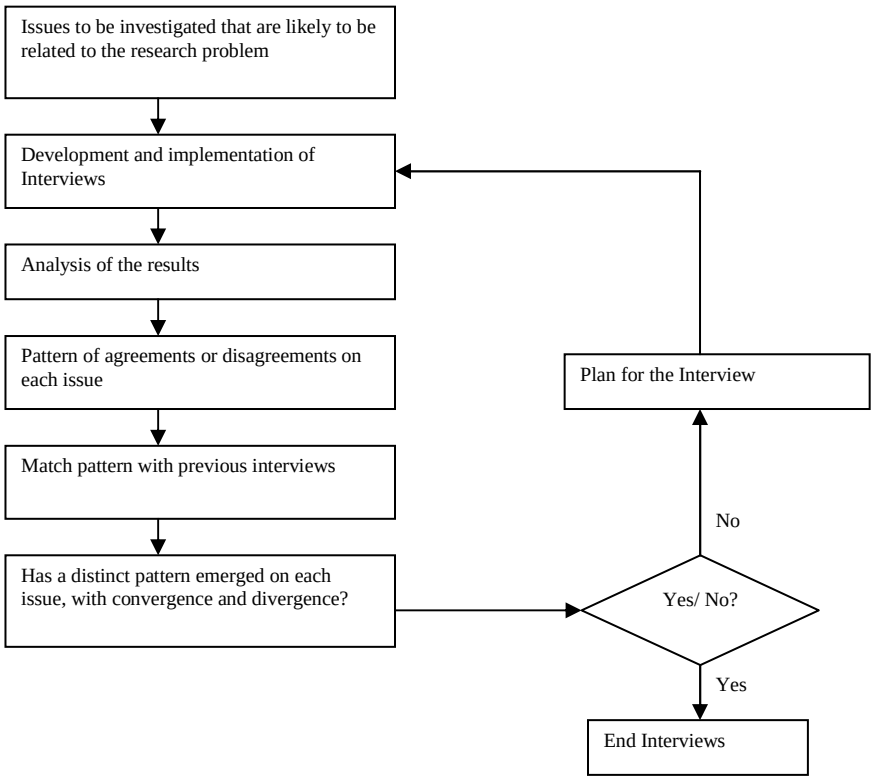
Nair & Riege (1995, p. 498) explains that convergent interviews is a technique that allows for "Collecting, analysing and interpreting qualitative information about people's attitudes, beliefs, knowledge and opinions through the use of a limited number of interviews with experts that converge on the most important research issues."

Essentially the convergent interviewing technique involved conducting a series of interviews with end users who have specialised knowledge of the phenomenon under investigation (Dick 1998; Nair & Riege 1995; Rao & Perry 2003). In this context, end users who have relevant experiences on usage of wireless services from leading service providers are interviewed through semi-structured questionnaire. Such a

series of convergent interviews results in '*successive approximations'*, thus refining both the research process and content (Arp et al. 2002; Dick 1990, p. 3).

The following flowchart in Figure 3.2 on convergent interview process indicates that a series of convergent interviews needs to be conducted until convergence on themes of the study has occurred. As the interview sessions progress, the researcher attempts to define the research process and questions clearly. The progressive nature of convergent interviews results in convergence on themes of the study following successive approximations on the research issues that are needed to be tested. This convergence is achieved by recognising a stable pattern of agreements on the themes of the study that different respondents are conforming in the same way to the themes identified following each interview session.

Figure 3.2: The convergent interview process



(Source: Adapted and developed for this research from Dick 1990a, Nair & Reige 1995)

3.4.4 Justification of convergent interviews for qualitative research

The approach this convergent interview technique takes for this research at the initial stage is an inductive, theory-building method based on a relatively underdeveloped theoretical base. This theoretical base is subject to interpretation of the complexity and dynamism of the context of social behaviours, attitudes and activities of real people. Thus, theory-testing methods for this research alone are not appropriate, although there is some deduction of theory developed from the literature. Convergent interview technique as qualitative research is recognised as an appropriate method for theory building stage. That is, it is recognised as a method for garnering information on contemporary behaviour within its real-life context, and which is capable of producing findings that are generalisable to proposition/theme settings (Nair & Riege 1995).

Rao & Perry (2003) and Dick (1990, p. 3) justify convergent interviews as one of the most suitable techniques for qualitative research for the following three reasons: first, as a method for quickly converging on key issues in an area of emergent research; second, as an efficient mechanism for data analysis after each interview; third, as a method for recognising when to stop collecting data. Further, the strengths of convergent interviews described in the following section also justify that convergent interview technique are a viable and suitable approach for this study at the first stage of data collection.

Therefore, in this research, the convergent interview technique is employed to focus and understand on contemporary situations, that is, situations that provide deeper insights into how wireless service characteristics and related behavioural factors influence their choice of wireless services.

3.4.5 Convergent interview – strengths and weaknesses

The real strength of convergent interview technique lies in its ability to combine the advantages of both structured and unstructured interviews and systematic process that is useful for better understanding of the contemporary issues when the literature available on the real-life context of study is limited or lacks a standard methodology (Dick 1990). Further, the flexibility and rigorous progressive nature of convergent

interviews when compared to in-depth interviews also enables the researcher to narrow down the research problem from the large amount of information coming out of a particular domain through successive approximations i.e., continuous refinement of the research process and content (Dick 1990; Nair & Riege 1995). In addition, the cyclic nature of convergent interview process has rigour as the multi-staged approach ensures that there is a consistency among the responses and number of times the same themes were identified (Carson et al. 2001; Dick 1998; Yin 1994). Further, the structure of convergent interview technique as shown in Figure 3.2, offers reliability to the research as another researcher could arrive at similar conclusions and findings when following the same procedures and process. In brief, convergent interviews are considered more suitable at the exploratory stage of the research as it offers flexibility, reliability and rigour as its major strengths to the research without inhibiting the researcher's ability.

Convergent interviewing technique, like all other methodologies, has some limitations despite their strengths discussed above. First of all, Dick (1998) and Carson et al (2001) note that convergent interview findings have a potential for interviewer bias as he/she may lack the necessary skill and experience that is required to carry out convergent interviews, or may have limited understanding of the contemporary problem under investigation. Rao & Perry (2003) and Riege & Nair (2004) apprehend that contribution of convergent interviews to the theory-building stage, or for better understanding the contemporary behaviour, largely depends on the prior knowledge of the context of the research topic. Finally, a convergent interview on its own may not able to generalise the results to the wider population, thus compromising the validity (Carson et al. 2001; Dick 1998; Rao & Perry 2003). A mixed method approach is used to address this issue. Despite these limitations, the strengths of convergent interviews outweigh the limitations and have a lot to offer at the exploratory stage of the research. Further, some of these limitations are addressed in the design and implementation of the interview protocol and data analysis stages which is further described in the following section.

3.4.6 Validity and reliability of the convergent interview research

This section discusses the measures that were taken to achieve quality in the convergent interview research. Different tests have been proposed to achieve quality. Quality of the convergent interviews for this study is assessed using validity and reliability checks. Validity and reliability is enforced into the research design by ensuring that its four major controls and/or measures, namely construct validity, internal validity, external validity and reliability, are in-built into the research design. The following Table 3.5 briefly outlines the validity and reliability measures for the research.

Table 3.4: Four measuring controls for evaluating the quality of qualitative research

Tests	Convergent interview tactic	Phase of research design	Chapter
Construct Validity	Use multiple sources of evidence Establish a chain of evidence Have key informants review draft convergent interview Establishment of triangulation of interview questions	Data collection & Data analysis Data collection Data Analysis	4 & 5
Internal Validity	Sample selection for information richness	Research Design Data Analysis	3 & 5
External Validity	Use replication logic in multiple interviews Predetermined questions Sample selection for theoretical replication Compare evidence with extant literature	Research design Research Design Research Design Data Analysis	3 & 5
Reliability	Develop and define convergent interview protocol Use convergent interview protocol Use convergent interview database	Research Design Data Collection Data Collection & Data Analysis	3, 4 & 5

Source: developed for this research based on Yin (1994) and Healy & Perry (2000)

Construct validity concerns the establishment of correct operational measures for the concepts being studied (Carson et al. 2001; Yin 1994). Data collection, data analysis and thesis writing: triangulation from multiple sources of evidence, establishing chain of evidence and having a draft of the interview analyses reviewed by the

informants are the three convergent interview techniques that can be used to increase construct validity.

The construct validity criterion for convergent interviews is satisfied as it defines all the core terms being used as well as clearly identifies the unit of analysis (McPhail 2003). For example, interview questionnaire defines what precisely mobility 'or' user context means with a good number of examples. Further, triangulation was achieved from multiple sources of data collection, that is, using eight convergent interviews each with different respondents and carefully worded interview questions for evaluating key constructs under study with different angles. In addition, triangulation of notes with digital recorded interview transcripts was used to provide cross-validation (Patton 2002) during the data analysis in Chapter 4.

Upholding a chain of evidence augments construct validity by facilitating other persons 'to follow the derivation of any evidence from initial research questions to ultimate conclusions' (Yin 1994, pp. 34, 98-9). Such chain of evidence was established for this research by providing adequate citation of any particular source for any evidence in the final report (Hirschman 1986). Re-evaluating and re-designing both the content and the process of the interview program during data collection and having the draft interview analyses reviewed by supervisors and other researchers during the data analysis and thesis writing helped to accommodate content validity, thus ensuring construct validity for convergent interview technique.

Internal validity, in general, refers to the degree to which the results of a study can be relied upon to be correct in capturing reality (McDaniel & Gates 1991, p. 305; Merriam 1998). To ensure internal validity, although this is not an issue with exploratory studies, all rival explanations and possibilities will be considered in the inferences of data analysis. The cyclic nature of the convergent interview process itself helps to address this issue as it results in successive approximations, thereby refining the research process and content over a series of interviews. Such process yields in convergent lines of enquiry through consistency of responses and the number of times the same themes were identified. Hence, this convergent interview process helps to ensure internal validity thereby confirming the goodness of the data

and its subsequent findings (Carson et al. 2001; Morgan 1997; Morgan & Kreugar 1993).

External validity is concerned with the generalisability of the research findings to the external settings, persons and times beyond the current study (Miles & Huberman 1994, p. 279; Sekaran 2002; Yin 1994, p. 35). In quantitative research, external validity is achieved through statistical generalisations of the study's findings from the selected sample to the larger populations. This analogy does not apply to qualitative research as the limited number of interview samples offers a poor basis for generalising. In contrast, qualitative research depends on the use of analytical generalisations as a means of achieving external validity where a particular set of results are generalised to some broader theory (Yin 1994, p. 36). For this study, external validity is ensured through theoretical replication in multiple convergent interviews. This replication is made evident from a proper selection of interviewees and use of the interview questions to determine whether they give similar responses on the themes identified during each interview with different respondents. Further, comparison of the findings which emerged from this research with the existing literature helps to establish analytical generalisations into the research design thereby ensuring external validity.

Reliability is essential for the research as it is concerned with consistency of the technique employed to measure the concepts that is supposed to measure and to realise similar results for the same study irrespective of the researcher (Emory & Cooper 1991; Sekaran 2002). The objective of incorporating reliability control/measure into the research design is to minimise errors and biases that arises due to the researcher. To ensure reliability in the convergent interview technique the following approaches are considered. Firstly, the convergent interview technique itself is considered to be reliable because of its structured process, which is followed for this study and is discussed in section 4.2. Secondly, the interview questions and procedures were standardised in the format of 'convergent interview protocol' for the purpose of data collection, which is outlined in Appendix 1. Thirdly, a structured and comprehensive 'convergent interview database' was built and maintained which includes transcripts and triangulated evidence from the existing literature. Fourthly, the findings of the study demonstrate reliability as they are shown to be consistent

across eight convergent interviews. Finally, the design and administration of the convergent interview program was peer reviewed by supervisors and other academic experts for relevance and appropriateness, thus contemplating another way to achieve reliability for this research (Guba & Lincoln 1994).

In summary, the following methods were applied to increase construct validity, internal validity, external validity and reliability and ensure quality for the first stage of the research – i.e., convergent interviews (McPhail 2003):

- clear definition of core terms and unit of analysis;
- triangulation – i.e., comparing multiple sources of evidence;
- contemplation of many possible explanations for relationships;
- ensuring one does not make unjustified claims when concluding;
- proper selection of interviewees and interview questions to arrive at similar responses for the themes identified in the study; and
- by ensuring procedures are transparent, and by having a colleague re-do parts of the content analysis, the research will be able to be replicated over time or for a different set of participants in convergent interviews identified elsewhere.

3.5 Phase 2: Quantitative research methodology

3.5.1 Justification of quantitative research

The second and final step in the research design was to collect quantitative data. The primary objective of gathering quantitative data at the descriptive stage of research was to quantify and test the findings of the convergent interviews with a wider population. For this research, quantitative method is more positivist in its outlook, involving statistical calculations with numerical data which, in turn, provides more meaningful descriptions of the situations i.e., the nature of relationships between end user behaviours and wireless services. The qualitative research using convergent interviews allowed a set of themes/factors to emerge from a pattern of recurring events. In contrast, the quantitative method for this research seeks to establish evidence that confirms or refutes themes/factors identified (Cavana et al. 2001; Sekaran 2002; Zikmund 2003).

The statistical reliability of the results from the quantitative research and the ability of the results to be generalised to the actual population sets quantitative research as the ideal option at the second stage of the research (Zikmund 2003). Quantitative research method is also considered appropriate and consistent with the descriptive nature of this area of inquiry as there is a need to determine people's opinions, experiences, preferences or beliefs, and generally quantitative research is acknowledged to be a useful form of research to measure both attitudes and behaviour (Cooper & Schindler 2006; Zikmund 2003).

Therefore, quantitative research using a deductive approach seeks to establish facts, make predictions, and test factors subsequent to the data analysis of the convergent interviews conducted at the exploratory stage of the research. Moreover, the outcome of this research approach will help to demonstrate the reliability and validity of the research analysis by triangulating the data from the qualitative and quantitative approaches (Neuman 2003; Patton 2002).

3.5.2 Online survey

Online survey technique is employed in the second and final stage of the research in order to collect quantitative data. This formed the most significant part of the data collection process. The purpose of a web-page based survey or online survey is to quantify and test the outcomes of convergent interviews as the qualitative data collection techniques are not possibly representative of the actual population (Zikmund 2003). This phase involved distributing a self-administered structured questionnaire to respondents in a systematic manner. That is, a survey questionnaire is posted on a web page and respondents are solicited with an invitation email giving them the information to access the online questionnaire and requesting them to complete. Their responses are submitted electronically by means of the internet. The process is further discussed in the survey research design section (Chapter 4). An online questionnaire was designed in such a way as to provide instant summary statistics and feedback on individual responses, and also with a look and feel for respondents that would serve as motivation to participate in the research (Dillman 2000; Porter & Whitcomb 2003; Schmidt 1997). The determinants obtained through

convergent interviews are utilised in the self-administered questionnaire and tested to confirm the factors responsible for their choice of wireless service. However, the appropriate questions for questionnaire are finalised only after the completion of convergent interviews. These survey questions obtained through interviews are peer reviewed for relevance and appropriateness prior to actual survey data collection.

Pre-testing of the survey questions is also carried out on a sample group to increase the validity and reliability of the questionnaire. The objective for pre-testing is to revise and improve the questionnaire from the suggested feedback to adapt to the representative population.

3.5.3 Justification of online survey

Surveys using questionnaires is one of the most commonly used methods of undertaking quantitative research (Cooper & Schindler 2006; Zikmund 2003). Survey technique using web-based communication medium is now being predominantly recognised as one of the major methods of quantitative data collection because of its various advantages, although this method is relatively new when compared to other quantitative data collection techniques. The online survey technique was considered most appropriate at the second stage of the research as it associates with descriptive research situations i.e., online surveys are suitable for descriptive research where the major objective of this study is to investigate current scenario of choice of wireless services and actual practice, and the reasons for their behaviour (Couper 2000; Zikmund 2003). Grossnickle & Raskin (2001) justifies online surveys as a reliable method for empirical research on people's attitudes although the data from such surveys may not be as precise as behavioural observations. Further, Couper, Traugott & Lamias (2001), Dillman (2000) and Zikmund (2003) note that web-based surveys are considered to be the most suitable survey method to employ when the sample consists of known respondents with web access.

Considering the advantages, such as reduction of data collection time and cost (Clayton & Werking 1998; Dillman 2000; Schmidt 1997), visual appearance and interactivity, versatility and accurateness, wide geographical reach (Zikmund 2003,

p .221-227), and instant feedback and summary statistics (Sax et al. 2003, p .410), the web page-based survey conducted using internet is justified for the study.

Therefore, the online survey questionnaire technique was selected as appropriate for achieving the major objective of the final stage of the research i.e., to describe how the wireless service characteristics and their related behavioural factors influence the choice of wireless services.

3.5.4 Online survey – strengths and weaknesses

One of the key strengths of the online survey technique is its versatility. Using the survey questionnaire, all types of abstract information can be gathered through this technique. Such versatility allows the researcher to gather information and understand much about respondents' opinions, attitudes, intentions and expectations. Online survey is considered to be a more efficient and economical method of data collection as it has the ability to collect large-scale data by expanding the geographical coverage using web-based medium of communication, thereby significantly reducing time and cost, which are key considerations for this research (Couper 2000). Further, flexibility of web surveys makes it feasible to deliver a wide variety of content with added functionalities such as multimedia, randomisations and adaptive questions using question-skipping logic, and including plain text to respondents in a standard way using self-administered methods that are not possible with paper based questionnaires (Couper 2000; Dillman 2000; Granello & Wheaton 2004)). Moreover, Witt (1998) argues that the web surveys are alternative and more attractive than traditional methods of data collection because of the ability to collect large amounts of data without interviewers, stationery or postage, and to process answers without data entry. Further, responses from the web-based surveys are extremely fast and can gather large scale data within a few days as the responses are recorded as soon as the respondents fill-in the questionnaire and submit the responses (Granello & Wheaton 2004; Sax et al. 2003).

In general, the major weakness of this method is that the quality of information secured depends heavily on the ability and willingness of the respondents to cooperate. Like other methodologies, low response rates and non-response bias

issues are the major concerns for online surveys. Low response rate is often the result of the lack of accessibility of the survey to the representative population who are computer illiterate. Non-response bias is also considered a concern as the respondents to the survey may differ from the population who did not respond in terms of their demographic and attitudinal variables (Andrews et al. 2003; Sax et al. 2003). These issues are further discussed in section 4.3.8. Couper (2000) also notes that there are several different types of errors such as coverage error, measurement error and sampling error that are associated with web-based surveys which may potentially impact the validity and reliability of the survey technique. Further, respondents may express their opinion when they do not know or are unable to see the value of participation, and respondents may interpret questions differently from what was intended by the researcher thus misleading the data and its interpretation by the researcher (Andrews et al. 2003; Couper 2000; Schmidt 1997). To address this issue, the survey questionnaire has included an additional field to measuring items to record response when respondents actually unaware of the topic of investigation/ unable to answer (see Appendix 2). When compared to the qualitative research methods, quantitative data collection techniques such as online surveys give less insight into processes underlying the situation under investigation. Moreover, some variables of interest to the researcher may not be measurable by using this technique and is a major concern for cross-sectional studies (Gable 1994; Schmidt 1997). Some of these limitations are further addressed in the validity and reliability of the survey questionnaire design section 4.3.9.

3.6 Conclusion

This chapter described the main research methodology used in the study. The overall research plan consisted of two major stages with two different research methods - qualitative research using convergent interviews and quantitative research using online surveys were discussed. A brief justification was provided for the use of the pluralistic method of approach in the study at the initial stage. This was followed by the description of the design and process of convergent interview and online survey techniques employed at two stages of the research, along with their justification, strengths and weaknesses.

Overall, this chapter established a foundation for the data collection process and analysis used in the study and discussed in Chapters 4 and 5. The next chapter documents the data collection process involving convergent interview and online survey techniques.

4 Data Collection

4.1 Introduction

While the previous chapter described the research methodology employed for this research, this chapter describes the data collection process carried out in two phases, namely qualitative data collection and quantitative data collection. Qualitative data collection using convergent interviews is described at the initial stage followed by the quantitative data collection using online surveys. The key steps in each of the phases is described such as participant's selection and background information, interview protocol, interview questionnaire, interview process, transcription, data analysis procedures for convergent interviews and sampling strategy, sample selection and survey questionnaire and administration, survey execution and data analysis procedures for online surveys. This chapter concludes with discussion on the research design and methodology limitations and ethical issues.

4.2 Phase 1: Qualitative data collection

4.2.1 Participants' selection and background information

In Phase 1, eight in-depth personal interviews were conducted. The number of interviews was selected in accordance with the guidelines for a minimum number of interviewees in qualitative research, which suggest five to fifteen interviewees for data stabilisation and convergence on issues, and the interviews were decisively data-driven (Dick 1998; Miles & Huberman 2002; Rao & Perry 2003). The sampling method for this qualitative research was purposeful rather random (Patton 2002). End users who are using different wireless telecommunication services from various Australian wireless service providers were selected to refine the theoretical framework and set the important factors/themes for investigation in this study. Individuals with a minimum of one year of experience were preferred and selected due to the likelihood of there being a more extensive range of wireless services' usage activity and experiences within their daily activities, including both at home and work. The participants were selected based on the geographical proximity to the researcher so as to allow for frequent and convenient interviews. The eight respondents who fit the criteria were invited to participate in the interview through email and phone correspondence during a two week scheduled interview session.

Hence the sample distribution across gender, age, profession and socio-economic status, was not experimentally controlled, but the population was nevertheless quite varied in their background and experience ranging from student, healthcare professional, researcher, lecturer and manager. Eight participants were classified for the study into Respondent A to H to ensure that the identity of the participant remained anonymous as assured. A brief summary of the respondents' demographic information along with their wireless telecommunication services usage activity is in Table 5.1 in section 5.2.1.

4.2.2 Interview protocol

An interview protocol was developed for the convergent interviews and to foster the validity and reliability of the data collection process. Interview protocol constitutes the core element of the main data collection phase – convergent interviews. The use of interview protocol allowed the researcher to think through the questions to be asked during the interviews, to group the interview questions based on the five research issues (i.e., mobility, system interactivity, wireless trust environment, system interoperability, and user context), and to facilitate subsequent data analysis (McPhail 2003; Miles & Huberman 2002; Yin 1994).

The interview protocol included as Appendix 1 was developed to facilitate the interview process by enabling the researcher to gather new insights into the research problem and to corroborate facts that had been previously established and described in the literature (McPhail 2003; Yin 1994). The interview protocol consisted of an overview of the study explaining the purpose and the process of the interviews, a statement confirming the researcher's obligation to maintain the confidentiality of the informant and adherence to ethical behaviour over the duration of the research project. For this study, the interview protocol was designed in such a way that the respondents would not feel intimidated in any way during the interview. This was achieved by giving adequate detail and introduction to the questions being asked (Perry et al. 2001). As a part of the interview protocol, a questionnaire was developed for the purpose of collecting non-identifying demographic data about the respondent, their wireless usage experiences and interview questions on wireless services and their related end user behaviours.

4.2.3 Interview questionnaire

The questionnaire for the convergent interviews (Appendix 1: Section C) is structured to identify the primary themes of the research. The interview questionnaire was developed and primarily classified into three sections based on the review of parent literatures on end user acceptance of the technology and wireless telecommunication services (Technology Acceptance Model, Theory of Planned Behaviour, Theory of Reasoned Action, and Innovation Diffusion Theory). The first part of the questionnaire collected demographic information so that general characteristics about the respondent could be established. Demographic information such as gender, age, occupation and level of education was collected through this section in order to identify the background of the respondent. The second part of the questionnaire gained the respondent's usage experience of wireless services. This section is considered to be the important part of the questionnaire as it evaluates the end user's preference of various wireless services and their actual practise/experience. This included questions such as type of wireless services used, devices used, service provider and number of hours used. The third section of the questionnaire collected information about their experiences of wireless service characteristics, which are primarily categorised into mobility, system interactivity, system interoperability, and user context. The interview questionnaire comprised a total of approximately 10 questions to guide all the major constructs considered for the study. Prior to the third section of the questionnaire, a brief explanation of the terminology was provided for the crucial constructs used for the study to assist interviewees in understanding the topic of investigation.

4.2.4 Convergent interview process

For the convergent interviews, a careful planning and management of the interview process was adopted based on the recommendations by Dick (1990, pp. 12-4). Firstly, the researcher, in consideration of his language background and emphasis on participation, recruited an interviewer to deliver questions and guide the conversation in relation to the primary themes of the research. Prior to the actual interviewing sessions, the researcher trained the interviewer on the interviewing process and research themes to ensure the interviewer was fully prepared and the results would not be negatively reflected as they can be subjected to interviewer bias (Dick 1998;

Morgan 1997). This was important for this research as the interviewer needed to build familiarity with the topic of discussion, be able to put all comments into perspective and follow up critical areas (Morgan & Kreugar 1993).

The first stage of data collection through convergent interviews was scheduled into a period of two weeks. This was to provide convenience and allow for work commitments of the respondents and the researcher. An invitation e-mail was sent to the eight participants selected for the convergent interviews. These were followed by a telephone call seeking an interview. Upon providing consent, the interviewees were informed of the timing (approximately 30 minutes to one hour duration) and location of the interview (University premises).

At the beginning of the interview sessions, the research issues were not explained to the interviewees. The interviews began with an explanation of the purpose of the research and the interviewees were requested to complete questions about their demographic details and wireless usage experience. This helped the interviewer to guide questions appropriately based on their demographic and usage experience details.

The interviews followed a semi-structured format with pre-determined questions at the initial stage and, as the interview progressed, more refined questions were included based on the *convergence*[2] of respondents over issues obtained through probing to focus on the research issues and process. The questions for the convergent interviews outlined in Appendix 1: Section C are designed to achieve the research objectives of the study and served as guidelines for the interview questions rather actual questions. A general opening question like "Could you please tell me your experiences with using of services of particular wireless service providers?" is asked, and then probing of questions is undertaken based on the responses from participants.

At the end of an interview, a brief summary was provided by the interviewer to highlight the issues covered in the interview. This was to ensure that interviewee responses for all the important issues considered for the study were investigated and

Convergence is a "process of eliminating disagreements and focusing only on agreements".

recorded. Finally, each interviewee was thanked for their time and contribution. All interview sessions were recorded using a digital audio recorder to assist in data analysis and reporting. The results of these convergent interviews were analysed using manual content analysis to identify issues relating to the refinement of the research model and to arrive at themes/factors for the study.

4.2.5 Pilot interview

For this study, one pilot interview was conducted prior to the eight main convergent interviews. This interview was held at university premises with an undergraduate student who had over three years' experience in using wireless services. The pilot interview for the study was to assess the interview questionnaire and identify any shortcomings that may arise in the interviewing process (Zikmund 2003). During this pilot study it was found that the interviewee had a different understanding of "wireless service characteristics" as defined in the study. The finding resulted in the fine-tuning of the interview technique by explaining the definition of the various terminologies such as system interoperability, wireless trust environment and user context corresponding to wireless service characteristics to all of the interviewees before the interview began.

The pilot study gave the researcher a sense of the time and the amount of prompting required, thus enhancing the confidence and experience of the researcher before the main convergent interviews (Yin 1994). It also assisted the researcher to refine relevant lines of questioning and also to provide some feedback on the overall research design (Yin 1994). For example, it was observed that interviewee was not familiar with the term 'system interoperability, which is one of the crucial constructs of the study, and the number of questions were taking more than the expected duration of one hour. It was also sensed by the researcher that some of the questions were relatively similar and yielded the same response from the interviewee. Interview questions were then peer reviewed and refined in order to ensure that the research design was good, impartial and reliable.

In brief, the pilot interview helped to refine the interview procedures, add relevance to the questions and provide some interviewing practice for the researcher (Yin

1994). The interview protocol developed for this study (Appendix 1) was refined after the completion of the pilot interview.

4.2.6 Interview, transcription and data analysis procedures

After the initial introductions were made at each interview, the consent form (Appendix 1) was given to the respondent being interviewed. Time was provided for the form to be read and any questions concerning the conduct and nature of the interview were then discussed. A copy of the consent form was then signed by both the interviewee and the interviewer, with each keeping a form for evidential purposes. Consent for audio-recording was granted in all eight interviews.

The interviews ranged in length from 40 to 60 minutes. While the interview sessions were in progress several notes were made by the researcher. This approach provided an opportunity for reflection and consolidation of the information provided. It also helped to manage the intensity of the interviews, as three to four interviews were conducted successively. The tapes were then transcribed over a three week period after the completion of all the interviews with the transcripts saved as Microsoft Word files. Care was taken to ensure the transcriptions were as accurate as possible by double proofing the content with the notes taken.

The main goal of data analysis is to produce convincing conclusions and to eliminate alternative explanations. Data analysis involves reviewing, categorising, tabulating, and recombining evidence to ascertain meaning relevant to the thesis' initial aim, objective, research questions and issues (Miles & Huberman 2002; Yin 1994). While data analysis using NVivo software was planned at the initial stage, the general analytical strategy – pattern-matching technique was selected as the primary data analysis technique for this stage. This technique is one of the preferred techniques for qualitative data analysis such as convergent interviews and would therefore strengthen the internal validity of the research (Miles & Huberman 2002; Yin 1994).

The matrix method using a pattern-matching process as suggested by Miles & Huberman (2002) for qualitative data analysis was used as it provides an effective and widely acknowledged way of dealing with the rich textual data obtained from

convergent interviews. Matrices provide a way of representing the data collected in a form that is guided by the research objectives, theoretical framework and research issues/questions. From the use of these data matrices, a set of themes/issues are developed for their investigation in the second stage of research using online surveys.

In section 5.2.2, there is a discussion of the findings and the themes identified from the initial part of the literature review, which forms the basis from which the questions for the online survey questionnaire were developed and the themes analysed.

4.3 Phase 2: Quantitative data collection – online survey

4.3.1 Sampling strategy

The target population for this study is end users who are using telecommunication services from Australian wireless service providers. According to the Department of Information and Communication Technology and the Arts (DICTA), there are 40 registered wireless service providers. From the online databases of "WiFi 411 online hotspots directory" and the Australian Communication Media and Authority (ACMA), there are another approximately 20 wireless service providers who offer various wireless services to end users. The unit of analysis is the end user who is using wireless services from any of those above service providers.

For this stage of research, a sampling frame was established after careful analysis of various factors such as time, cost and representativeness of the sample. Upon consideration of those factors, non-probability method of convenience sampling technique was employed for the online survey. Zikmund (2003, p. 380) and Leedy & Ormrod (2005) refers to convenience sampling as *sampling that takes people or other units that are readily or conveniently available.* The convenience sampling technique involved recruiting a sample from the following sources for the purpose of online survey:

1. direct end users identified from the above wireless service providers;
2. healthcare professionals within Australia: sources from HiF-net;
3. professionals and end users associated with wireless networking groups in Australia: sources from lists.samba.org;

4. students and employees of USQ and other organisations;
5. end users identified by the Consumers' Telecommunications Network, Australia; and
6. end users identified by the Australian Telecommunication Users Group (ATUG).

Although the convenience sampling technique was employed, the sample selected for the online survey was assumed to be random in nature across demographic variables such as age, gender, profession, service provider, socio-economic status, to reduce the variability.

4.3.2 Sample size

Considering the importance of results from the sample size that are to be generalised across a wider population, the effective sample size for this study is 200 and is primarily determined by the size of the sample population (Neuman 2003). The factors such as homogeneity of sampling units, incidence, precision, statistical power, analytical procedures, and time and cost were considered to be vital in determining the effective sample size (Davis & Cosenza 1985). Prior studies such as Hair et al (2006) and Coakes & Steed (2006) also suggested that at least 5 responses are needed for each attribute to statistically signify the effective sample size. There are 29 key attributes that are evaluated using the online questionnaire and would therefore require a minimum of 145 responses for this study. Based on the sample frame, discussed in sampling strategy, the study expected that at least 200 responses from a sample frame of around 2000 participants could be considered for analysis after taking into account the low response rate (approximately 10 percent) for online survey techniques, although it is extremely difficult to statistically sample the online population (Andrews et al. 2003).

4.3.3 Operational definitions

Based on the findings of the exploratory stage of research and from the previous literature, the operational definitions of the variables or constructs were formulated for the online survey questionnaire. The constructs for this study are of multidimensional nature with multiple variables such as attitude, perceived ease of

use, and perceived usefulness. These variables were measured using multiple items of measurement for each variable. The measurement items for questionnaires in surveys included multiple measurement scales such as simple dichotomous, nominal, likert, and checklists for measuring demographic, wireless usage experience and behavioural factors (e.g., attitudes, behavioural intentions, perceptions etc) of the end users (Zikmund 2003). Table 4.1 summarises important studies on the key constructs with their measurement items concerning technology acceptance theories, which were adapted to the wireless environment.

Table 4.1: Dimensions for survey questions based on technology acceptance theories and other IS related adoption theories

Construct	Definitions	Measurement items (Likert Scale)
Perceived Usefulness (Burton-Jones & Hubona 2005; Davis 1989; Venkatesh et al. 2003)	The degree to which a person believes that using a particular system would enhance his or her job performance.	• Using the system in my job would enable me to accomplish tasks more quickly. • Using the system would make it easier to do my job. • I would find the system useful in my job. • Using the system gives me greater control over my work. • Using the system would improve my job performance. • Using the system improves the quality of the work I do. • Using the system in my job would increase my productivity. • Using system allows me to accomplish more work than would otherwise by possible • Using the system would enhance my effectiveness on the job. • Using the system supports critical aspects of my job. • Overall, I find the system useful in my job.
Perceived ease of Use (Agarwal & Prasad 1998a, 1999; Davis 1989; Venkatesh & Davis 1996; Venkatesh et al. 2003)	The degree to which a person believes that using a system would be free of effort.	• I find the system cumbersome to use. • Learning to operate the system would be easy for me. • Interacting with the system is often frustrating. • I find it easy to get the system to do what I want it to do. • The system is rigid and inflexible to interact with. • It is easy for me to remember how to perform tasks using the system. • Interacting with the system requires a lot of mental effort. • I find it takes a lot of effort to become skilful at using system. • Overall, I find the system easy to use.

Intentions to use (Agarwal & Prasad 1998a; Horton et al. 2001; Hu & Chau 1999; Venkatesh & Davis 2000)	The degree to which an individual decides to use.	• Assuming I had given access to the system, I intend to use it. • Given that I had given access to the system, I predict that I would use it. • I intend to use the system, whenever it is available. • I tend to use the system, wherever it is available. • I tend to be a heavy user of the system, whenever I had given access to the system. • I plan to use the system, whenever it is available.
Attitude (Agarwal & Prasad 1999; Al-Gahtani & King 1999; Davis et al. 1989; Hu & Chau 1999)	An individual's positive or negative feelings about the performing the target behaviour.	• Using the system is a bad/good idea. • Using the system is a foolish/wise idea. • The system makes work more interesting. • Working with the system is fun. • I dislike/like the idea of using the system. • Using the system is unpleasant/ pleasant. • Using the system is beneficial for me.

The above dimensions from the literature review that related to behavioural factors were then reviewed to relate to wireless service characteristics in order to determine their influence for their choice of wireless services. The primary evaluation criteria for measuring the influence on choice of services included the five major wireless service characteristics extracted from the exploratory stage of convergent interviews: mobility, interactivity, wireless trust environment, system interoperability, and user context. While the choice of wireless services was not measured explicitly as a construct, it was coded from the point of measurement in the wireless usage experience section described in the Appendix 2: Section B. The following Table 4.2 describes the measuring items for each of the wireless service characteristics along with their operational definitions.

Table 4.2: Measuring items for wireless service characteristics

Construct	Measurement Items
Mobility (Gera & Chen 2003)	• I am much more mobile than I used to be. • I used to stay at home or work place when I expected a call or message. Now I leave home when I want to. • I feel more mobile now, as I am able to send messages to my friends abroad.

System Interactivity	• I feel that information displayed using the device is cumbersome. • My device will enable me to access all the services available. • Interface design for the wireless system lets me to access services with ease. • I need to perform lengthy scrolling of pages on screen to view the information. • When using the system, I feel that there is missing information.
Wireless trust environment (Lu et al. 2003)	• The wireless system lets easily make choice of the features available to me. • It is easy to notice the features of the wireless system. • It is easy to access the features of the wireless system. • When using the system, I feel that there is enough managerial security protection. • When using the system, I feel that there is enough security technique protection
System Interoperability	• When using the wireless system, I am not able to connect or use the system. • When using the wireless system, I feel that there are frequent interferences disrupting the service. • When using the wireless system, I am not able to access some services at some locations. • When using the system, I feel that features of the wireless system take considerable time to download
User context (Venkatesh & Davis 1999)	• People who influence my behaviour think that I should use the wireless system • I use the wireless system because of the proportion of coworkers who use it. • In general, the organisation has supported the use of wireless system • Specialised instruction concerning the wireless system was available to me. • Guidance was available to me in the selection of the system • I prefer to choose wireless system that has been recognised widely

4.3.4 Questionnaire design and administration

The construction of a questionnaire for online surveys is an important step in the research design as it guides the researcher systematically to ask the relevant questions and improve overall accuracy of the online survey (Zikmund 2003). For this research, the questionnaire (Appendix 2) was designed to achieve the primary objectives of the research question. Prior studies have provided a number of guidelines for development of online questionnaires (Andrews et al. 2003; Dillman 2000; Frazer & Lawley 2000; Porter & Whitcomb 2003). From those studies, the following steps have been reviewed and implemented for this research:

- setting up clear objectives i.e., to collect data on the level of five major wireless service characteristics: mobility, system interactivity, wireless trust environment, system interoperability, and user context;
- operational constructs;
- incorporating results from the exploratory stage and previous studies with relevant variables;
- use of multi-item measures for each of the constructs;
- comparing questionnaire with previous studies;
- peer review of questionnaire from academic and industry experts;
- pre-testing of the online survey questionnaire.

The questionnaire development process also involved addressing issues such as standardisation of a format to suit to each of the different sampling frames discussed in the sampling strategy, ensuring respondents could participate freely in the survey through use of carefully worded questions, and facilitating the survey administration and data processing of responses in a simplified manner (Frazer & Lawley 2000). Initially the preliminary questionnaire draft had adopted the structure from other technology acceptance studies. This was aiming to measure the level of agreement on the factors that are identified as key factors in those studies. However the constitution of statements was altered after realising that the generic nature of the statements, without reflecting the wireless services characteristics and its usage data, would seriously diminish the range of possible findings. The final version consisted of three sections similar to that in the preliminary draft. However, the third section varied and consisted of a list of specific statements with agreement level measured on a six point Likert type scale as opposed to a five point Likert type scale used in the initial draft.

Based on the revisions to the preliminary draft, review of parent literatures on end user acceptance of the technology and wireless telecommunication services, and from the convergent interview findings, the following structure consisting of three sections was formulated for the final version of questionnaire (shown in Appendix 2). The first two sections of the survey questionnaire were similar to the questionnaire used for the convergent interviews. Section A of the questionnaire collected

demographic information so that general characteristics about the respondent could be established. Section B of the online questionnaire collected the respondent's usage experience of wireless services. Finally, section C collected information on end users' agreement on wireless service characteristics for their related behavioural factors. The structure and design of three sections is described below.

4.3.4.1 Section A: Demographic variables

Demographic information in the questionnaire takes the form of subjective norm and is classified as a number or class so it can be used to test differences within groups of the sample using chi-square tests (Sproull 1995). The demographic information section included four items measuring age (Q1.1), gender (Q1.2), education level (Q1.3) and occupation (Q1.4) for testing the differences within groups of sample and ruling out sampling bias (Czaja & Blair 1996; Sproull 1995, p .187). These demographic variables were measured either using nominal and/or ordinal scales.

4.3.4.2 Section B: Wireless usage experience

End user's usage experience of wireless services is evaluated in section B. This section is vital for the research as it evaluates the end user's preference of various wireless services and their actual practise. The section consisted of a total of 10 attributes to collect information on various end users' preferences and actual usage of wireless services. Most of the attributes took the form of either ordinal or nominal scale. In this section, questions from Q2.1 to Q2.5 were used to collect information on the end users' actual usage of wireless services, wireless devices, wireless service provider, pricing and their access locations. These questions were measured using multi-select items or checklist items. Multiple options were provided for each question to select from the list and an empty text field left to enter any item that was not described on the list of options. Questions Q2.6, Q2.7, and Q2.8 were used to collect information on the end user's usage frequency and duration of the wireless services in terms of how long, how often and how many hours in a typical week they have used the wireless services. Each of these questions was measured using the frequency-determinant choice item. Finally, questions Q2.9 and Q2.10 were used to collect end user attitudinal information on wireless services in terms of usage comfort and satisfaction. These questions form the critical part of the questionnaire as they were used to determine the dependency of wireless service characteristics and

related behavioural factors (perceived ease of use and perceived usefulness) on the choice of wireless services. Ordinal scale was used to measure these questions.

4.3.4.3 Section C: Wireless service characteristics

The third section of the questionnaire includes collecting information about their behavioural experiences on wireless service characteristics which are primarily categorised into mobility, system interactivity, system interoperability, and user context. This section in the interview questionnaire comprised a total of 29 items. Each of these items was measured using a six-point Likert scale representing 1 for 'Strongly Disagree', 2 for 'Disagree', 3 for 'Neither Disagree/ Nor Agree', 4 for 'Agree', 5 for 'Strongly Agree', and 6 for 'Don't know/ Unable to answer'. Option 6 is treated as missing information for data analysis purposes. The following Table 4.3 describes the five major measuring constructs and the number of measurement items for each of the constructs.

Table 4.3 Wireless service characteristics in terms of five major constructs and their corresponding number of items

No.	Construct	No. of Items (Question no.)
1.	Mobility	5 (Q3.1 – Q3.5)
2.	System interactivity	5 (Q3.6 – Q3.10)
3.	Wireless trust environment	5 (Q3.11 – Q3.15)
4.	System interoperability	5 (Q3.16 – Q3.20)
5.1	User context – facilitating conditions	5 (Q3.21 – Q3.25)
5.2	User context – cost	2 (Q3.26 – Q3.27)
5.3	User context – reputability	2 (Q3.28 – Q3.29)
		Total : 29

A brief definition of terminology was provided for the major constructs used for the study to assist respondents in understanding the topic of investigation.

4.3.5 Questionnaire layout

The design of the questionnaire included a welcome screen to gain participants' cooperation, provided brief instructions about the estimated time to complete the survey, and outlined the structure of the survey at the initial stage (Zikmund 2003, p .222). Quality of the survey questionnaire was maintained by taking utmost care that content on the website was visually appealing, questions were easy to answer, simple graphics were used, and the survey length kept short. The online

questionnaire consisted of four web pages in total. The first page included a welcome screen followed by each of the three questionnaire sections on a separate page and linked in order so that participants could respond to the questions in a systematic manner. The fourth page also had a 'submit' button allowing respondents to record their response to the questions.

4.3.6 Pre-testing of the questionnaire

Prior to the conduct of the actual survey, the questionnaire was pre-tested with about 20 selected respondents to increase the validity and reliability of the questionnaire. The objective was to revise and improve the questionnaire from the suggested feedback to represent to the wider population (Grossnickle & Raskin 2001). Pre-testing of the questionnaire involved distributing e-mails to USQ Faculty of Business staff, friends and colleagues with the URL access used in this survey. Participants were requested to report on the approximate time spent in completing the questionnaire, the level of difficulty, suggestions for further improvements, and possible errors found while taking the online survey.

Pre-testing of the questionnaire revealed that technical jargon in some of the questions was too confusing. The respondents indicated that the length of questionnaire was acceptable. However, they commented that it was too optimistic to term it as 5 minutes as opposed to 10-15 minutes that they took for filling out the questionnaire. Some respondents pointed out errors in the functionality of multiple select items. That is, the questions with checklist items were acting as radio buttons rather than as a real checkbox when they opted to choose the 'other' field to input an entry that is not listed in the set of options. One respondent indicated that one question's options appeared twice. Another respondent suggested the inclusion of another dimension in the research, namely unreliability of power supplies to support the network, as this plays significant role on the choice of wireless services, although the development of questionnaire was based purely on the findings from the convergent interviews. In summary, the pre-testing of the survey questionnaire helped the researcher to revise and refine the questionnaire in terms of wording, errors and use of construct items.

4.3.7 Questionnaire administration

Encompassing more than 70 percent of Australian population access to ICT by August 2006, according to Nielsen/ NetRatings report (www.internetworldstats.com), the web page-based survey was considered to be representative of the sample. The questionnaire was made available online on the "qualtrics.com" web page and participants were solicited with an invitation e-mail asking them to participate in the online survey (Zikmund 2003, p .222). The surveying tool "qualtrics.com" was used and justified for the data collection process after the researcher was convinced that "qualtrics.com" would be appropriate to gather large scale data as it offers numerous tools to distribute the survey, gather and to analyse the data without requiring excessive time, cost and effort.

Contact was made with all the relevant bodies of the sampling frame to advise as to the recruitment of the samples. Three types of approaches were made to contact the relevant bodies:

1) a cover letter attached to a hard copy of the questionnaire requesting them to provide a list of their members' contact details or to distribute the copies of hard copy questionnaire to their members (hard copy questionnaire format is seen on Appendix 2);
2) an email cover letter with a URL link to the online questionnaire requesting them to distribute to their group members; and
3) phone correspondence.

In response to this correspondence, healthcare professionals from HiF-net group (dgroups.org), wireless networking professionals and end users from lists.samba.org and USQ employees and students agreed to participate in the research. However, none of the major wireless service providers agreed or cooperated to distribute the online survey questionnaire to their end users due to their privacy policies. Professional bodies such as ATUG and CTA did not respond after repeated attempts to contact through phone or email correspondence.

An invitation e-mail was sent to the participants who were identified by the sample frame that agreed to participate in the research. The invitation e-mail highlighted the importance of participation and objectives of the research and, to gain trust and

cooperation, also assured anonymity of the participant. Upon receiving the consent of the participant, the participants were provided with the following access information (URL: <http://new.qualtrics.com/SE/?SID=SV_1yJCFrQrxBfzyfy&SVID=Prod>) to the survey website and with a brief introduction of the survey content using e-mail (Granello & Wheaton 2004, p .388).

On completion of the survey, a follow-up e-mail was sent to respondents to offer the results of the survey and thank them for their participation. In an attempt to increase the response rate, after two weeks, non-respondents who did not consent to participate were also sent an e-mail soliciting participation in the survey (Zikmund 2003, p .225).

4.3.8 Issues of response rates and non-response bias

Prior studies indicate that non-response bias and low response rates are potential problems for online surveys compromising the generalisability of the research and representativeness of the population (Clayton & Werking 1998; Couper 2000; Dillman 2000; Kaplowitz et al. 2004; Porter & Whitcomb 2003; Sax et al. 2003; Zikmund 2003).

Response rates for web page-based surveys when compared to traditional surveys are low (Gunn 2002; Nichols & Sedivi 1998). Prior studies on online surveys indicate that response rates for online surveys are as low as around 10 percent as the responses for web page-based surveys are currently in state of flux as novel techniques being followed, continuous proliferation of Internet use, and more importantly depend on nature of the sample population (Granello & Wheaton 2004; Sax et al. 2003). Personalised e-mail cover letters, multiple follow-up reminders, providing results in advance, and pre-notification of the intent of the survey through e-mail were some of the strategies followed to improve the response rates for this study (Dillman 2000; Gunn 2002).

Similarly, non-response bias is also a significant issue in web surveys and is dependent on the sample frame (Couper 2000). Non-response bias is tested by comparing respondents with non-respondents and pre-survey respondents with

post-survey respondents with their nominal demographic data using a chi-square test (Couper 2000; Couper et al. 2001). A mixed mode survey approach (i.e., combining both e-mail, hard copy questionnaire and web survey) was followed for the study as discussed in the survey research design to minimise the non-response bias (Dillman 2000; Schaefer & Dillman).

4.3.9 Quality of design – ensuring the reliability and validity of online survey questionnaire

The survey questionnaire and its measurement items were assessed to estimate their consistency and accuracy. Measuring controls, namely reliability and validity tests, were conducted to ensure quality in terms of consistency and accuracy in the online survey research.

Reliability tests refer to how consistently a measuring instrument measures the relevant concept or construct. Reliability in quantitative research is concerned with consistency and dependability or stability in the measurement. The reliability of the measurement items of the research model was obtained using Cronbach's coefficient alpha to ensure the internal consistency and dependability of the measurement of variables of this research model. Variables with correlation or Cronbach's coefficient less than 0.7 were considered to have low reliability and were eliminated. However, it is acceptable to have Cronbach's coefficient of 0.6 for exploratory research (Hair et al. 2006). To ensure each of the measurement variables indicates one, and only one, concept, unambiguous and clear theoretical definitions have been developed for each of the variables that was measured in this study (Neuman 2003). This study used a six-point Likert type scale (as discussed earlier in section 4.3.4.3) for the respondent's opinions in relation to the measurement of the variables that conceptualise the research model. Although the Likert type scale is considered to be ordinal in nature, it is widely accepted as an interval scale for the purpose of social research in information systems (Cavana et al. 2001; Stewart & Cash 1997). Measuring items from prior literature on IS adoption-related theories and wireless technology, which have been proved to be reliable, were taken into consideration for the measurement of wireless service characteristics and related behavioural factors.

On other hand, validity tests refer to how well an instrument measures the particular concept that it is supposed to measure. Validity in quantitative research is concerned with accuracy i.e., whether we are measuring the right concept (Sekaran 2002). To increase face validity of the study, this survey questionnaire was peer reviewed and pre-tested for relevance and appropriateness with staff from the Department of Information Systems and other disciplines in the USQ Faculty of Business prior to actual survey data collection. Suggested changes were incorporated into the survey. The data collected through multiple sources of evidence i.e., findings from convergent interviews and the survey questionnaire and multiple measures for the constructs, will ensure construct validity for the study. Principal component factor analysis, a factor analysis technique, was performed to acknowledge enough evidence on convergent validity and discriminant validity for the measures to achieve construct validity of the study (Hair et al. 2006). As the study incorporated some of the technology acceptance theory constructs, and evaluated the themes that emerged from the convergent interviews, the criterion validity is demonstrated. All possible alternative explanations are considered in the inferences of the data analysis to ensure internal validity. Statistical or conclusion validity can be judged only after statistical analyses are carried out and after the conclusions of the study are stated. Multiple measurement items, using multiple scales for measuring the survey questionnaire, provides increased richness and validity to the research outcomes and also reflects the multi-dimensional nature of complex real-world problems (Mingers 2000).

4.3.10 Data interpretation and analysis

4.3.10.1 Pre-analytical process

The advantage of an online survey is that once the questionnaire has been filled out and submitted, the information can be downloaded directly into a database. The data collected from the qualtrics.com website was downloaded directly in the SPSS syntax style format for further analysis and interpretation. This process facilitates the automated coding process thereby improving efficiency and eliminating any possibility of human coding errors. This also enabled the survey results to be easily checked for completeness before the data was exported into SPSS.

4.3.10.2 Descriptive statistical procedures

Descriptive statistics, such as frequencies, percentages and means, were generated for all items used in the survey questionnaire i.e., in the demographic information section, wireless usage experience section, and wireless service characteristics section. This enabled the researcher to better understand the data and provided guidance for further analysis and interpretation using exploratory factor analysis. During this process, outliers that influenced analysis and interpretation of the results were identified (Coakes & Steed 2006). Outliers identified were then retained until there was sufficient evidence to prove that they do not provide any accurate representation of the target population. During the descriptive statistical process, normality tests were performed on the data collected by observing normal probability plots and histograms (Hair et al. 2006). This is because the assumption of normality is a prerequisite for parametric inferential statistical techniques used in the study (Sekaran 2002).

4.3.10.3 Exploratory factor analysis

For this research, an exploratory factor analysis technique was employed to analyse the data collected. The principal component analysis technique of factor analysis, an inferential statistical approach, was conducted to analyse the inter-relationships among a large number of predictor variables and to develop theory regarding the nature of the constructs. The primary objectives of this exploratory factor analysis was data summarisation and data reduction[3] with minimum loss of information (Coakes & Steed 2003, 2006). Data reduction was achieved through observation of the correlation matrix and selection of variables with the highest factor loading to use it in subsequent analysis and interpretations such as multivariate techniques (Hair et al. 1998; Hair et al. 2006; Zikmund 2003, p .586). This was another means of finding the validity and reliability of the measuring items (Coakes & Steed 2006).

The underlying assumptions were tested to assess the items measuring each construct including adequate sample size, normality, linearity, outliers among cases,

[3] Data reduction is the process of summarising the information from large number of predictor variables into smaller number of factors.

factorability of the correlation matrix, and outliers among variables (Coakes & Steed 2003).

4.4 Limitations of the mixed method approach

The advantages and disadvantages of using both convergent interviews and online surveys have been discussed in sections 3.7.4 and 3.8.4 and justified. However, there are several potential limitations of this research.

The scope of the convergent interview method was confined to end users who are using wireless services from various Australian wireless service providers within the Queensland region. As the interviews are qualitative in nature, the interviewees involved may not be representative of the actual population, although careful selection of the sampling frame from which the interviewees chosen were was used to limit the problem. Further, the analysis and interpretation of the outcomes of such interviews are still subject to bias as the researcher may have limited understanding of the contemporary problem under investigation (Dick 1998).

The main data collection technique for this study was a self-administered questionnaire using online surveys. This is subject to several limitations, such as non-response bias and low response rate, which were discussed in section 4.3.8. In addition to the above issues, there are possible problems of self-selection and self-reporting in this study. This is because the online questionnaire was only distributed to the end users identified in the sampling frame and who were allowed to participate at will, resulting in bias toward end users who are willing to participate in the survey. Using such an approach compromises the external validity of the research. Further, information gathered on respondents' demographic statistics and wireless usage experience was self-reported rather observed (Blair & Burton 1987). Therefore, care should be taken in interpreting or generalising from these findings to the target population.

In addition, the reliability of the results may be somewhat questionable as the self-administered survey approach restricts the respondents' ability to clarify questions that they feel are ambiguous, although definitions of some important

constructs were provided in the online questionnaire. However, having a reasonable data set size should average out this element of error associated with the survey research.

In predicting the IS usage behaviour in the wireless environment, it is acknowledged that there are other variables that may serve as potential confounds. For example, this study considers frequency and duration of use as important factors as they maintain consistency of action, context, target and time. This is an important consideration when studying the acceptance and usage of technology because end users become experienced in the system or technology and move from novice to an expert over time and with frequency of use which, in turn, impacts behavioural factors. A longitudinal study may have helped to take these factors into account, understand the implications and its phenomenon on behavioural factors of end users, and obtain comprehensive and valid results. However, a demographic variable relying on past data was used in ascertaining approximate levels of exposure to the wireless environment.

4.5 Ethical considerations

Ethical considerations were observed and accommodated in the research design (Miles & Huberman 1994; Neuman 2003). Ethical clearance for the study was sought and received from the USQ Ethics Committee. An "Information and Consent form for Interview Participants" was approved as part of this process. The consent form includes background information about the research, a definition of the terminologies, assurance that no personal identification of any end user participating in the research will be made at any stage, and a request for permission to record the interview. Appendix 3.1 and 3.2 contains a copy of the consent form used for the convergent interview protocol and online survey questionnaire.

Complete anonymity was promised to all interview and survey respondents to ensure they felt confident in providing private information. This was necessary in order to maximise the participation rate of end users. The researcher carefully explained the purely academic intent of the research, its purpose, and the interest and outcomes. A

great deal of care has been taken to ensure that the anonymity of all respondents and their respective background is protected.

4.6 Conclusion

This chapter discussed data collection methods used for the convergent interviews and online surveys.

The data collection process for the convergent interviews, which formed the first stage of the research, was discussed and detailed the interview research parameters that were used for this research – parameters such as process steps, participants' selection and the unit of analysis, data analysis procedures, and design for quality. This was followed by discussion of the online survey data collection process, which described the sampling strategy, sample size, development and testing of the survey instrument and pre-testing of the questionnaire and finally, data interpretation and analysis procedures used in the study.

Chapter 5 provides a detailed analysis on the convergent interviews and survey data.

5 Data analysis

5.1 Introduction

Chapter 4 described the data collection technique employed for both the convergent interviews and online surveys. The purpose of this chapter is to summarise and present the results of the data analysis of both the convergent interviews and online surveys. There are two main sections in this chapter – qualitative data analysis and quantitative data analysis. Section 5.2 begins with a brief summary of the respondent profiles, then the results of the data analysis of the eight convergent interviews in relation to each theme are addressed. It concludes with a brief summary of the core findings about each theme. Section 5.3 addresses the quantitative data analysis and begins with data examination and screening, followed by descriptive statistics of the questionnaire items used in the online survey. The results of the exploratory factor analysis, along with the important issues/factors extracted during the exploratory analysis, are then described.

5.2 Phase 1: Qualitative data analysis

5.2.1 Profiles of respondents

The respondents have been selected to ensure that they are from different backgrounds and have different experiences with wireless services. Selecting people from different backgrounds and varied experiences provided more comprehensive information for triangulation. As explained earlier, the interview respondent names were disguised and identified individually using single character alphabets from A to H. This identification system preserves respondent anonymity and also keeps respondent information separate.

Table 5.1 represents the respondents' background and experience in wireless services in terms of their profession, wireless services used/using, wireless devices used/using to access the wireless services, wireless service provider, service plans, access location, years of experience and usage activity.

Table 5.1: Convergent interview respondents' profiles

Respondent	Venue, date & time	Profession	Services used	Devices used	Service provider	Service plans	Access area	Years of experience	Usage activity
A	Respondent Office	Business and communication co-ordinator	Email, SMS, Internet, Video Streaming/conference, business solution services and transaction oriented services	Mobile phone, PC	Vodafone, Optus and Telstra	Pre-paid and Post- Paid	Both at Home and Work	> 3 years	Daily
B	Respondent Office	Technical Manager	Email, SMS and Internet	Mobile phone and PC	Telstra	Pre-paid	At work	1-2 years	Once a week or more
C	University	Student	Email, SMS, MMS, Internet, Video streaming, transaction oriented services and location based services	Mobile phone, PDA/Tablet PC/ Palm-top, PC and Sensor Devices	Optus, Telstra and USQ	Pre-paid and Post-paid	Both at home and work	> 3 years	Daily
D	Respondent Home	Researcher/ Healthcare	Email, SMS, Internet, video streaming /conference and transaction oriented services	Mobile phone and PC	Telstra and IINET	Post-paid	Both at home and work	> 3 years	Daily
E	University	Student/ Manager	Email, SMS, Internet and University databases	Mobile Phone and PC	Telstra and USQ/Griffith University	Post-paid/ Contract	Both at home and work, at University and friend	> 3 years	Daily
F	University	Academic/ Lecturer	Email and SMS	Mobile phone	Optus	N/A	At home	For an year	Every 2-3 months
G	University	Student/ Security Officer/ Waiter	Email, SMS, Internet and transaction oriented services	Mobile Phones, Pager and PC	DIGIPLUS and USQ	Pre-paid	At home and University	For an year	Daily
H	University	Computer Programmer	SMS	Mobile phone	Vodafone	N/A	Both at home and work	> 3 years	Daily

For the first phase of data collection, convergent interviews, lasting an hour each, were conducted with each respondent. Most interview sessions were conducted at the University of Southern Queensland, although where possible, some interviews were conducted at the respondent's office or home. During the first week of interviewing sessions, three interviews were conducted consecutively, each lasting for an hour, with a break of ten to fifteen minutes in between. Immediately after the first two interviews, the interviewees provided the researcher with feedback about heavily loaded questions and the incomprehensibility of text book terminology used in the interview questionnaire, although relevant guiding information was provided for each question. The third interview progressed as scheduled, however, the questions were not asked as depicted in the interview questionnaire, rather, the respondent was asked to explain or describe the generic nature of each question using guiding information. The interviewer was also requested to take one issue at a time rather several issues for each question as there was scope for the respondent missing some issues. This enabled the respondent to converse more and elaborate on specific issues. The fourth interview was conducted at the interviewee's location for his/her convenience, and incorporated the suggested changes in the interview questionnaire to facilitate greater comprehensibility of the issues to be covered. During the second week of interviewing, each of the remaining four interviews were conducted successively with a break of 10-15 minutes between each.

From the analysis of the convergent interviews using pattern-matching technique, the motivational reasons or intentions of end users to use wireless services, and the subsequent behavioural factors, are pinned down and grouped into patterns of data for better understanding of the changes that occur over time and their corresponding influence on choice of services.

5.2.2 Interpretations from the interviews

In this section, the pattern matching technique explored the major themes that emerged from the rich information set contained in the interview transcripts. These major themes were grouped into data matrices for further explanation and are guided by the theoretical framework developed for this research. The findings in this section form the basis for the design and content of the online survey instrument used in the

next stage of the research. Thus, the patterns derived from the data analysis underpin the research conclusions and implications to be discussed in Chapter 6. The major themes as established during the literature review were as follows:

1. mobility
2. system interactivity
3. wireless trust environment
4. system interoperability
5. user context.

The following Table 5.2 represents the major themes and associated characteristics that were explored using interview questions Q2-Q10 as guided by the prior literature review and theoretical framework during the convergent interviews.

Table 5.2: Research issues and their associated characteristics

Wireless service characteristic	**Measuring constructs**	
Mobility	Coverage	
	Real time connectivity	
System Interactivity	Device Complexity	
	Service Complexity	
Wireless Trust Environment	Security	
	Privacy	
System Interoperability	Uniform Standards (2G, 3G, CDMA, WAP etc)	
	Expected Performance (Quality, Speed and Reliability of Services)	
	Seamless Connectivity	
User Context	Facilitating Conditions	Wireless Access availability
		Training & Resources
		Policies & Regulations
	Social Influences	Image
		Social Network

The responses of the convergent interviewees to the questions about the five major themes, as identified from the literature review, are presented in two ways. Firstly, a summary of the results of the convergent interviews is discussed. Secondly, excerpts taken from the interview transcripts provide evidence of patterns being found in the data. These excerpts are used to qualify the interpretations in the discussion and only represent a sample of the convergent interviewees as the transcript of all interviewees ran to approximately 73 pages (shown in Appendix 5) of A4 single spaced typed words and not every word spoken is presented.

In the beginning, the respondents were asked a general and broad question (question Q1 of the interview protocol in Appendix 1) to establish rapport (Dick 1990). The first question asked interviewees to explain what wireless characteristics they look for when choosing a wireless service. This question addressed the overall issue of end user preference/selection of wireless services, albeit the question was also helpful to explore any new factors so that the interviewees can expand and digress during the conversation of the interview (Carson et al. 2001). This procedure was followed to avoid imposing the logic of an a priori framework on the respondents. Even though there is a wide range of responses to this question, there are some common views that were repeatedly expressed by all the respondents. The following list of issues in Table 5.3 are extracted from the responses to interview question Q1.

Table 5.3: List of issues emerged in response to the question – Q1

Issues/ Factors	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**
Coverage	✓	✓	✓	✓	✓	✓	✓	✓
Cost	✓	✓	✓	✓	-	✓	✓	✓
Reputability	✓	-	-	-	✓	✓	✓	✓
Enabling services – webmail, blog service etc	✓	-	-	-	-	-	-	-
Security	✓	-	-	-	✓	✓	✓	-
Privacy	-	-	-	-	✓	✓	-	-
Social network/ compatibility	-	✓	✓	-	-	-	-	-
Wireless access availability	-	✓	-	-	✓	-	-	-
Speed	-	-	-	✓	-	-	✓	-

One new factor, *reputability* of a service provider, was extracted from the convergent interviews. Most of the interviewees, as seen from the above table, expressed that reputability of a service and its service provider has a significant role in influencing their choice of wireless services. The discussion on this factor has been further provided in the findings of wireless service characteristics – user context (section 5.2.2.4). A comprehensive range of factors/themes emerging from all interview findings were depicted in Table 5.3. Thus, the list of themes that arose from the interview findings shows that interviewees confirm the theoretical framework.

5.2.2.1 Mobility

Of all the five major themes evaluated through the convergent interviews, mobility has been considered as one of the important aspects/major themes by all interviewee respondents. The mobility characteristics such as coverage and real time connectivity of device and network were explored through interview question Q2 to identify their impact on the choice of wireless services. Most interviewees emphasised that when choosing any wireless service, mobility would be the foremost factor that they look for and, importantly, some interviewees believed that it would be an absolute minimum expectation in the major areas that they are going to work. This is because they believe that mobility would allow them to carry out their work at any place and at any given time *without any constraints for finding something that's tied down by cords* (Respondent F). For example, Respondent D explicitly noted that "*People expect to be able to do business not just any time – 24/7 – which is what the internet has given us but wireless has given us any place*". The interviewee further responded to the same interview question that, as mobility affects the modus operandi of their work, it will have considerable influence on their preference/usage of wireless services: "*Something that the health industry is very excited about because the adoption of computing, particularly for a thing that the doctors use which is primarily online orders is very poor ... doctors are always mobile … they don't have the time to find the free device, sit down and use it so around the world in health care, there's a lot of excitement about mobile – the mobility and wireless devices*."

From the interview responses, it is clearly evident that coverage seemed to be the crucial characteristic of mobility as it would impact their quality of work in terms of time saving and efficiency. Interviewee Respondent A expressed his view on mobility coverage as saving significant time and allowing him to carry out his work without adequate preparation: "*it's really important that in the major areas that I work that you know these services are able to be provided to me because it means that I don't have to be as well prepared…. I can just go and know that they're all there and I can just need to be able to access them some how so that's why its important that it works in the areas I need it to work."* Correspondingly, interviewee Respondent B articulated the importance of mobility in a similar fashion to that of respondent A by stating that: "*Yes well we wouldn't have bought it if it wasn't going to work in the areas we wanted it to so.'* Respondent F indicated that '*certainly*

coverage would have been an issue because if not, if you didn't have that coverage then that would deteriorate ability to serve that purpose. It would reduce its ability to allow that portability or mobility of me from base (so to speak)". Similarly, Respondent C highlighted the value of coverage in terms of its affect on the quality of work "*…..but if we're talking about wireless network technologies, then I would say that it would hinder a lot of my work because I use my notebook for access at the University and I use University resources to access information but when I move out of that range I can't do a lot of things*."

With respect to responses to another mobility characteristic considered for this study, real time connectivity, few respondents indicated that there is a need for eventual access to information otherwise it would hinder/halt their work. In response to this issue, interview Respondent C discussed that lack of real time connectivity results in user frustrations "*the wireless will disconnect itself although it does reconnect sometimes after 1 or 2 seconds but it's within that 1 or 2 seconds that sometimes when you're sending an email or reading an article and the connections .....that way it increases a lot of frustration because all your work is halted (tasks) and you have restart all your work again*." To add to what Respondent C discussed, Respondent E added the following comments about the necessity of instant or real time connectivity, "*There are a lot of situations where I would need eventual access so if I had to write a report, do some calculations, then I would just have to save it and download it later or send it later if I didn't have the access at the time*". Although the mobility characteristic has been considered important by all the respondents, Respondents C and G articulated their view on mobility that it is just a matter of convenience more than productivity.

Question Q3 (Appendix 1: Section C) was designed to extract behavioural factors when choosing wireless services with respect to the mobility characteristic. Collecting systematic data on mobility and related behavioural factors that are influencing the choice of wireless services will contribute to the main research question. In response to the question, all interviewee respondents exemplified that mobility has a significant impact on their performance of tasks, productivity and their intention to use the services. Some of the excerpts in relation to this question were already covered in the findings of question Q2, however as explained earlier, the

objective of this question was also to explore behavioural factors. Some of the noteworthy findings relevant to behavioural factors from different respondents are illustrated below, "*so yeah the level of freedom that's come in, I feel really comfortable with it because you're not constrained to finding something that's tied down by cords*" (Respondent F). Few respondents indicated that they would feel isolated or frustrated when they were asked about how would they feel in the absence of coverage: "*Sometimes everybody gets a bit angry or confused or a bit impatient as well with technology but its better than not getting the information*" (Respondent G). "*Yeah I suppose some people would feel isolated. Again, if I was, I would feel frustrated if I was in that situation of are you trying to use it as a tool to mean that I didn't need to go in, then that would be a frustration because if I then had to go elsewhere anyway to be able to"* (Respondent E).

In summary, on the basis of the interview findings, the mobility characteristic is considered to be the important theme or factor for further evaluation using online surveys.

5.2.2.2 System interactivity & wireless trust environment

The second major factor/theme investigated in the convergent interviews is system interactivity. System interactivity of a device or a service/application is manifested in a range of activities such as scrolling pages, QWERTY keyboard availability, service/application interface, and their associated functionalities such as webmail access and 3G content. Questions Q4, Q5 and Q6 (shown in Appendix 1: Section C) were used to evaluate the wireless service characteristic, system interactivity, for its influence on the choice of wireless services. Although the actual questions asked in the interviews were not specific as depicted in questionnaire and were much related to experiences drawn on their wireless devices, all interviewees agreed that the wireless service characteristic, system interactivity, plays a major role in influencing their choice of wireless services.

Question Q4 relates to system interactivity and its influence on the choice of wireless services. Respondents indicated that user friendly interface, size, and support for major functionalities of a device or service/application are the key drivers for their

choice of wireless services. With regard to a device or service/application and its ability to support associated functionalities, respondents have presented a common perspective that a device with all the necessary interfaces and large in size will be easier to use, whereas the devices with less or minimal user interface are hard to interact with. Likewise, a service/application with a user-friendly interface and that supports major functionalities will be more convenient to interact with and easier to use, whereas a service/application with less or minimal user interface and which barely supports major functionalities are hard to interact with. In response to the question, Respondent C put forth some of his experiences with system interactivity and has a great deal to say on the subject, as can be seen from the following comments: "*Well it depends on the device anyway. In terms of wireless devices, there are so many types. First of all we have the pager, mobile phone, PDAs, and your notebook is all mobile devices. In terms of notebook it's a large item and all the necessary interfaces is there – its easier to use. If you move to something smaller like PDAs and mobile phones, PDAs is something that you have to get used to……. Oh mobile phone is a little bit more accessibility and convenient because you don't use a pen. You just press buttons on the mobile phone keypad and it's easier with the numbers but even limited in terms of functions compared to a PDA. PDAs you can probably have more storage, more processing power than a mobile phone and it will go faster but for mobile phone it will be more convenient for short tasks/small tasks. I can send small messages and bigger recording and voice recordings."*

With respect to the service/application, Respondent C also adds the following comments: "*Well again PDAs come in different softwares and if it so happens that your software are used which is called Palmaware, it has a less user friendly interface. It does all the scrolling with a stylus pen on the touch screen but on the tablet screen actually but it does not offer – its not a user friendly interface because you have to its basically you have to do like press a few buttons just to get to one task*".

To add to what Respondent C discussed, Respondent D articulated that, "*I did try a PDA for a while but I found it was too much of an overhead to maintain a PDA and a laptop and as I took my laptop everywhere anyway, and after a while I thought why am I taking this PDA around. I now I know the PDAs and laptops are a bit better*

integrated but still I generally largely prefer to take my laptop around with me and that has limitations because the laptop is obviously bulky."

Further responding to the subject, interview respondents clearly elucidated that they would stop using the service(s) completely when the interactivity endowed with the particular device or service/application is sub-standard for which they have owned or subscribed unless they can access the required information or perform the desired task reasonably. Respondents also expressed that it is an expectation that their device or service/application needs to be intuitive and reliable so that they can interact with convenience and ease of use. Some of the illustrative comments were, "*I'd stop using it, full-stop……It can't be slow you know because everything else is fast paced around you so you know no one's going to slow down while you say can you just hold on a minute while I scroll down here. I'll be 5 minutes just sitting there. They're not going to do that.*" (Respondent F). "*If I was using it then that would be what you would want to use it for – wanting to achieve with it.*" (Respondent E).

Similar to question Q3, question Q5 was designed to extract behavioural factors with respect to the wireless service characteristic, system interactivity. When asked about whether they are comfortable with the service access facilitated by the interactivity, and can accomplish tasks as expected using the interactivity option, respondents implicitly or explicitly noted that interactivity has a positive effect on their work to a certain extent, however, they would feel frustrated if it is difficult to adapt to the devices with different user interfaces. For example, the Respondent C feels that the mobile phone is convenient for short/small tasks whereas large devices like the laptop are easier to use. This was supported by comments such as, "*It does have certain positive impact. First of all I get more access to information and email and basically also any time I need it but the next thing would be the it would still be the data entry point where I need to put in the data is all the wireless devices are still much slower and it does have occasional connectivity problems with other devices…….… Yes because the character recognition software is not that advanced because different people have different handwriting styles and [part of the thing with the] technology they need the users to fit to the standard of the device instead of the device to fit with the user style ……..'I basically use it for reading mails, access*

some of the contacts because I know its going to be slow if I try to write something on it. But I would say that it does get a little frustrating because of all the keying."

For triangulation purposes, respondents were also asked to comment on whether sub-standard system interactivity (i.e., taking a long time to scroll between the pages, slow connection, poor resolution, poor graphics) constituted a barrier for their choice of services. In response to the question, a few of the respondents agreed that sub-standard interactivity will be a significant aspect in deciding their choice of wireless services and service provider. Illustrative comments were, "*Ok from a useability perspective, yes. I think that quality is going to drive it so if it was frustratingly slow and obviously we're used to being almost at that broadband speed at work etc. so you get spoilt and I think going too far back beyond that you tend to become*." (Respondent E). "*Yes it would because for me it would be a matter of convenience – not a matter of necessity so I wouldn't put up with*" (Respondent H).

Further responding to the question, a device's lack of up-to-date functionality was mentioned as a serious impediment for their accessibility to different kind of services available. They implied that this is one of the key drivers for their current state of behaviour and choice of wireless services. Respondent H: "*At the moment I don't because my old phone doesn't support it. I may use it if I haven't ..... with it but if I found that it was something that was easy to use and convenient then I may use it*."

Nevertheless, some interviewees believed that there will be an increase in the functionality of the wireless device or service/application due to the recent advances in wireless technology. In particular, developments toward more user friendly interfaces with the device or service and the speed and quality of the technology associated with the service/application will, overall, increase the system interactivity. This is because, as interviewees believe, devices are going to reduce in size and will also be able to support all the major functionalities when compared to today. Some of the illustrative comments in support of this issue are: "*I think the technology has still got a fair way to go and there's likely to be a bit of fallout of devices…. I mean we're going through a transition phase so in today's Australian there's an article about mobile phones there's a likely or increasing a user interface device so we could see the demise of – the continued demise of PDAs and tablets and those kinds of devices*

and instead we'll end up with large amounts of functionality we need on mobile phones……. So we've got this situation at the moment where we've got a range of devices and there needs to be some sort of shake out so we end up with a smaller number of devices that will meet all our information needs for both data as well as voice and location services as well" (Respondent D)

In contrast to the views of the above respondents, some of the interviewees expressed that, when they experience problems with system interactivity, they would be more willing to learn to fix and use the service rather than fully discontinuing them. For example, "*I just find that if I can find something – if I can find anything that makes my daily job easier well then I'll give it a go. But I'm also willing for it to take a little bit of time for me just to get used to how it works so you know I've got no problem providing there's some light at the end of the tunnel that this is actually going to be better for me*." (Respondent A). "*Oh there are always problems; some problems will crop up in some areas. I think unless it's a major concern, unless it's really stopping me from doing my research or downloading some business applications for my business, unless it literally stops that, then it's not going to be a big concern to me. It will be annoyance and I might go later and find someone who has more expertise in this area and ask them to resolve the problem for me but other than that I'll just keep trudging on and maybe go in a different direction*." (Respondent E). "*well yes and no because when I'm comfortable I can keep going but sometimes I get stuck so I've got to ask someone not like just switch off and go off. That's a bit drama I think so…*" (Respondent G).

Question Q6 relates to efficient data transfer and the security, privacy and other issues associated with system interactivity. In response to the question, most of the interviewees (Respondents A, B, C, E, F and G) agreed that security and privacy are considered as important aspects which would impact their choice of wireless services while security was a primary concern for some respondents and privacy for others. Most interviewees commented that they simply put trust in their wireless service provider and believed that the services they are using from the service provider are reasonably secure. This phenomenon is because of the reputation the service provider holds, or the establishment of the service provider, in the market. Simultaneously, interviewees also acknowledged that they are actually unaware whether any of their

security and privacy information is being exploited (i.e., if any of their confidential information is stolen or compromised). Some illustrative comments were, "…..… *security would come top of my list actually reputable company and its you know you are comfortable with the way that they transact and whatever it is that they have portrayed as their coverage in that security line and then it would be the places that I would want to use it*" (Respondent E). "*Well most of these things as an end-user you have really no idea. You just trust that it's working. You know sometimes if you're working with another group you may, you know they have a presence on the web which you may, you have to put some trust in, right so if you don't know who they are ……certainly privacy is a big issue. I think I'm, well I don't know whether I'm like other people but what I do is that if I'm going to someone I expect that's my details aren't given to other people unless they ask me first*" (Respondent A). "*I don't know much about the security. I'm assuming the stuff that comes through is reasonably secure but I don't know, I haven't checked. So security and privacy I don't' know. It had better be secure. They didn't warn us that it wasn't.*" (Respondent B).

Interviewees also believe that security for wireless services is one of the grey areas as it is still in the stage of developing/maturing and consider that when compared to wired services, wireless services are more vulnerable. They also implied that wireless security is not just limited to the perspective of the service provider but also from anywhere they access or have access to. Illustrative comments were, "*I've gone to mini seminars and things on wireless security and from at that stage I know that it is a maturing area but it certainly has been raised a lot that wireless if not set up correctly is not secure and that's not necessarily meaning the provider. If and we're just implementing around a little wireless LAN at home etc. so if I was to go, branch into that, then yes, I would be checking to make sure that things that should be done.*" (Respondent E). "*in terms of security and privacy, so far I have not encountered any security or privacy issues because they do so that wireless services are much more vulnerable than wired services so I've yet to encounter anything that would say that the security and privacy of information is [compromised].*" (Respondent F).

One interesting aspect that emerged from the interview responses is they feel that security and/or privacy mechanisms for the wireless services are not under their control and are largely subject to the service provider they use. However, a few respondents indicated that they will take any necessary steps such as installing security softwares, accessing only reliable areas/points, using security mechanisms like WEP, and refraining from subscribing to unauthorised content in order to ensure that security is under their control and they do not become a target. This was supported by comments such as, "*…still try to draw on other alternatives but mainly because the university uses WEP and there's no other options for other security mechanisms - so I have to follow the university's, I believe it's the specification of the university wireless local area network.*" (Respondent C). "*I don't say I feel more comfortable because you tend not to think the control aspect of it while you're doing it. It's just there you know and I tend not to think about the lack of control or control at USQ until something comes up that says your computer is being attacked. It's in the back of your mind before that. I think all I can do is keep up the security software that I have – keep it updated to make sure that nothing happens.*" (Respondent F). "i*f I was transacting myself personally unless I was .....banking details etc. then I wouldn't be concerned about my provider security necessarily however if we're talking of 3rd parties information that I'm using, then I would want to ensure that I was following their guidelines*" (Respondent E). "*At home because some of these services provided, they don't have a proper ..... but free ..... it's not free because it's been my own experience and also that in books and magazines people just log in, sometimes a bug comes through at the same time. So the wireless had to ..... so I've been told at home not to do it because we've, well if a bug comes in then the whole system ..... You know so we have to spend another few hundred dollars.*" (Respondent G).

However, system interactivity issues relating to efficient data transfer did not emerge as an important theme and have any significant impact on their choice of wireless services. Only three of the eight interview respondents commented on the data transfer issues. Respondent B commented that data transfer between devices seems to be working well and providing the same kind of performance as on the wired network. Similarly, Respondent A noted that it would not be a big concern as long as it works in a reasonable time frame: "*OK so efficient data transfer yeah well you*

know I expect I wouldn't know – its' got to work, you press the button, it's got to do something in a reasonable time frame. I know that as a user of some of the stuff if it's encrypted, it can take longer, it's slower but you know you understand you're doing that for a particular purpose. So you know as long as it's working at a reasonable timeframe, if you're willing to accept that that's the way that it works at the moment, so that's alright." However, Respondent C expresses his view on the efficient data transfer that it is beneficial for smaller devices: "*Usefulness - lets say for data transfer wireless devices is benefit for ..... and I like because I usually read items on the internet and on the internet all the files are not very big so it provides sufficient time and traffic for the data can be loaded from my mobile devices and now it all falls on the processing power of the mobile devices and usually the mobile devices have sufficient power to run all the documents that I need unless it's a movie file or a big music file*."

In summary, evidence gathered from the interviews on the influence of system interactivity on the choice of wireless services indicates that this is an important research issue that needs to be further explored and tested using online surveys in order to provide better understanding of the nature and extent of wireless services and related behavioural factors.

5.2.2.3 System interoperability

The wireless service characteristic system interoperability e.g., accessing the same service from different wireless service providers, networks and devices, was considered an important theme for evaluation using convergent interviews as guided by the theoretical framework. Interviewees were asked to explain the influence of the system interoperability on their choice of wireless services in questions Q7 and Q8. In response to the questions, most of the interviewees agreed that system interoperability plays a major role in influencing their choice of wireless services.

Interview respondents commented that system interoperability would be an important aspect considered as critical usage or useful for their work. They felt that they would not be able to function fully if they could not change their device or application and/or their interfaces to suit to the type of facility or location they are interacting

with. That is, they believed that interoperability between devices/networks and/or applications allow them to interconnect seamlessly. For example, Respondents H and D reflect some of the comments, *"Yes I think that would be, if they were both useful you know for work or for critical usage, I think that would be very important … otherwise you can't function fully*" (Respondent H). ***"****that's going to be a big issue for example you know would they be happy using one device for communications within the campus and then having to go and use another device outside like a GPRS device? So they could use a wireless LAN device both for voice and data on a hospital campus but then when they leave, that's not going to work out in the street so another device?*" (Respondent D)

Interviewees commented that the significance of the system interoperability characteristic for their choice of wireless services largely depends on the company they work for, if they are looking to enhance their job or to provide for a need. Interview respondents also commented that system interoperability between devices, networks or applications needs to be convenient (i.e., clean and straightforward without adding any extra steps) when used to enhance their job or provide additional access. Some illustrative comments were, "*Yes I think choice of services definitely. Again it would be a case of you're wanting to use it to enhance what you could do or to provide a need. So if you are able to have that interoperability so that you're not having to add those extra steps in between, then yes you'd go that*" (Respondent E). "*For me I would not go for it. The reason being I don't use the presence of that service but if there was a need, I would say yes. If there was a need, the company I worked for ..... said yes you're doing it, I said OK then, how can you help me? How can I help you? Yes.*" (Respondent G). "*But in my situation it just wouldn't be worth it if I have to do that because it's not that critical for me to have that additional access but if it's there and it's clean and straightforward then it would be a helpful, very convenient addition to what I already have……..Its' only useful if it's convenient.*" (Respondent H).

However, some interviewees commented that system interoperability would not be a major issue as long as it works seamlessly or compatibly with the other devices (i.e., they will be able to interconnect between devices/networks/applications without any interference). In response to the question, Respondents A, B, E and F noted that it is

an expectation that any well established or mainstream service should be able to work without any problems. For example, "*Well especially anything that's well established. I mean I understand that you know as new things come out that there might be new areas that take a little while for them to mainstream a little bit but anything's that mainstream, you expect that to work and you expect that to work every time. I do, that's why you pay them the money.*" (Respondent A). "*because you're just basically buying network access and the internet by definition is interruptible and we're just using a transport layer. I mean this might make more sense if you were talking about things like hand held devices with different browsers on them kind of thing but*" (Respondent B). "*Yes and not provide frustration because oh it's down again or whatever. I think that's the other thing which is an availability issue even though it's not value added – the coverage is but how stable it is.*" (Respondent E). "*Oh well it would have to be or I can via email. If it's not compatible in so much as – it's got to be compatible that if I'm putting data into Microsoft Excel then I've got Excel. I mean that's got to be compatible. It's how I get it from there to here that that's the problem and if I can't do it via wirelessly which I should be able to in the form of sending a, transmitting a document via email then I'll have to just download it with a call.*" (Respondent F).

Similar to other questions (Q3 and Q5), question Q8 was used to extract behavioural factors. Respondents were asked to explain their feelings on how system interoperability and its associated issues, such as standards and performance, affect the choice of wireless services. In response to the question, respondents articulated that system interoperability would enable them to do the job faster and save significant time. For example, "*Um faster – yes, that would be for me. They are very, I think no one would argue that we can do it a lot faster with the device or the service is definitely a good thing…….And time factors is it does save time because I don't have to walk around looking for places to access information. Information is here already in my hands and standardisation is like .....I would be happy because even though it's a matter of cost as well. I don't have to switch from one it saves me the trouble of switching from one service to another*" (Respondent C).

However, respondents noted that they would like more standardised access to the wireless services as they believed that there are numerous standards available for

each of the services and it is increasingly frustrating for them to choose between, or have, different standards to use the same service. Illustrative comments were, *Well I'm definitely go for more standardised access to wireless services. I'd really hate to go and choose between service providers because each service provider has different benefits – offer different benefits to their services and like Telstra usually has the most coverage in terms of wireless services but Optus has a better, usually has a better customer plan and all my friends are on Optus services but if you're talking about wireless LAN and for now the thing that is still very standardised because the university is just using the 802.11 b service and there have not been any compatibility issues with students computers so far and.*" (Respondent C). "*for example it would affect my choice if they told me that if I was to go with this particular company, any company, and they said I could only access their resources from this service, right, well then that would be a real consideration for me not to use them.*" (Respondent A).

Interview respondents further indicated that they would like to choose the service that is more prevalent, compatible with major service providers, and supports emerging standards, so that they have some protection in terms of shelf life or redundancy. This is because they fear that superior technology might replace the inferior over a time. For example, "*I would want to go towards standard or common standards only because that gives you some protection in terms of shelf life or redundancy but if you've bought history ..... with examples of superior technology being overtaken by inferior technology because for various reasons…..I would want to go down a path where what I was buying was the current or the emerging standard or the dominant. There are lots of different standards. If you look at things that are frustrating and even quite dangerous they're often where we don't have standards like which side of the road do we drive on*" (Respondent D).

In brief, the interview findings helped to clarify the significant influence of the system interoperability characteristic on the choice of wireless services and is therefore considered an important research issue which needs to be further explored and tested using online surveys to provide a better understanding of the nature and extent of wireless services and related behavioural factors.

5.2.2.4 User context - facilitating conditions

The final major factor/theme investigated in the convergent interviews is user context. User context for this study is primarily structured into facilitating conditions and social influences. Question Q9 asked respondents to elaborate on their experiences with facilitating conditions such as wireless access availability, policies and regulations, training and resources, security and legal protection, as they operate/interact with wireless services. Issues associated with wireless access availability, policies and regulations and training and resources were commonly raised by the interview respondents. Security and legal protection aspects were not discussed in great detail by the interview respondents and are therefore considered as an insignificant research issue for the study.

In response to the question Q9, wireless access availability emerged as one of the crucial aspects that would impact their choice of wireless services. Interview respondents expressed the view that wireless access is limited to only certain access points usually defined by the wireless network provider and remarked that it has to be accepted as a part of the service. They further discussed that, in general, there is wide coverage for mobile phone access, whereas wireless access for notebooks and PDAs is limited to wireless access points and is considered a bigger concern as different service providers use their own configuration mechanisms or settings. Illustrative comments were, "*With this Telstra device it's been pretty good except that in the depths of buildings. It only works near the windows…. Yes we have to live with that. The wireless is going to be like that though*." (Respondent B). "*Well mobile phone – let's say if you are located in the area of Toowoomba, mobile phone has very good coverage. PDAs and notebooks, if you are using wireless networks then it would be a much more bigger concern because you USQ uses a different network setting but if you've been to places like McDonalds hotspot services, then it would require another set of settings so you have to change the settings often and it does create a lot of problems in terms of time to configure the settings to suit the environment*." (Respondent C).

Simultaneously, respondents reported that lack of wireless access availability at desired access points can have a significant impact on their choice of wireless services where the magnitude of the impact usually depends on the frequency and

duration of the access/network availability. For example, Respondent H quotes that, "*Ah it depends on the frequency and duration. If you know if it was for a long period or if it happened often, then it would be a concern. It would be frustrating but if it was just once in a blue moon just for a short time then it wouldn't be a real concern*."

However, some respondents commented that it is an expectation that wireless access needs to be available all the time for work purposes or other needs. Some of the noteworthy comments were, "*It's always got to be up ..... or within, if they say that they can have down time etc and or understand that things do go down or but it's just overall, it should be reliable*." (Respondent E). "*At the moment other than with my laptop I'm really restricted to areas that my laptop has access to. I have a wireless LAN in my house so I'll be stucking anywhere in my house. My friend has a wireless LAN in her house so obviously I can go anywhere in her house so here at USQ it's the same. Down at Griffith it's the same. But other than those 4 areas most other, there's not a lot of areas where you can go to and just sit down and know you've got wireless connectivity……I'm studying, I'm accessing databases, I'm accessing it through my laptop. So that wireless connectivity has got to be there*." (Respondent F). "*Well basically recently I tried to get PC access wireless access and it was incredibly confusing and particularly from the point of view of dealing with the University*." (Respondent B).

With respect to policies and regulations, al most all of the respondents except Respondent B confer that there are many policy and regulation issues that exist for wireless services in order to integrate them into work practices. However, most interviewees acknowledged that they were actually unaware of the policies and regulations associated with access to wireless services, and they further commented that they do not take notice unless they are required to (e.g., copyright restrictions, access to unauthorised content etc). Further, interviewees also believed that they operate well within the boundaries without violating any policies and regulations, and felt that policies are an advantage for less informed users.

There is unanimous agreement among all respondents that pricing policies associated with service have been the most significant factor affecting their choice of wireless

services. All interviewees explicitly noted that living within budget is their number one priority and that they like to evaluate all the best options associated with pricing policies and look for future proofing even if it costs more in shorter term.

Further discussing pricing policies, respondents noted that their choice of wireless services is primarily driven by cost factor, followed by coverage and then reputability of service in terms of longevity in the market and financial liability of the provider. For example, "*So as I was saying the prices depend but it depends on the company also because sometimes they just shut down in a few months after they've come into business and we have experience also, that it's cheap but it just disappeared*" (Respondent G). "*It depends. If I had 2 different providers both of which were reputable, both providing the same coverage but one had a significant advantage in cost, I might go for ..... Not that I mind, I wouldn't change to save a couple of dollars*." (Respondent F).

In regard to training and resources, respondents noted that they have not been trained or had any resources available from their service provider. They felt that end users will feel more comfortable when training and resources are made available as they believed that lack of knowledge about what a particular service can do can be a barrier for adoption of the service. For example, "*I'd say that they don't provide any training or resources you know for that. It was, in fact it was difficult to even find it right but you know when I discovered that this service was available to me well then you know I was doing all this*." (Respondent A). "*I don't have anything to say about that. There's no training or security or any of these issues*." (Respondent B). "*I don't know..... But yeah, that's certainly that if it was made available as a user, that would mean then yeah I'll put my hand up for those sorts of things to feel more comfortable about the bigger picture…… OK a barrier can also be a lack of knowledge of what it could do for you whereas I'm saying at the moment I'm not looking for it because I don't feel that I need anything better than I have now but that could be because I'm not aware of what it could do for me and what it could enable*." (Respondent E). "*Yes if somebody gives training, …… they saw the training was good. But when they were ..... getting the job done itself, it's too difficult. So yes, but if they're willing to train, why not?*" (Respondent G).

They also believed that training and resources would be quite helpful during the initial wireless access setup (i.e., if they are moving to a service with new features which is a little complex to operate/use than they are used to) and also to fix problems. For example, "*Basically ..... resources are well like at ITS they provide the [solutions] resources like how to set up your system so that you can connect into the USQ network but in terms of how to use the devices if its not a device from the USQ, if the device is not USQ property they basically you won't provide too much support in training …….. if I had a running of problems with the device I use on their wireless network, I would like to know where to find answers to solve the problem. I can basically solve the problem myself but I need to know where to look for the solutions and if the service provider can offer the solutions to problems that other users face on their service, that information if it is readily available it would be a great help*." (Respondent C). "*When I got, when I bought the laptop obviously you then have to have the connectivity to the USQ site and that's inputting maybe IP addresses or whatever – I had no idea so I had to go down the computing department here and get them to do all that*." (Respondent F). "*Um it would if I was moving to something with new features which was a little more complex than I was used to, then that would be helpful*." (Respondent H).

However, most interviewees portrayed themselves as self-trained and like to try to fix issues or set up the wireless access connection with resources provided such as instruction manuals. Some comments were, "*It didn't go and I basically had to sort that out for myself, which I did and so I don't know. I seem to be able to work my way through these things but I just don't know how the average person from the public that might be less you know like been around*" (Respondent A). "*Training and resources – well basically I'm self trained in using all these devices*." (Respondent C). "*No. It's the sort of thing you learn by doing it I think rather than training*." (Respondent F). "*It would just be a reassuring backup because with most products I find I can work it out with the instructions or whatever you, I mean I think ..... you try and work it out for yourself rather than*" (Respondent H).

Finally, question Q10 asked respondents to explain the role of social influences and cultural differences on their preference/usage of wireless services. Interestingly, social influences and cultural differences were not considered a major issue

influencing their choice of wireless services. In response to the question, most of the interview respondents (Respondents A, B, D, E, F, G & H) commented that wireless technology and services have now become a basic part of doing business/work (i.e., it is mainstream and seen as a utility rather status symbol). They further noted that they look for more practical use and functionality rather than status or image. The following comments by respondents highlight that social influences and cultural differences was not a high priority factor in influencing their choice of wireless services.

"*No. That doesn't worry me because you can tell from my phone that I bought the cheapest one I could get and you know so because I'm not into all that……. No cool factor for me because I'm uncool but you know I don't see it as prestigious or anything like that. Going back a couple of years I would have. I would have thought that would be really cool to have that but these things that they're mainstream so you know quickly now that they just become –they're utilities you know, like it's a utility. Like you pay for your water, you pay for your lights you know so in that regard you expect them when you turn on the switch*" (Respondent A). "*There's no status in having your laptop plugged into the network at work. It's just a given so these things should be available*." (Respondents B). "*No because I'm inherently a dag and I don't, I rarely buy things for image*." (Respondent D). "*No, I'm really not interested*." (Respondent E). *"OK obviously if I'm going to carry around a wireless device, I don't want it looking like a brick, right but on the other hand I wouldn't pick something just because it looked cool if it did not have the services, resources and facilities I needed*." (Respondent F). "*Um not more, not to copy them but for my own use, yes*." (Respondent G). "*Only if there was a practical advantage (Relative Advantage), not just the peer pressure…. I'm too old to worry about cool*" (Respondent H)

In brief, after examining the user context characteristics, facilitating conditions was considered to be the important aspect influencing choice of wireless services. This needs to be further explored through online surveys for better understanding of the context and nature of wireless services and related behavioural factors.

5.2.3 Summary of the convergent interview findings

The exploratory stage of the research i.e., using convergent interviews, evaluated the wireless service characteristics and related behavioural factors for their impact on the choice of wireless services. Empirical evidence from the convergent interviews confirmed the five major themes that were deemed important during the development of the theoretical framework and selected for further detailed study in the online survey stage. These are: mobility, system interactivity, system interoperability, wireless trust environment, and user context. These major themes for the study were finalised after initial extraction of the set of important issues obtained from the eight convergent interviews. Table 5.6 shows the list of important issues that were extracted from the convergent interviews about the wireless service characteristics and related behavioural factors on choice of wireless services.

Table 5.4: Important issues extracted from convergent interviews about wireless service characteristics

1	Mobility including coverage and real time connectivity
2	System interactivity including device complexity and service complexity
3	Wireless trust environment including security and privacy
4	System interoperability (seamless connectivity) including uniform standards and expected performance (speed, quality and reliability of services)
5	Wireless access availability
6	Policies and regulations
7	Training and resources
8	Social influences including image, status and education (social network)
9	Cost factor
10	Reputability of the service provider

The above ten important issues were formalised from the data analysis of excerpts taken from the convergent interview respondents. The list of these issues are then summarised and tabulated in Table 5.7 and are based on agreements and disagreements from the eight convergent interviewees.

Table 5.5: Respondents' agreements and disagreements on various issues

Issues Interviewees	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A	✓	✓	✓	✓	✓	×	×	×	✓	✓
B	✓	×	✓*	✓*	✓	0	0	×	✓	0
C	✓*	✓	✓*	✓	✓	×	✓	✓	✓	✓
D	✓	✓*	0	✓	✓	✓	✓	×	✓	0
E	✓	✓	✓	✓*	✓	×	×	✓*	✓	✓
F	✓	✓	✓	✓*	✓	✓*	✓	×	✓	✓
G	✓*	✓	✓	✓*	✓	✓	✓	×	✓	✓
H	×	×	×	✓	✓	×	✓	×	✓	✓*

✓ = agreements
× = disagreements
✓* = there is some sort of agreement but depends on situations
0 = not familiar with issue and so neither agreement nor disagreement was possible

The ten important issues identified during the convergent interviews were then integrated into the original five major themes and re-examined as part of the ongoing literature review for the second stage of research using online surveys. Overall, the data analysis from convergent interviews during the exploratory stage confirmed the relevance of the theoretical framework with five major research themes associated with wireless service characteristics and provided additional knowledge to inform the design and implementation of the online surveys. However, the convergent interviews in this theory-building stage also provided deeper insights into how wireless service characteristics and related behavioural factors influence choice of wireless services. The findings from the convergent interviews are used in the development of the survey questionnaire.

5.3 Phase 2: Quantitative data analysis

In this section, data analysis on quantitative data collected using online surveys during the descriptive stage of the research is reported. In section 5.3.1, data preparation, sample size, response rate and issues of non-response bias is discussed.

5.3.1 Data preparation

As the survey was web-based, the data entry, coding and editing were simplified through automatic processing of the data collected. It prohibited multiple data entry through the use of several validating mechanisms such assigning a unique response ID for each respondent response, use of cookies, and name and IP address of the respondent. All completed online survey responses are considered to be valid as there was no monetary incentive scheme and respondents willingly participated in the online survey.

Of the 231 responses collected from the online survey, 43 responses were considered to be invalid and unusable as there was missing information in the major sections of the questionnaire. As it was assumed that the respondents were unwilling to cooperate with the survey, these 43 responses were then discarded and not used in further analysis and interpretation. The remaining 188 responses were screened and

edited once the data was collected from the website and entered into SPSS. SPSS treats empty fields as constant values, therefore, for attributes that involved a nominal or ordinal scale, fields without selections were filled with '0' to allow them to be used for further interpretation.

5.3.2 Sample size and response rate

Response rate was one of the most important issues faced by the online survey research. It was very difficult to appraise or gather information on exactly how many respondents in the sampling frame the online survey questionnaire was distributed to and exactly who responded from each sampling frame. This is because most of the sampling frame that agreed to participate in the research, as discussed earlier in section 4.3.7, distributed the questionnaire to their members either by circulating the questionnaire URL internally through email or posting it on the relevant group web page so that respondents could participate voluntarily based on the eligibility criteria. However, a rough sample size and response rate has been drawn based on the user statistics obtained from the relevant sample. The statistics should not be taken as a guideline for calculating the exact response rate. Table 5.8 illustrates the sampling frame and approximate response rate.

Table 5.6: Sample size and approximated response rate

Sampling Frame	Sample population (Approximately)	Number responded (Approximately)
Healthcare professionals within Australia: Sources from HiF-net group.	Approximately 40 registered professionals from Australia out of 1470 (Internationally).	10
End users and professionals associated with Wireless networking groups in Australia: Sources from lists.samba.org	541 – Non digested members 193 – Digested members	30
Postgraduate students and Employees from USQ and other organisations	3242 – USQ Staff 485 – On campus postgraduate students 200 – Other organisations	80 40 30
IS professionals within Australia: Sources from isworld.org	618 from Australia out of 7287 (Internationally)	40
Total	**5300**	**230 (<5% approx)**

From the above table, the effective sample size and response rate after the corrections to errors and deletion of cases was 188 (231 – 43) and 5 percent of population respectively. The response rate was much lower than the expected response rate of around 10 percent previously suggested in section 4.3.8. The sample size of 188 meets the proposed guideline (discussed in the section 4.3.2) for the ratio of observations to the 29 indicators used in this research. Therefore, this sample size has been deemed appropriate for the data gathered from this research to be further analysed using exploratory factor analysis.

5.3.3 Non-response bias

A non-response error check was done to statistically identify any differences that existed between those respondents who completed the survey early and those who completed the survey late. This error check was performed as it was necessary to rule out any sampling bias that may have existed in the survey. A chi-square goodness of fit test was conducted for the variables used in the demographics section to distinguish the difference in population in terms of early respondents and late respondents. Late respondents in the survey were distinguished from the early respondents through the date on which the follow-up email was sent to the respondents. Early respondents were judged to be the first 87 percent of responses (199 - 37 (invalid responses) = 162) received between 7 October 2006 and 18 October 2006; the remaining 13 percent (32 – 6 (invalid responses) = 26) were judged as late and were received between 20 October 2006 and 15 November 2006. The three demographic variables tested showed that no significant difference ($p>0.05$) existed between early and late responses, thus providing evidence that there is no bias between the early and late responses at the 95 percent confidence level. Table 5.9 summarises the results of chi-square tests to show the difference between early and late respondents in terms of the demographic characteristics i.e., gender, age, and level of education. Table 4.1 from Appendix 4 shows the comprehensive results of chi-square tests performed on demographic details. Chi-square tests were unable to be performed for the occupation variable as it involved multi-response items.

Table 5.7: Chi-square tests for non-response error (early-vs-late respondents)

Variables	Pearson Chi-square value	Degree of freedom (df)	Two-tailed p	Significant difference between two groups (p= 0.05)
Gender	0.019	1	.889	No
Age	5.076	5	.407	No
Education	5.692	4	.223	No

5.3.4 Characteristics of respondents

This section describes demographic characteristics of the respondents, which are summarised in Table 5.10. The first column of this table identifies demographic variables investigated in this research and groups used to categorise respondents for each of these variables. The second and third columns show the proportion of respondents in each group in quantity and percentage formats respectively. From this table, it can be seen that most respondents are males (59.74 percent), are between 25-49 years of age (66.5 percent), and have a postgraduate qualification (45.65 percent). In relation to occupation, most respondents are from the other category (i.e., from different backgrounds other than those listed) (39.57 percent) followed by students (27.83 percent).

Table 5.8: Profile of respondents

Item No.	Demographic Characteristic	Number of responses	Percentage
Q1.1	**Gender**		
	Male	118	62.8%
	Female	70	37.2%
Q1.2	**Age**		
	Under 18	1	.5%
	18-24	32	17.0%
	25-34	62	33.0%
	35-49	63	33.5%
	50-64	25	13.3%
	65 or older	5	2.7%
Q1.3	**Occupation**		
	Student	54	28.7%
	Clerk	8	4.3%
	Manager	46	24.5%
	Salesman	7	3.7%
	Healthcare professional (specify)	10	5.3%
	Other	72	38.3%
Q1.4	**Level of education**		
	Secondary qualification	17	9.0%

	Technical qualification	7	3.7%
	Graduate degree	65	34.6%
	Postgraduate qualification	94	50.0%
	Other	5	2.7%

5.3.5 Wireless usage experience

In this section, 10 variables were measured to determine end user experience of wireless usage using the nominal and ordinal scales. The data collected for each of the 10 variables is summarised into a question that is grouped into items, number of responses and percentage formats. Table 5.11 illustrates the descriptive statistics on wireless usage experience for end users.

Table 5.9: Descriptive statistics on wireless usage experience

Item No.	Wireless usage experience	Number	Percentage
Q2.1	**Wireless Services**		
	Email	137	72.9%
	SMS (Short Messaging Service)	149	79.3%
	MMS (Multimedia Messaging Service)	45	23.9%
	Internet	152	80.9%
	Video streaming/ conference	32	17%
	Business solution service(s)	19	10.1%
	Transaction oriented service(s) (i.e. banking, shopping etc)	68	36.2%
	Location based service(s) (i.e. traffic and travel information, weather, emergency etc)	47	25%
	Other	14	7.4%
Q2.2	**Wireless Devices**		
	Mobile phones	162	86.2%
	Pager	4	2.1%
	PDA/ Tablet PC/ Palm-top	41	21.8%
	PC	132	70.2%
	Sensor Devices (i.e. Bluetooth, RFID etc)	41	21.8%
	Other	10	5.3%
Q2.3	**Wireless Service Provider**		
	IBurst	3	1.6%
	Optus	55	29.3%
	Primus	6	3.2%
	Telstra	56	29.8%
	Vodafone	27	14.4%
	Other	90	47.9%
Q2.4	**Service plans and cost of Wireless services**		
	Pre-paid	55	29.3%
	Post-paid (i.e. monthly, annually etc)	133	70.7%
	Other	9	4.8%
	Cost	30	16%
Q2.5	**Wireless Services access**		
	At home	43	22.9%
	At work	19	10.1%
	Both at home and work	126	67%

	Other	21	11.2%
Q2.6	**How long have you used the Wireless services?**		
	Less than one month	4	2.1%
	1 to 6 months	10	5.3%
	6 months to a year	23	12.2%
	1 to 3 years	69	36.7%
	Over 3 years	82	43.6%
Q2.7	**How often do you use the Wireless services?**		
	Daily	150	79.8%
	Once a week or more	24	12.8%
	1 to 3 times a month	8	4.3%
	Every 2-3 months	3	1.6%
	2-3 times a year	3	1.6%
Q2.8	**In a typical week, how many hours do you spend in accessing the wireless services?**		
	0 to 5	91	48.4%
	6 to 10	36	19.1%
	11 to 30	33	17.6%
	More than 30	28	14.9%
Item No.	**Wireless usage experience**	**Number**	**Percentage**
Q2.9	**How comfortable do you feel using wireless services in general?**		
	Very comfortable	107	56.9%
	Somewhat comfortable	54	28.7%
	Neither comfortable nor uncomfortable	20	10.6%
	Somewhat uncomfortable	2	1.1%
	Very uncomfortable	4	2.1%
	Don't know/ Unable to answer	1	.5%
Q2.10	**Overall, how satisfied are you with wireless services?**		
	Very satisfied	47	25.0%
	Satisfied	97	51.6%
	Neutral	32	17.0%
	Dissatisfied	11	5.9%
	Don't know/ Unable to answer	1	0.5%

Question Q2.1 in the wireless usage experience section refers to the type(s) of wireless services that end users are using. This question was considered to be crucial for the research study as it evaluates end user choices of wireless services. The study examined eight types of wireless services from basic wireless email to more advanced services such as wireless multimedia, video streaming/conference, business oriented services, and location based services such as traffic and travel related information. Out of 188 valid responses to the question, wireless internet was the most commonly used wireless service, used by 81 percent of all respondents. Following wireless internet, the most popular wireless service is wireless SMS with 80 percent of all respondents currently using or planning to use it. Use of wireless email services was reported by 72.9 percent of respondents, with location-based services reported by 36.2 percent, transaction-oriented services (25 percent) and

SMS (23.9 percent). The remaining proportion was shared among the rest of three other types of wireless services including the 'other' option.

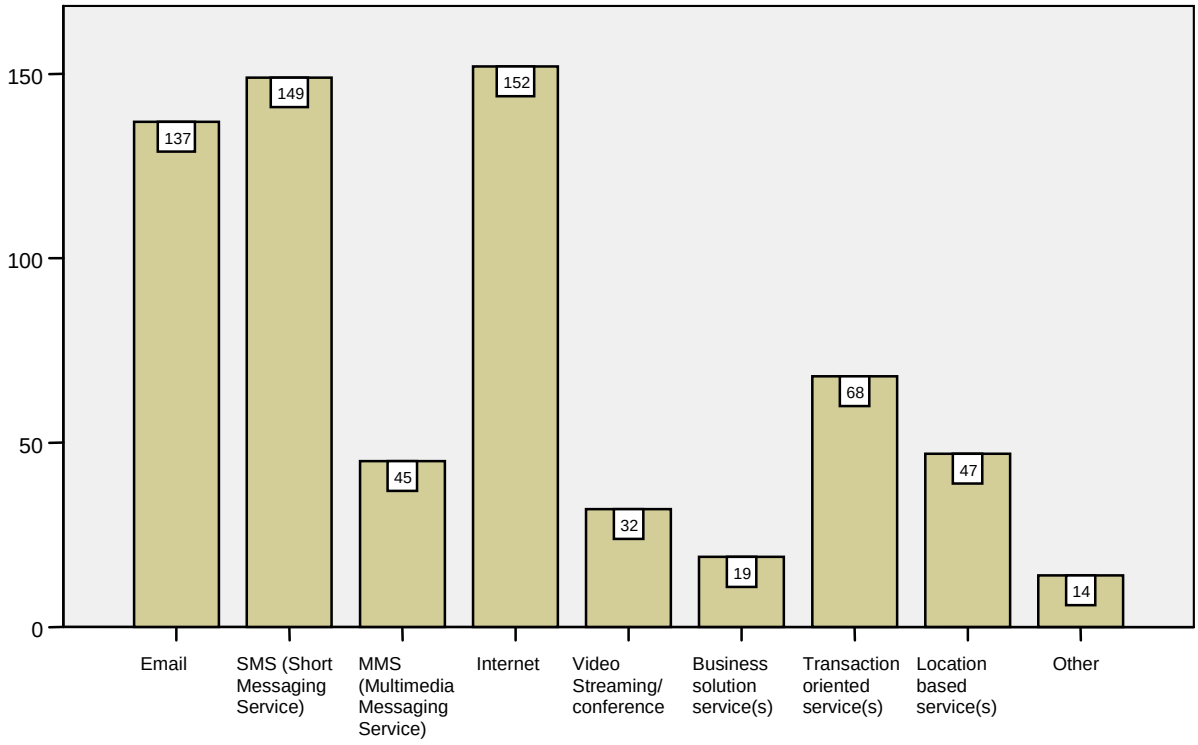


Figure 5.1: Type(s) of wireless services used

From a list of five possible wireless devices, respondents were asked in Q2.2 to indicate the type of wireless devices they use to access wireless services. Respondents were able to indicate other wireless devices if not included in the list. The descriptive statistics in Figure 5.2 below shows that a significant proportion of respondents i.e., 86.2 percent use mobile phones and 70 percent of respondents use personal computers as their primary wireless device to access wireless services. After personal computers, 21.8 percent of respondents indicated that they use PDA/Tablet PC/Palm-top to access wireless services, and a similar percentage use Bluetooth/ sensor devices. Lastly, 5.3 percent of respondents have used 'other' wireless devices to access wireless services.

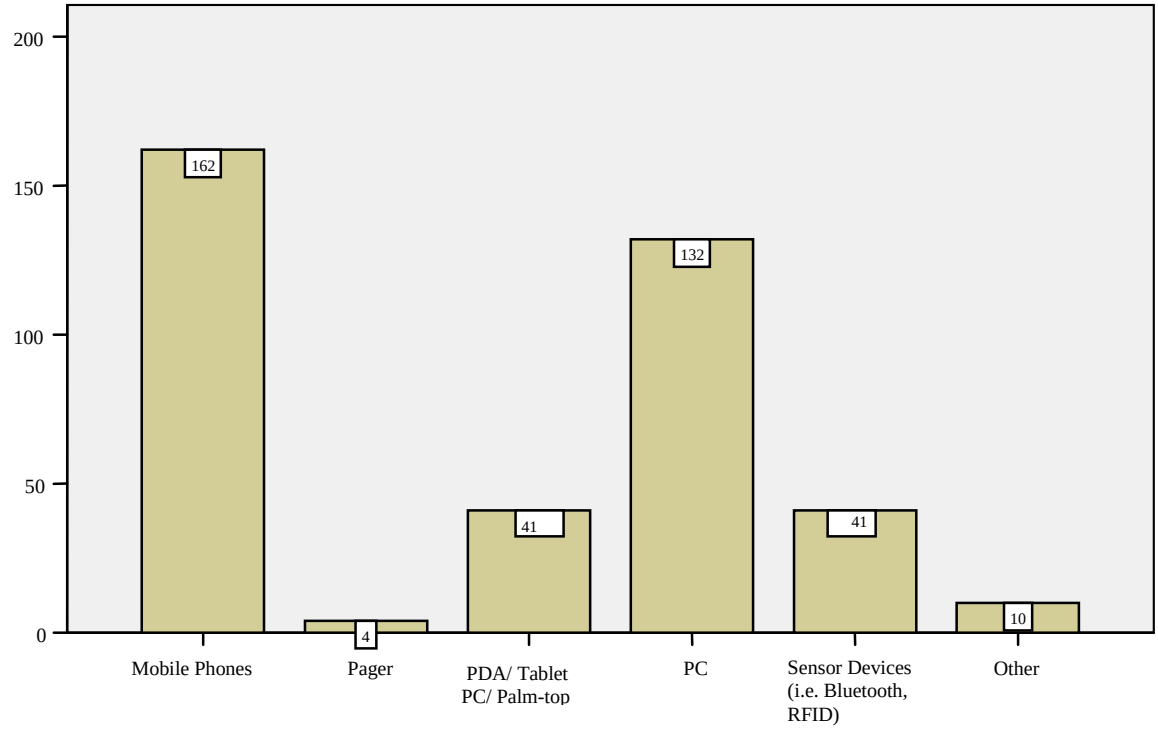


Figure 5.2: Type(s) of wireless devices used

Respondents were also asked to report on the wireless service provider that they subscribe to. Table 5.11 shows the frequency distribution of the respondents in response to question Q2.3. From the bar chart given in Figure 5.3 below, it can be seen that the significant proportion of responses (47.9 percent) belong to the 'other' category. After 'other', the major Australian wireless service providers, Telstra and Optus, have shared almost equal number of responses with 29.8 and 29.3 percent respectively. Fourteen percent of respondents indicated Vodafone as their wireless service provider.

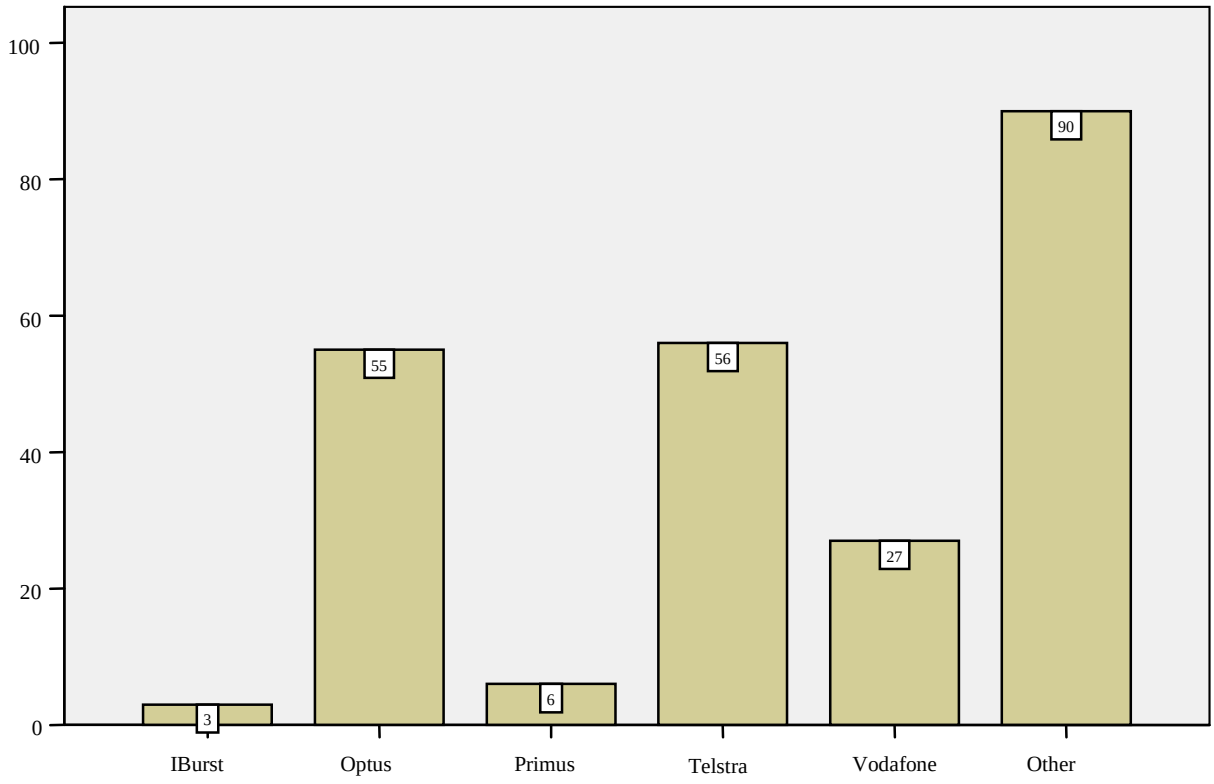


Figure 5.3: Wireless service provider subscribed to

In relation to service plans and costs associated with wireless services, the larger proportion of respondents i.e., 70.7 percent indicated that they are using a post-paid plan for their wireless services, whereas 23.7 percent of respondents indicated that they are on a pre-paid plan. Only four percent of respondents indicated that they use other types of plans such as free, pay as use, and managed service. In regard to wireless service access, 67 percent of respondents reported that they access wireless services both at work and home, while 22 percent and 12 percent of respondents reported that they access wireless services only at 'home' or 'work' respectively.

The frequency and duration of wireless usage experience in terms of how long they have used the wireless services, how often they use the wireless services, and how many hours do they spend in accessing the wireless services was measured using questions Q2.6, Q2.7, and Q2.8. The frequency distribution from the table on end user usage duration on the wireless services shows that 43.6 percent of respondents are end users with over 3 years of experience in using wireless services, while 36.7 percent of respondents are end users having wireless services experience of between 1 and 3 years. Respondents with less than 1 year and more than 6 months constituted

around 12 percent. With respect to frequency of wireless usage experience, a significant proportion i.e., almost 80 percent of respondents, reported that they use wireless services daily, and nearly half of the respondents (48.9 percent) indicated that they use wireless services for around 0 to 5 hours in a typical week.

The overall comfort and satisfaction of an end user while using the wireless services were evaluated by questions Q2.9 and Q2.10. Likert type scale was used in measuring these two questions. In response to the questions, the major proportion of respondents, 56.9 percent have indicated that they are very comfortable and 28.7 percent are just comfortable with the wireless service access. Interestingly, only a trivial number of respondents (i.e. around 2 percent) from the sample were either uncomfortable or very uncomfortable. The remaining 10.6 percent of respondents were neither uncomfortable nor comfortable with the service access. Likewise, a signification proportion of respondents were either satisfied (51.6 percent) or very satisfied (25 percent) with the level of wireless service access. Only 17 percent of respondents were neither unsatisfied nor satisfied with service access. The remaining proportion of responses (5.9 and 0.5 percent) were shared among dissatisfied and don’t know/unable to answer options.

5.3.6 Wireless service characteristics

The five key constructs (i.e., mobility, system interactivity, wireless trust environment, system interoperability, and user context grouped into facilitating conditions, cost, and reputability) revealed from the prior literature and outcomes of the convergent interviews were evaluated in this section using Likert type or behavioural intention scales. Means and standard deviations of these variables were used to describe these wireless service characteristics. With respect to items measuring wireless service characteristics, all of the means were rated higher than the neutral position, indicating some level of agreement with each of the statements. Summary statistics of the means and standard deviations for these variables are presented in respective tables of each construct.

Table 5.10: Descriptive statistics on wireless service characteristic – mobility

Item No	Mobility	Mean	Standard Deviation
3.1	I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	4.12	0.990
3.2	When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	4.19	0.867
3.3	Due to availability of wireless services, I am able to access information on the move.	3.97	0.967
3.4	I am much more mobile than I used to be.	3.88	1.053
3.5	My expectation is that I will be able to use wireless services at any place and at any given time.	3.95	1.134

Five variables measured this construct. All items related to mobility were rated quite high by most of the respondents. Items such as impact of wireless coverage on work efficiency and level of freedom while using wireless services were treated as important by respondents with means over 4 (Q3.1, m = 4.12, sd = 0.990; Q3.2, m = 4.19, sd = 4.19). The other items were also considered equally important by all of the respondents as their means were slightly lower than 4. Thus, the findings on mobility yielded from the survey suggest that mobility is an important factor affecting a respondent's decision when choosing wireless services. Summary statistics of means and standard deviations on items measuring mobility are reported in Table 5.12.

Table 5.11: Descriptive statistics on wireless service characteristic – system interactivity

Item No	System Interactivity	Mean	Standard Deviation
3.6	When using wireless services, I feel frustrated as it is difficult to type using the small keys.	3.18	1.179
3.7	My wireless device will enable me to access all the services available.	3.29	1.168
3.8	Interface design of the wireless system enables me to use wireless services with ease.	3.44	1.060
3.9	Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.	3.98	0.953
3.10	Wireless services are flexible to interact with.	3.64	1.043

The construct system interactivity was measured using five items to determine their influence on choice of wireless services. The first two items (Q3.6 and Q3.7) were rated relatively equal to the neutral mean, indicating that respondents are relatively less likely to agree with statements measuring system interactivity facilitated by their wireless device and its functionality while accessing the wireless services (Q3.6, m = 3.18, sd = 1.060; Q3.9, m = 3.98, sd = 0.953). However, care should be taken in interpreting the results as the standard deviation is quite high. Respondents have agreed for the rest of the three items (Q3.8, Q3.9 and Q3.10) measuring system interactivity in terms of interface design and functionality of the wireless system for their influence on choice of wireless services as their means rated high (Q3.8, m = 3.44, sd = 1.060; Q3.9, m = 3.98, sd = 0.953; Q3.10, m = 3.64, sd = 1.043). Online survey results on system interactivity shown in the above Table 5.13 support results from the convergent interviews.

Table 5.12: Descriptive statistics on wireless service characteristic – wireless trust environment

Item No	Wireless Trust Environment	Mean	Standard Deviation
3.11	I feel that access to wireless services is secure.	3.14	1.117
3.12	I trust that all my details are secured while accessing wireless services.	3.04	1.205
3.13	My service provider provides adequate security protection mechanisms for wireless services.	3.48	1.269
3.14	I am restricted to use only security protection mechanisms that my service provider recommends.	3.52	1.405
3.15	I believe that wireless security would support in completing my job.	3.78	1.091

In relation to the wireless trust environment construct, two items measured the degree to which respondents feel trust and security when accessing the wireless services. Respondents reported that they were unsure about security and trust while accessing the wireless services as their means were rated closer to the neutral mean (Q3.11, m = 3.14, sd = 1.117; Q3.12, m = 3.04, sd = 1.205). Respondents supported the item related to adequate managerial security protection from their service provider (Q3.13, m = 3.48, sd = 1.269) and further reported that they are restricted to

using only security protection mechanisms that their service provider recommends (Q3.14, m = 3.52, 1.405). Finally, the item related to wireless security in support of their job performance was rated high, indicating the significance of wireless trust environment as a crucial factor influencing the respondent's decision for choice of wireless services. Table 5.14 reports the summary statistics of means and standard deviation of items measuring wireless trust environment.

Table 5.13: Descriptive statistics on wireless service characteristic – system interoperability

Item No	System Interoperability	Mean	Standard Deviation
3.16	I am able to connect to wireless system that my workplace uses.	3.74	1.250
3.17	Interoperability would improve my job performance.	4.03	1.044
3.18	Standardised wireless services influence my decision to choose between service providers.	3.90	1.082
3.19	I would expect that my services are compatible between service providers.	4.07	0.843
3.20	Switching wireless services between service providers requires a lot of mental effort.	3.76	1.275

With regard to system interoperability, the results indicated that respondents had favourable attitudes to the items measuring this when it came to choice of the wireless services. Respondents indicated that they are able to connect to the wireless system that their workplace uses (Q3.16, m = 3.74, sd = 1.250), and that interoperability would improve their job performance (Q3.17, m = 4.03, sd = 1.044). Respondents also reported that standardised access to wireless services has an influence on their decision to choose between service providers (Q3.18, m = 3.90, sd = 1.082). Further, they expected that services needed to be compatible between service providers (Q3.19, m = 4.07, sd = 0.843), and believe that switching wireless services between service providers requires a lot of mental effort (Q3.20, m = 3.76, sd = 1.275). Therefore, all items have means higher than the neutral mean indicating that respondents were agreeable with these variables. Table 5.15 shows the summary statistics of means and standard deviations on items measuring system interoperability.

Table 5.14: Descriptive statistics on wireless service characteristic – user context – facilitating conditions

Item No	User context – Facilitating conditions	Mean	Standard Deviation
3.21	I feel comfortable while dealing with wireless access to my services at work.	4.01	1.008
3.22	My wireless system has access to wireless services only at limited areas.	3.71	1.172
3.23	My workplace culture influences my decision to choose wireless services.	3.54	1.306
3.24	Policies on wireless services will help less informed users.	3.76	1.067
3.25	Training helps to explore wireless services that are available.	4.01	0.981

The final key construct from wireless service characteristics, user context, was measured using 9 items which were initially classified into facilitating conditions, cost and reputability. Five items were employed to measure the user context, facilitating conditions of respondents. One item (Q3.21) was used for identifying respondents' comfort when dealing with wireless access to their wireless services at their work place. Respondents reported that they were satisfied and comfortable with the level of access to wireless services as the item was rated high with a mean over 4.0 (Q3.21, m = 4.01, sd = 1.008). Two items (Q3.22 and Q3.23) were rated highly by the respondents, indicating agreement to the statements related to restricted wireless system access and the influence of workplace culture on their decision to choose wireless services (Q3.22, m = 3.71, sd = 1.172; Q3.23, m = 3.54, sd = 1.306). The other two items (Q3.24 and Q3.25) were used to measure the degree to which policies and training on wireless services are helpful to respondents. Two of these items (Q3.24 and Q3.25) were also rated high and indicated that respondents were likely to be influenced by training and policies thereby affecting the choice of wireless services (Q4, m = 3.76, sd = 1.067; Q5, m = 4.01, sd = 0.981). In general, these results, as displayed in Table 5.16, have strongly shown that these respondents consider facilitating conditions as an important factor influencing their choice of wireless services.

Table 5.15: Descriptive statistics on wireless service characteristic – user context – cost and reputability

Item No	User context – Cost	Mean	Standard Deviation
3.26	Reduced costs influence my decision to choose a service provider.	4.00	1.013
3.27	I am confused by the different pricing plans that aren't comparable.	3.82	1.147
Item No	**User context – Reputability**	**Mean**	**Standard Deviation**
3.28.	I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.	3.57	1.170
3.29	I prefer wireless services only from reputable service provider that has longevity in the market.	3.89	1.010

Each of the remaining constructs under user context, i.e., cost and reputability, were each measured using two items. The two items (i.e. Q3.26 and Q3.27) relating to the user context – cost construct strongly show that respondents were influenced by the costs associated with the wireless services (Q3.26, m = 4.00, sd = 1.013; Q3.27, m = 3.82, sd = 1.147). Items Q3.28 and Q3.29 measuring the user context – reputability construct were also rated high with mean responses well over 3.5, which strongly indicates that respondents were more concerned with the reputability of the wireless service provider prior to choosing a wireless services (Q3.28, m = 3.57, sd = 1.170; Q3.29, m = 3.89, sd = 1.010). From these results, it appears that these respondents tend to consider the user context variable as an important factor in relation to their choice of wireless services. As such, the results from the survey confirm the findings of the convergent interviews conducted during the exploratory stage of the research.

5.3.7 Reliability analysis

Reliability in terms of internal consistency and dependability of each construct was determined using Cronbach's coefficient alpha (Hair et al. 2000). Variables with correlation or Cronbach's coefficient less than 0.7 were considered to have low reliability and were eliminated with an exception of acceptable (α) value of 0.6 for an exploratory research such as this. Initially, the reliability of all 72 variables used in the survey was measured using SPSS software V14.0. Such analysis conducted on

variables indicated that all of the variables measuring the survey instrument are reliable with Cronbach's (α) value of **0.740**. In addition, the overall measure of internal consistency of the 29 items measuring the wireless service characteristics section of survey instrument demonstrated high internal consistency of scales with Cronbach's coefficient (α) value of **0.825** (Hair et al. 2000; Sekaran 2002). Reliablity statistics for all 72 items used in the survey and 29 items measuring wireless service characteristics with Cronbach's alpha and Cronbach's alpha based on standardised items are presented in Tables 5.18 and 5.19 respectively.

Table 5.16: Reliability statistics for all 72 items used in the survey

Cronbach's Alpha	Cronbach's Alpha Based on Standardised Items	No. of Items
0.740	0.646	72

Table 5.17: Reliability statistics for all 29 items measuring wireless service characteristics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
0.825	0.832	29

Further, the reliability statistics were drawn for each of the individual constructs measuring wireless service characteristics i.e., mobility, system interactivity, wireless trust environment, system interoperability and user context. The Cronbach's alpha (α) scores of each construct measuring wireless service characteristics were slightly closer to the normal standard value of **0.6**, which is acceptable for an exploratory research such as this (Hair et al. 1998). The measure of internal consistency (α) scores of **0.779**, **0.693**, **0.625** and **0.685** for each of the construct items of wireless service characteristics indicates that the scales for these constructs are reliable measures, except the Cronbach coefficient value of **0.558** for system interactivity. However, the items measuring this construct were retained until sufficient evidence was found to eliminate it from further analysis. The following table presents the reliability Cronbach's alpha scores.

Table 5.18: Reliability coefficients for variables measuring wireless service characteristics

Reliability Coefficients of Wireless service characteristics	Alpha	Standardised Item Alpha	No. of items
Mobility	0.779	0.785	5
System Interactivity	0.558	0.601	5
Wireless trust environment	0.693	0.699	5
System Interoperability	0.625	0.649	5
User Context – Facilitating conditions, cost and reputability	0.685	0.689	9

An examination of reliability statistics (as shown in Table 4.3.2 in Appendix 4) of the items comprising statements for the system interactivity scale indicates that the Q3.6 statement has the negative corrected item-total correlation value of -0.013. If this statement is removed from the scale, the overall reliability can be significantly increased from 0.558 to 0.723. Correspondingly, the fourth and fifth statements of wireless trust environment (Q3.14 and Q3.15) and the fifth statement of system interoperability (Q3.20) have low corrected item-total correlation values of 0.273, 0.307 and 0.242. If these statements are removed, then the overall reliability of wireless trust environment and system interoperability can be increased to 0.796 and 0.651 from 0.693 and 0.625 respectively. Therefore, these four items (Q 3.6, Q3.14, Q3.15 and Q3.20) were dropped for further analysis using the factor analysis technique. Corrected item-total correlation values for items related to user context – cost (Q3.26 and Q3.27) and user context – reputability (Q3.29) are low with values 0.278 and 0.286, and 0.271. However, these items were retained in the analysis at this primary stage and will be noted for closer inspection when the individual measures are tested.

From the findings of the reliability tests, the decision was taken to continue the factor analysis technique in the interest of measuring the constructs in the research model on the understanding that caution must be used in interpreting the results.

5.3.8 Exploratory factor analysis

In this section, an exploratory factor analysis with all 25 items measuring the five major constructs of wireless telecommunication services was performed simultaneously to determine whether these items adequately reflected critical aspects of the constructs being measured. From the exploratory factor analysis, a total of six parsimonious set of factors were extracted based on their high factor overloading of items. Exploratory factor analysis for this research provided insights into the interrelationships among the set of items measuring wireless service characteristics and empirical support for addressing the research model.

Prior to assessing the items measuring each construct of wireless service characteristics using factor analysis, as guided by Hair et al (1998) and Coakes & Steed (2003), the following assumptions were tested and considered to be met:

1. adequate sample size
2. normality
3. linearity
4. outliers among cases
5. factorability of the correlation matrix
6. outliers among variables.

5.3.8.1 Assumption testing

The sample size obtained from the population was 188, indicating a sufficiently large enough sample as the preferred minimum sample size was 150+. Sample size was discussed earlier in the section 5.3.2. Thus, the assumption of adequate sample size for conducting factor analysis was satisfied.

Tests of normality, linearity, outliers among cases and outliers among individuals were performed in the data preparation stage and descriptive statistics stage for all 25 items measuring the 5 major constructs of wireless service characteristics. All 25 items have satisfied the assumptions of normality, linearity and outliers among cases and variables as shown in Table 4.2 (Appendix 4). However, in general, the assumptions of factor analysis are more conceptual than statistical and from the statistical point of view, any departure of variables from normality, linearity,

homosedasticity and outliers diminish the observed correlations, which was not the case for this research (Hair et al. 2006). Subsequent to the tests of normality, linearity, and outliers, the correlation matrix was observed to check for significant relations in justifying the application of factor analysis.

5.3.8.2 Factorability of the correlation matrix:

The three analytical tools used for assessing the factorability of the correlation matrix were correlation analysis, the test of sampling adequacy 'the Kaiser-Meyer-Olkin', and the Bartlett test of sphericity for the correlation matrix. Initially, the correlations between all 25 items measuring the five major constructs were assessed in order to justify the application of factor analysis. The correlation matrix of all observed items measuring wireless service characteristics is illustrated in Table 5.22. From Table 5.22, it is observed that almost all of the 25 items used in this study were correlated positively and significantly to each other at the level of $p<0.05$ and $p<0.01$. Interestingly, none of these correlations was higher than 0.75, which indicates that each item was distinctive enough to measure different items under the same construct (Sekaran 2000).

Further, the anti-image correlation matrix from the correlation analysis was used in assessing the sampling adequacy of the variable. Such an examination of anti-image correlation matrix revealed that the measures of sampling adequacies of the items were well over the acceptable level of 0.5 in determining the factor analysis to be appropriate for the research model.

From the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (Table 5.21) for all 25 items, it is observed that the KMO value is 0.762, which is greater than the acceptable level of 0.6, signifying the adequacy of the item relationships. In addition to the KMO, the Bartlett test of sphericity for the correlation matrix was used to assess the overall significance of the correlation matrix (Hair et al. 2006). From the tests, the magnitude of the correlations was sufficiently large and significant for Barlett's test of sphericity with $\chi^2 = 1402.763$, degrees of freedom (df) = 300 and a significance level of $p = 0.000$. Therefore, from observation of the above tests, there are items with substantial number of strong correlations (correlation coefficients

greater than 0.30) that are moderately related and are deemed appropriate to be used in factor analysis (Hair et al. 2006).

Table 5.19: KMO and Bartlett's test statistics of all 25 items measuring wireless service characteristics

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.762
Bartlett's Test of Sphericity	Approx. Chi-Square	1402.763
	Df	300
	Sig.	0.000

Table 5.20: Correlation matrix of all items measuring wireless service characteristics (*p<.05, **p<.01)

		3.1	3..2	3.3	3.4	3.5	3.7	3.8	3.9	3.10	3.11	3.12	3.13
Mobility-1.	**3.1**	1	.504(**)	.344(**)	.423(**)	.314(**)	.100	.180(*)	.059	.155(*)	.115	.036	.070
Mobility-2.	**3.2**	.504(**)	1	.516(**)	.481(**)	.352(**)	.152(*)	.214(**)	.044	.258(**)	.221(**)	.156(*)	.181(*)
Mobility-3.	**3.3**	.344(**)	.516(**)	1	.548(**)	.330(**)	.073	.194(**)	.081	.234(**)	.113	.047	.080
Mobility-4.	**3.4**	.423(**)	.481(**)	.548(**)	1	.407(**)	.250(**)	.305(**)	.147(*)	.200(**)	.142	.135	.158(*)
Mobility-5.	**3.5**	.314(**)	.352(**)	.330(**)	.407(**)	1	.099	.178(*)	.019	.189(**)	.179(*)	.142	.109
System Interactivity-2.	**3.7**	.100	.152(*)	.073	.250(**)	.099	1	.622(**)	.241(**)	.408(**)	.238(**)	.204(**)	.104
System Interactivity-3.	**3.8**	.180(*)	.214(**)	.194(**)	.305(**)	.178(*)	.622(**)	1	.258(**)	.535(**)	.272(**)	.257(**)	.162(*)
System Interactivity-4.	**3.9**	.059	.044	.081	.147(*)	.019	.241(**)	.258(**)	1	.267(**)	.164(*)	.099	.048
System Interactivity-5.	**3.10**	.155(*)	.258(**)	.234(**)	.200(**)	.189(**)	.408(**)	.535(**)	.267(**)	1	.375(**)	.361(**)	.265(**)
Wireless Trust Environment-1.	**3.11**	.115	.221(**)	.113	.142	.179(*)	.238(**)	.272(**)	.164(*)	.375(**)	1	.731(**)	.438(**)
Wireless Trust Environment-2.	**3.12**	.036	.156(*)	.047	.135	.142	.204(**)	.257(**)	.099	.361(**)	.731(**)	1	.543(**)
Wireless Trust Environment-3.	**3.13**	.070	.181(*)	.080	.158(*)	.109	.104	.162(*)	.048	.265(**)	.438(**)	.543(**)	1
System Interoperability-1.	**3.16**	.180(*)	.188(**)	.131	.200(**)	.119	.085	.119	.031	.136	.054	.032	.211(**)
System Interoperability-2.	**3.17**	.472(**)	.206(**)	.107	.179(*)	.263(**)	.076	.060	.151(*)	.030	.138	.029	.005
System Interoperability-3.	**3.18**	.196(**)	.134	.089	.154(*)	.297(**)	.083	.155(*)	.045	.157(*)	.198(**)	.139	.281(**)
System Interoperability-4.	**3.19**	.207(**)	.193(**)	.075	.130	.289(**)	.179(*)	.215(**)	.182(*)	.183(*)	.267(**)	.128	.221(**)
User Context - Facilitating conditions-1.	**3.21**	.261(**)	.334(**)	.231(**)	.238(**)	.216(**)	.115	.176(*)	.039	.172(*)	.094	-.014	.105
User Context - Facilitating conditions-2.	**3.22**	.209(**)	.064	-.134	.067	.094	-.074	-.056	.148(*)	.053	.065	.107	.188(**)
User Context - Facilitating conditions-3.	**3.23**	.166(*)	.171(*)	.024	.116	.137	.005	.042	.138	.120	.057	-.008	.031
User Context - Facilitating conditions-4.	**3.24**	.123	.119	.103	.184(*)	.344(**)	.135	.218(**)	.100	.184(*)	.187(*)	.158(*)	.150(*)
User Context - Facilitating conditions-5.	**3.25**	.208(**)	.180(*)	.130	.208(**)	.164(*)	.095	.109	.080	.114	.130	.054	.095
User Context - Cost-1.	**3.26**	.123	.250(**)	.153(*)	.065	.223(**)	.050	.055	.166(*)	.106	.113	-.088	.037
User Context - Cost-2.	**3.27**	.056	.082	.029	.071	.154(*)	-.008	.012	-.048	.057	.058	.110	.111
User Context - Reputability-1.	**3.28**	.034	.126	.056	.077	.081	.146(*)	.112	-.037	.123	.051	.066	.005
User Context - Reputability-2.	**3.29**	.200(**)	.189(**)	.139	.199(**)	.163(*)	.209(**)	.161(*)	.125	.149(*)	.199(**)	.210(**)	.171(*)

Table 5.20 – continued (*p<.05, **p<.01)

		3.16	3.17	3.18	3.19	3.21	3.22	3.23	3.24	3.25	3.26	3.27	3.28	3.29
Mobility-1.	**3.1**	.180(*)	.472(**)	.196(**)	.207(**)	.261(**)	.209(**)	.166(*)	.123	.208(**)	.123	.056	.034	.200(**)
Mobility-2.	**3.2**	.188(**)	.206(**)	.134	.193(**)	.334(**)	.064	.171(*)	.119	.180(*)	.250(**)	.082	.126	.189(**)
Mobility-3.	**3.3**	.131	.107	.089	.075	.231(**)	-.134	.024	.103	.130	.153(*)	.029	.056	.139
Mobility-4.	**3.4**	.200(**)	.179(*)	.154(*)	.130	.238(**)	.067	.116	.184(*)	.208(**)	.065	.071	.077	.199(**)
Mobility-5.	**3.5**	.119	.263(**)	.297(**)	.289(**)	.216(**)	.094	.137	.344(**)	.164(*)	.223(**)	.154(*)	.081	.163(*)
System Interactivity-2.	**3.7**	.085	.076	.083	.179(*)	.115	-.074	.005	.135	.095	.050	-.008	.146(*)	.209(**)
System Interactivity-3.	**3.8**	.119	.060	.155(*)	.215(**)	.176(*)	-.056	.042	.218(**)	.109	.055	.012	.112	.161(*)
System Interactivity-4.	**3.9**	.031	.151(*)	.045	.182(*)	.039	.148(*)	.138	.100	.080	.166(*)	-.048	-.037	.125
System Interactivity-5.	**3.10**	.136	.030	.157(*)	.183(*)	.172(*)	.053	.120	.184(*)	.114	.106	.057	.123	.149(*)
Wireless Trust Environment-1.	**3.11**	.054	.138	.198(**)	.267(**)	.094	.065	.057	.187(*)	.130	.113	.058	.051	.199(**)
Wireless Trust Environment-2.	**3.12**	.032	.029	.139	.128	-.014	.107	-.008	.158(*)	.054	-.088	.110	.066	.210(**)
Wireless Trust Environment-3.	**3.13**	.211(**)	.005	.281(**)	.221(**)	.105	.188(**)	.031	.150(*)	.095	.037	.111	.005	.171(*)
System Interoperability-1.	**3.16**	1	.387(**)	.182(*)	.252(**)	.350(**)	.251(**)	.217(**)	.185(*)	.347(**)	.089	.157(*)	.246(**)	.032
System Interoperability-2.	**3.17**	.387(**)	1	.396(**)	.325(**)	.284(**)	.305(**)	.258(**)	.137	.229(**)	.142	.045	.129	.115
System Interoperability-3.	**3.18**	.182(*)	.396(**)	1	.454(**)	.236(**)	.107	.107	.192(**)	.223(**)	.180(*)	.239(**)	.190(**)	.269(**)
System Interoperability-4.	**3.19**	.252(**)	.325(**)	.454(**)	1	.345(**)	.120	.061	.330(**)	.290(**)	.307(**)	.174(*)	.238(**)	.161(*)
User Context - Facilitating conditions-1.	**3.21**	.350(**)	.284(**)	.236(**)	.345(**)	1	.202(**)	.203(**)	.266(**)	.276(**)	.199(**)	.108	.199(**)	.133
User Context - Facilitating conditions-2.	**3.22**	.251(**)	.305(**)	.107	.120	.202(**)	1	.407(**)	.225(**)	.147(*)	.072	.151(*)	.049	.117
User Context - Facilitating conditions-3.	**3.23**	.217(**)	.258(**)	.107	.061	.203(**)	.407(**)	1	.218(**)	.163(*)	.129	.108	.270(**)	.058
User Context - Facilitating conditions-4.	**3.24**	.185(*)	.137	.192(**)	.330(**)	.266(**)	.225(**)	.218(**)	1	.452(**)	.198(**)	.235(**)	.328(**)	.223(**)
User Context - Facilitating conditions-5.	**3.25**	.347(**)	.229(**)	.223(**)	.290(**)	.276(**)	.147(*)	.163(*)	.452(**)	1	.247(**)	.249(**)	.302(**)	.185(*)
User Context - Cost-1.	**3.26**	.089	.142	.180(*)	.307(**)	.199(**)	.072	.129	.198(**)	.247(**)	1	.101	.217(**)	.089
User Context - Cost-2.	**3.27**	.157(*)	.045	.239(**)	.174(*)	.108	.151(*)	.108	.235(**)	.249(**)	.101	1	.166(*)	.167(*)
User Context - Reputability-1.	**3.28**	.246(**)	.129	.190(**)	.238(**)	.199(**)	.049	.270(**)	.328(**)	.302(**)	.217(**)	.166(*)	1	.245(**)
User Context - Reputability-2.	**3.29**	.032	.115	.269(**)	.161(*)	.133	.117	.058	.223(**)	.185(*)	.089	.167(*)	.245(**)	1

5.3.8.3 Factor analysis for wireless service characteristics

The discussion in the previous section confirmed the factorability of the correlation matrix for the suitability of application of factor analysis for all items measuring wireless service characteristics. At this stage, the principal component analysis factoring technique for predictor variables was selected for this study. A principal component analysis was performed to reduce the number of predictor variables (Hair et al. 2006). The principal component analysis on the 25 items with 5 major constructs yielded six principal factors and were labelled as mobility, system interactivity, wireless trust environment, system interoperability, user context – facilitating conditions, and user context - reputability, based on their highest overloading of factors and the item characteristics assessed from the prior literature. The following steps were adopted in the principal components technique of factor analysis:

1. computation of the research matrix
2. factor extraction
3. rotation.

5.3.8.4 Initial factor analysis

Using SPSS software, principal component analysis with orthogonal rotation using varimax algorithm was performed on the 25 items in redistributing the variance among factors and to obtain optimal factor solution (Hair et al. 2006). In this process, latent root criterion and percentage of variance were assessed in determining the number of factors to be extracted. Eigen values greater than 1 were considered significant in latent root criterion, while a solution that accounts for 60 percent of cumulative total variance or more in the percentage of variance criterion is considered to be satisfactory (Hair et al. 2006).

In deciding the number of factors to be retained for further analysis, the total variance from the statistics obtained was analysed. Eight factors with Eigen values greater than 1 were extracted resulting in a total of 63.69 percent of variance of all 25 items. The table of statistics on total variance explained is shown in Appendix 4 - Table 4.4.

In interpretation of factors, the unrotated component matrix was computed first and analysed to assist in obtaining a preliminary indication of the number of factors to extract. From the computation, the fifth item, mobility construct (Q3.5), second item, system interoperability (Q3.17), and the items related to user context – facilitating conditions (Q3.21-Q3.25), have loadings on only one factor each and the remaining items either have high or negative loadings on more than one factor, resulting in difficult interpretation of the output. The statistics obtained from the unrotated factor matrix are shown in Appendix 4 -Table 4.5.

For the above reason, factor matrix was recomputed with the orthogonal rotation technique using the varimax algorithm so that each of the factors extracted are distinctive enough in terms of factor-loading pattern and the percentage of variance (Hair et al, 1998, p.125). This technique simplified the interpretation of the factor matrix. From the examination of the rotated component matrix of wireless service characteristics, Factor-1, Factor-2, and Factor-3 have pure variables i.e., they comprised only the items that were measuring mobility, wireless trust environment and system interactivity constructs respectively without any complex loadings. These factors have items with factor loadings ranging from 0.545 to 0.798 for Factor-1, 0.781 to 0.867 for Factor-2, and 0.484 to 0.831 for Factor-3. The other remaining factors (i.e., factors 4 to 8) have complex loadings that involved items with negative loading or items with factor loading on multiple factors. Factor-4 comprised five items (two from user context – reputability and three from user context – facilitating conditions) with factor loadings ranging .0484 to 0.831, while Factor-5 consisted of only three items of system interoperability and Factor-6 with two items from user context – facilitating conditions. Factor-7 consisted of three items, where an item has negative loading on the Factor-4. Similarly Factor-8 has three items with two items have complex loading on Factor-3 and Factor-5. The unrotated component matrix is shown in Appendix 4 - Table 4.5.

From the interpretation of the rotated component matrix, it was obvious that a more meaningful solution is required for selection of final factor solutions. For this reason, the factor model was reassessed and respecified through removal of items having low loadings and complex loading on multiple factors. Further, from the reliability tests, items that were considered to have low corrected total-item correlation coefficients

(specifically from the user context construct) that were retained during reliability tests were re-examined to cross check whether any of these items had low loadings or complex loadings so that the items could be removed.

The following three items of wireless service characteristics were excluded from the factor model for the purpose of computation of the research matrix (these statements were highlighted in Appendix 4 - Table 4.6):

- Items Q3.26 and Q3.27 from user context – cost construct, as these two items have low corrected total-item correlation coefficients and formed a factor with unrelated items that have low loadings;
- Item Q3.29 from user context – reputability as it has low loading and deviated from the remaining items of wireless service characteristics.

5.3.8.5 Factor analysis

Subsequent to the removal of the three items, factor analysis with the remaining 22 items was rerun using SPSS. Items with factor loadings greater than 0.5 were considered as significant in the computation of the research matrix to ensure that factors extracted have items with highest loadings and adequately reflected the construct it supposed to measure. From the evaluation of the rotated component matrix, there were 20 items that were considered significant with factor loadings greater than 0.5 that accounted for 60.2 percent of total amount of variance. These 20 items were categorised under six principal factors in the rotated factor matrix. The rotation converged in six iterations before reaching to the optimal solution. All these items were pure variables as there was no overloading of variables across other factors, thus demonstrating the distinctive quality of the items measuring the respective constructs.

The final step in factor analysis involved determining how many factors were required to be interpreted and then assigning a label to these factors (Coakes & Steed 2006). This step was considered relatively straightforward in this study as there were no factors with complex overloading and the items extracted to the corresponding factor were almost related to the items measuring the actual construct. The factors obtained from the principal component analysis were grouped into six factors,

namely **mobility, system interactivity, wireless trust environment, system interoperability, user context – facilitating conditions-1, and user context – facilitating conditions-2**. The following Table 5.23 presents the factors with their corresponding items that were extracted from the rotated component matrix.

Table 5.21: Rotated component matrix

	Component					
	Mobility	**Wireless trust environment**	**System Interactivity**	**User context – Facilitating conditions-1**	**System inter operability**	**User context – Facilitating conditions-2**
Mobility-3. Due to availability of wireless services, I am able to access information on the move.	.803					
Mobility-2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	.774					
Mobility-4. I am much more mobile than I used to be.	.753					
Mobility-1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	.643					
Mobility-5. My expectation is that I will be able to use wireless services at any place and at any given time.	.527					
Wireless Trust Environment-2. I trust that all my details are secured while accessing wireless services.		.883				
Wireless Trust Environment-1. I feel that access to wireless services is secure.		.791				
Wireless Trust Environment-3. My service provider provides adequate security protection mechanisms for wireless services.		.768				
System Interactivity-2. My wireless device will enable me to access all the services available.			.795			
System Interactivity-3. Interface design of the wireless system enables me to use wireless services with ease.			.794			
System Interactivity-5. Wireless services are flexible to interact with.			.625			

Table 5.22: continued

	Mobility	Wireless trust environment	System Interactivity	User context – Facilitating conditions-1	System inter operability	User context – Facilitating conditions - 2
System Interactivity-4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.			.598			
User Context - Reputability-1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.				.742		
User Context - Facilitating conditions-4. Policies on wireless services will help less informed users.				.691		
User Context - Facilitating conditions-5. Training helps to explore wireless services that are available.				.648		
System Interoperability-3. Standardised wireless services influence my decision to choose between service providers.					.744	
System Interoperability-4. I would expect that my services are compatible between service providers.					.699	
System Interoperability-2. Interoperability would improve my job performance.					.673	
User Context - Facilitating conditions-2. My wireless system has access to wireless services only at limited areas.						.808
User Context - Facilitating conditions-3. My workplace culture influences my decision to choose wireless services.						.708

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Rotation converged in 6 iterations.

The first principal factor consisted of all five items measuring mobility as a key construct from wireless service characteristics and this factor was labelled mobility. Similarly, the second and third factors consisted of three items (Q3.10, Q3.11 and Q3.12) measuring wireless trust environment and four items (Q3.6, Q3.7, Q3.8 and Q3.9) of system interactivity constructs respectively. Therefore, these two factors

were labelled as per their characteristics and guided from the literature review. The fourth factor was labelled as user context – facilitating conditions-1, as it included the two items from user context – facilitating conditions and one item from user context – reputability (Q3.12). Item Q3.12 related to user context – reputability was more categorically related to user context – facilitating conditions as it reflects the financial liability aspects of a service provider. Similarly, the fifth factor was assigned as system interoperability as it included three items measuring the system interoperability characteristic. Finally, the sixth factor was labelled user context – facilitating conditions-2 as it included two items from the same construct measuring wireless service characteristics related to wireless access availability. Therefore, labelling of the items was subjected to interpretation of the statement that correlated with items measuring the user context – facilitating conditions.

5.4 Conclusion

In this chapter, section 1 provided detailed analyses for each of the five major themes investigated during the exploratory stage of the research using eight convergent interviews. From these analyses, which were supported with excerpts taken from the interview respondents, it can be concluded that wireless service characteristics including mobility, system interactivity, wireless trust environment, wireless access availability, policies and regulations, training and resources, costs and reputability of the service provider, and user context play an influential role in user behaviour for choice of wireless services.

Section 2 provided detailed analysis on the data collected using online surveys. Data analysis included descriptive statistics and factor analysis. Exploratory factor analysis was used to study the relationships of variables, and grouped multiple items belonging to the same construct together. The six factors that were extracted from the factor analysis was discussed in detail. The following chapter provides discussion about the conclusions of the research problem followed by limitations and future implications.

6 Summary, Conclusions and Implications

6.1 Summary

As outlined in Chapter 1, this dissertation reports on empirical research into the nature and the extent of wireless service characteristics and related end user behaviours. The first chapter provided the background and justification for the research, together with an outline of the study. The research question was developed from identified gaps in the literature. The research question was:

> *What behavioural factors influence the choice of wireless telecommunication services for end users?*

A two-stage research design was proposed for this study. Stage 1 was an exploratory study involving convergent interviews to develop and refine a research model. Initially, this stage also included a literature review to explore and identify a suitable theoretical framework for this research. Stage 2 was a quantitative study, using an internet based survey, to gather data to test and confirm the findings from the stage 1 convergent interviews.

In Chapter 2, the literature was reviewed and gaps in the literature were identified. Different theories and empirical studies of wireless service characteristics and related end user behaviours were reviewed. A preliminary model adapted from the technology acceptance related theories, together with suitable factors found in the wireless technology literature was proposed for this research. This model was developed to understand the relationship between the five major constructs of wireless service characteristics (i.e., mobility, system interactivity, wireless trust environment, system interoperability, and user context) and the end user behaviour for their choice of wireless telecommunication services.

Chapter 3 described the research methodology followed in both the exploratory and descriptive stages of this research. The overall research plan consisted of two major stages with two different research methods: 1) qualitative research using convergent interviews and 2) quantitative research using online surveys. Each of these was discussed. A brief justification was provided for the use of the pluralistic method of

approach in the study at the initial stage. This was followed by a description of the design and process of convergent interviews and online surveys techniques employed in the two stages of the research, along with their justification and strengths and weaknesses.

Chapter 4 described the data collection technique employed in this study for both stages. In section 1, convergent interviews with end users experienced in wireless services usage were planned to gain greater insight about the research objectives. The results of these convergent interviews were used to refine and develop measurement variables for operationalising the constructs of this research for use with the online survey. Finally, the model proposed in Chapter 2 was revised and refined based on these findings. In section 2, the data collection using online surveys was described, together with a description of the sampling strategy, and operational definitions based on the literature review and findings from previous chapters. A questionnaire was designed and pre-tested with respondents having similar profiles to the proposed respondents in order to identify possible weaknesses in design. A revised questionnaire was then developed based on pre-test results. Finally, data preparation and analysis, and ethical considerations, were discussed.

Chapter 5 reported the analysis of data collected using the combined methodology. In the first section, the pattern matching technique was employed to analyse the qualitative data collected through eight convergent interviews. A brief summary highlighting the list of important factors emerging from the convergent interviews was proposed. The next section began with data examination and screening, followed by descriptive statistics. Exploratory factor analysis was used to study the relationships of variables and grouped multiple items belonging to the same construct together. The six factors extracted from the factor analysis were discussed in detail. Finally, several additional preliminary insights were presented.

This final chapter, Chapter 6, begins with brief summary of the dissertation report followed by the conclusions of the research problem and findings. This is followed by a brief conclusion, description of the study limitations and recommendations for future research in this area.

6.2 Conclusions about the research problem

In this chapter, conclusions about the findings from the web-based survey are presented. Given that the research problem was to determine "end user behaviours for wireless telecommunication services", six major factors were identified to assist in accomplishing this outcome. These six factors (i.e., mobility, system interactivity, wireless trust environment, system interoperability, user context – facilitating conditions-1, and user facilitating conditions-2) have been examined and the results were presented in the previous chapter. Discussion on the six factors follows to address the research problem.

6.2.1 Mobility

The first research theme/issue investigated the mobility aspect of wireless service characteristics. In this study, end users believed that mobility would be the foremost factor that influences their behaviour toward the usage/preference of wireless services. The five questionnaire items in relation to the mobility construct of wireless service characteristics, tested through the online survey, emerged as a single decisive factor in determining the end user choice of wireless services. The results of the factor loading for these items were discussed in Table 5.23.

In relation to this construct, the respondents returned the questionnaire item (Q3.3) – *Due to the availability of wireless services, I am able to access information on the move*, with a significant factor loading of 0.803. From the results, it is evident that respondents felt that access to information on the move is an important aspect that influences their behaviour when choosing wireless services. This is because wireless services bring in the concept of mobility for the user, where they are not restricted to stationary places in order to have access to the services needed to perform their required task/job. The study results are in consistent with Kjeldskov & Stage (2004), in which the authors note that mobility involving motion and navigation while interacting with wireless system has its influence on the social context. Their study reported usability problems that are experienced in mobile use and subsequent user behaviour as a result of such problems.

Level of freedom is another important element of the mobility construct of wireless service characteristics. The questionnaire item (Q3.2) – *When using wireless services, I feel comfortable with the level of freedom as I am able to move around*, has been extracted from the convergent interviews. This item has returned a factor loading value of 0.774. While using wireless services, respondents felt comfortable because they were able to freely move around and not be constrained by cords. Survey respondents perceived wireless services as enablers of freedom allowing them to work at their convenience. This is because wireless services free respondents from needing a physical presence to be accessible to others. Level of freedom associated with mobility, according to Palen, Salzman & Youngs (2000) will have influence on the user communicative practice and behaviour for their adoption of wireless technology. In relation to this aspect, Sarker & Wells (2003b) found that users experienced an immediate sense of freedom from being bound to their desks with the wireless system. These findings justify the study findings showing level of freedom as an important aspect having impact on user behaviour.

The questionnaire item (Q3.4) - *I am much more mobile than I used to be* has a factor loading of value 0.753. Although this questionnaire item has been adopted from Gera & Chen (2003), the item in this study proved to be significant element in measuring the mobility construct of wireless service characteristics. From the results, it is evident that respondents perceived that they feel more mobile now when compared to the previous use of wireless services. The change in the perception of end users is largely due to the emergence of wireless technology that has resulted in mobility for end users in terms of their ability to access/use the services irrespective of time and location (Perry et al. 2001; Wiberg & Ljungberg 2005). This newfound mobility also enabled them to have access to real time data that indeed has an impact on their decision to choose the services. Prior studies pertaining to user perceptions and behaviour in the context of wireless environment support the findings from the study (Agarwal & Prasad 1998b; Palen et al. 2000). These studies comment that user perceptions have a direct effect on the attitude and behavioural components for their acceptance of wireless technology.

Another questionnaire item (Q3.1) has a significant factor loading value of 0.643, which indicated that respondents agreed *wireless coverage facilitates mobility in*

order to improve their work efficiency. From the results, it is evident that coverage is an important aspect of mobility, as it offers advantages in numerous areas including improvement in work efficiency and flexibility. Due to the availability of wireless services in a wide coverage area, end users are able to perform their job/work even from places remote to their conventional workplace or location. Such coverage facilitated mobility for an end user influences their behaviour to choose only wireless services that are available in wide coverage areas. Phillips (2002) and other similar studies such as Christensen (2001) have explored the various benefits of remote interactions such as impact on job productivity facilitated by the high degree of mobility. These studies have also discussed the impact of mobility on the behavioural context of users.

Respondents also believed that *availability of wireless services anytime and anywhere* is another aspect of wireless service characteristics which influences their decision on wireless services. Respondents expected these services to be available whenever they are needed and expected to be able to perform their tasks regardless of time and location. The anytime and anyplace context of mobility, according to Kun (2001), Perry et al (2001) and Wiberg & Ljungberg (2005) studies, are subjected to have their influence on the social context in the wireless environment. Sarker & Wells (2003b) supported the study findings by stating that availability of wireless services increased the use of data features and consequently, the chance of adoption.

6.2.2 System interactivity

The second research theme investigated system interactivity and related end user behaviour for their influence on choice of wireless services. Data analysis on the system interactivity theme indicates that four out of five questionnaire items tested through the online survey were regarded as important elements.

These results suggest that system interactivity in terms of the flexibility and convenience, enabled by the wireless device and the interface design of wireless devices, have considerable impact on the choice of wireless services. These findings are also supported from the convergent interviews and the prior literature. Firstly, wireless devices and the ability to access the available wireless services is an

important aspect of system interactivity impacting an end user's decision to choose among the wireless services. This questionnaire item - '*wireless device will enable me to access all the services available*' (Q3.7), tested from the online survey, returned a significant factor loading value of 0.795. The results provide sufficient evidence to conclude that their wireless devices enable them to access all the wireless services available, however, it cannot be certain that they are currently accessing all these available services. These findings support the prior literature pertaining to the usability evaluation of wireless services from wireless devices that explored its implications on end user behaviours for their acceptance of the wireless technology (Axiotis et al. 2004; Palen & Salzman 2002; Palen et al. 2000; Thomas & Patrick 2002).

Secondly, *interface design of the wireless system* is another element that contributed to the overall system interactivity factor in determining the end users' choice of wireless services. This questionnaire item (Q3.8) initially emerged from the convergent interviews and returned a factor loading value of 0.794 from the online survey. While, in general, the interface design of the wireless system is characterised in terms of its hardware and software functionality aspects, respondents in the survey agreed that they are able to access/use the wireless services with convenience and ease. Therefore, from the results of the convergent interviews and the survey, it is clearly evident that respondents preferred the wireless service with a device that has a more user friendly interface and has supported major functionalities so that they can interact with convenience and easy of use. These findings are supported by the prior literature, in which Gururajan, Hafeez-Baig & Moloney (2005) note that the capacity of a wireless device and interface design has a major role on the user behavioural intent for acceptance of the wireless technology in the healthcare sector.

Thirdly, respondents in both the online survey and the convergent interviews expected that interaction with the wireless system when accessing the services needs to be flexible. That is, they reported that it is an expectation that their wireless services needs to be both intuitive and reliable so that they can interact with convenience and ease of use. The questionnaire item (Q3.10) – *wireless services are flexible to interact with* has a factor loading value of 0.625. In support of these findings, Eleanor et al (2007) evaluated camera phones and visual tags for the

purpose of their interaction while using wireless services. That study ascertained the role of the flexibility of interface design associated with the wireless system as being an important factor to be taken into account from the perspective of an end user as it has an impact on their job/task productivity. Findings from that study also reported that users felt positive when the interactivity enabled by the wireless system is flexible to interact with. In keeping with the above survey results, Brodie & Perry (2001) and Palen & Salzman (2002) also found evidence that user attitudes are subjected to influence towards the acceptance of wireless technology with the interactivity enabled by the wireless system.

Finally, system interaction and its associated productivity i.e., effect on work efficiency, is another element that contributed to the factor – system interactivity. With regard to this aspect, the questionnaire item (Q3.9) tested in the survey has a factor loading value of 0.598. From the survey results, it can be concluded that respondents perceived that a wireless system which involves short/small tasks and requires limited interaction is more convenient and easy to use. These user perceptions associated with the wireless system interactivity has a direct effect on behavioural intent as the interaction design of the wireless system is able to cater and satisfy the task context needs of the user. In general, users' interaction needs in relation to wireless technology will differ significantly depending on the context of task. The findings of this study are also supported by the past research of Fabio et al (2006) who suggest a positive relationship between system interactivity and its impact on user perceptions and subsequent behaviours.

From the survey results, it can be concluded that system interactivity is a significant factor from the perspective of the end user that has major influence on their decision of wireless services.

6.2.3 Wireless trust environment

Empirical results from the online survey confirm that wireless trust environment is an important factor in determining the choice of wireless services. Three out of five items (Q3.12, Q3.11, and Q3.13) tested through the online survey in regard to this construct received significant factor loadings of 0.883, 0.791 and 0.768.

This study found that respondents believed that access to wireless services is secure. In regard to this, the first two questionnaire items (Q3.11 and Q3.12) correspond to the respondents' attitude towards the safety (i.e., security and privacy) of the information that is exchanged while accessing the wireless services. From the results, respondents indicated that they felt that access to wireless services from the wireless service providers is reasonably secure and ascertained trust on the details that is shared while accessing wireless services indicating them as safe. Privacy and security associated with trust are two inter-related constructs and have considerable impact on the user behavioural intent for their acceptance of the wireless technology. This is because with more trust, users tend to reveal more information that is required for wireless services access, and they will prefer to use the same service thereafter. In the wireless environment, trust will have more influence on user behavioural intent when compared to the wired environment, resulting in the negative influence on the adoption of wireless technology when security and privacy issues are not addressed adequately and when these issues have impact on users' job and performance (Ghosh & Swaminatha 2001; Gururajan, Hafeez-Baig et al. 2005).

Similarly, the questionnaire item (Q3.13) - *my service provider provides adequate security protection mechanism for wireless services* is another aspect that contributed to the factor – wireless trust environment. It is evident that respondents believed that there is an enough managerial security protection mechanisms from their wireless service provider when accessing the wireless services without requiring them to be adequately prepared for and/or use any additional protection methods to safeguard their personal information. Security protection techniques such as authentication and access control are some of the commonly used mechanisms by wireless service providers to protect the end users' information. Users may grow suspicious and sceptical when they perceive that there are no such protection techniques available from their wireless service provider. Ashley, Hinton & Vandenwauver (2001) note that perceived lack of security in the wireless environment has impact on the user behavioural intent for their adoption of wireless services, which indeed have serious repercussions on the deployment of the wireless services from the wireless service providers.

Therefore, from the data analysis, end users indicated that their decision on the preference/usage of wireless services was more based on the trust over their details while accessing their wireless services, rather than its support in completion of job. This is supported by the results as the other two questionnaire items - "*I am restricted to use only security protection mechanisms for wireless services*" (Q3.14) and "*wireless security in support of completing their job*" (Q3.15) used in the survey to measure the wireless trust environment were initially identified from the convergent interviews, but are not supported by subsequent analysis in this study.

Overall, the result of the survey shows trust as an important factor in a collective way influencing user behaviour for choice of wireless services. The questionnaire items which proved to be significant in relation to the wireless trust environment factor received adequate support from the findings of the prior literature and from the convergent interviews. As discussed earlier in the Chapter 2, studies related to trust in a wireless environment were much focused on the commerce and healthcare industry and its influence on user behaviour, yet from the results of the online survey, these elements tend to have noteworthy influence on the wireless telecommunication services. In regard to the trust aspect, Perry et al (2001) suggest that although the anytime, anyplace context with a wireless system may be possible, it may not always be acceptable with the environment surrounding the context of user interaction.

6.2.4 System interoperability

Analysis of the empirical evidence from the survey reveals that respondents tend to prefer wireless services that are interoperable across various wireless service providers. This is evident from the online survey results as three out of five questionnaire items tested in the survey correspond to wireless services compatibility and uniform standards, and have emerged as important elements impacting the end user decision on choice of wireless services.

Respondents preferred the wireless services that are more standardised and this element has an impact on their decision to choose between wireless service providers. The questionnaire item (Q3.18) from the online survey has returned with a significant factor loading of value 0.795. From the survey results, it is evident that, despite the fact that there are many wireless standards (i.e., protocols, networks,

applications and interfaces) to choose between, respondents preferred to choose the wireless service that is more standardised in terms of its widespread acceptance, compatibility with other service providers, and ability to support emerging standards. This aspect has influence on the user behavioural intent as the end users feel frustrated choosing between different available standards. Similarly, the other questionnaire item in the survey returned with a high factor loading of value 0.699. This item corresponds to the compatibility of wireless services between various wireless service providers. During the exploratory research stage, the convergent interview respondents supported this aspect of system interoperability by stating that compatibility of wireless services between service providers is absolutely essential for their work or critical usage. This is because users' type and need of wireless services will vary significantly with the workplace's facility and location they are interacting, and users expect that these wireless services need to be interoperable in order to function fully. Thus, the survey responses provide additional support for this aspect as an important factor that has impact on adoption levels of wireless technology. In regard to this aspect, Lyytinen & Yoo (2002) argue that wireless services usage is determined by a user's perceived compatibility of the wireless technology, and that prior experience influences these perceptions.

Lastly, respondents in both the questionnaire survey and the convergent interviews believed that system interoperability would improve their job performance. The online survey has returned the questionnaire item relating to this aspect with a factor loading of value 0.673. The significant factor loading suggests that respondents felt the interoperability factor was beneficial as it integrates wireless services to interconnect seamlessly across different wireless devices, networks, and applications, thereby allowing them to communicate the desired information effectively. Due to the seamless connectivity to the information sources, end users perceived system interoperability as a means to enhance their communication capabilities and as a factor to improve their overall job productivity. In regard to this aspect, Varshney (2003) commented that system interoperability has impact on the work efficiency levels, thus justifying the results of this study.

6.2.5 User context

This section contemplated the analysis on the contextual factors surrounding the end user such as social influences, policies and regulations to determine their influence on user behaviour for their choice of wireless services. In the online survey, this construct was categorised into three primary aspects (namely facilitating conditions, reputability and cost) with nine questionnaire items that emerged during the exploratory stage of the research using convergent interviews. Factor analysis on the online survey respondents found five questionnaire items (out of 9 items) to be significant in influencing the end user behaviour for their acceptance of the wireless technology. As described earlier, these items were classified into facilitating conditions-1 and facilitating conditions-2 based on the relativity of the questionnaire items to the construct.

6.2.5.1 Facilitating conditions-1

Data analysis of the online survey responses revealed that financial liability aspects of a service provider, training and policies are the three important aspects that play a major role in influencing the end user behaviour for their acceptance of the wireless services. Firstly, respondents in both the online survey and the convergent interviews reported that they place more value on the financial liability aspects of a service provider prior to choosing a wireless service. This questionnaire item (Q3.28) has a .0742 factor loading. In general, financial liability aspects associated with wireless services from the wireless service provider include service contract (pay-per-use or subscription-based) costs, initial setup costs, and cancellation costs. This element has influence on behavioural intent as users tend to be highly involved in information search and purchase/selection decision making due to the relatively high costs associated with the liability aspects for their access to wireless services. This aspect is also in consistent with TAM – cost, one of the predictor variables in which TAM assumes that users choose to use IT based on a rational cost/benefit trade-off (Compeau et al. 1999).

From the survey results, it is also clear that respondents felt support (in terms of training and resources) is absolutely essential for their adoption of emerging technology such as wireless technology. The questionnaire item (Q3.25) – '*Training*

helps to explore wireless services that are available' has returned with a factor loading of value 0.691. Users accrue sufficient knowledge related to the requirements of access to wireless services and the various features that are available with wireless services when the training is offered from the service provider. This aspect has influence on user behaviour as they perceive lack of knowledge about a particular service can be a barrier for adoption of service in terms of what it can do or it could enable. In the socio-cognition literature, knowledge and learning through training has been reported as an important concept for the users' understanding and usability evaluation for the adoption of technology (Lyytinen & Yoo 2002).

Another aspect, policies, also has significant influence on end user behaviour for their choice of wireless services. This questionnaire item - '*Policies on wireless services will help less informed users*' (Q3.24) tested from the online survey has returned with a significant factor loading of value 0.648. Earlier, it was identified in the convergent interview findings that most of the respondents do not keep track of, or are unaware of the existing policies, yet the survey respondents indicated that education about the policies and regulations in coordination with usage of wireless services will help them better integrate with work related practices. Prior studies such as Lyytinen & Yoo (2002) and Palen & Salzman (2002) warn that policies have inadvertent consequences on the use of emerging technologies such as the wireless technology. These studies note that unprecedented concerns surrounding the user contextual factors including policies may likely create difficulties and barriers that can confound users' understanding of this emerging technology.

6.2.5.2 Facilitating conditions-2

Wireless access availability and social influences (specifically workplace culture) are the two aspects that contributed to the factor – facilitating conditions-2. Firstly, the study found that respondents believed availability of wireless services at desired access points or locations is an important consideration for their choice of wireless services. In regard to this aspect, the questionnaire item (Q3.22) – *My wireless system has access to wireless services only at limited areas*, returned with a significant factor loading of value 0.808. This suggests that, despite the fact that the wireless access points are usually defined by several wireless technology parameters

such as network coverage, wireless service provider, and type of wireless devices and services, respondents expected that the wireless services needed to be available in most locations where they would consider having impact on the work or other needs. Lack of wireless service access at the desired locations or access points imposes significant restrictions on the information availability to the end users. This aspect has influence on the behavioural intent and consequently the chance of adoption. This is because users rely on information for decision-making in every aspect of life and expect these services to be available irrespective of time and location for effective decision-making. These results are also in consistent with the Lyytinen & Yoo (2002) and Sarker & Wells (2003a) studies which discuss the importance of information availability and its impact on user learning and performance for the acceptance of wireless technology.

Finally, the social situation in which the respondents normally use their wireless services is another important aspect of facilitating conditions-2. In regard to this aspect, the questionnaire item (Q3.23) - *My workplace culture influences my decision to choose wireless services,* has a significant factor loading of value 0.708. From the results, it can be understood that respondents gave preference to the social situations, specifically to the workplace culture, in which the wireless services are used. Presumably the workplace culture includes the role and status of the user in coordination with the type of wireless services used in the work environment. While performing their duties, individuals depend on such workplace culture for the interpersonal communication or information exchanged using wireless services (Gururajan 2005). Although the wireless technology-based work environment and its impact on the user performance is currently under researched, there has been adequate empirical support for the relationship between the contextual factors and user behaviour (Al-Gahtani & King 1999; Venkatesh & Davis 2000; Venkatesh et al. 2003). These studies note that undoubtedly user contextual factors such as social, cultural, and psychological factors interact with the wireless technology and service design influences the user behaviour.

6.3 Conclusion

For successful deployment of wireless service to end users, the perceived barriers and drivers of the wireless telecommunication services characteristics from the perspective of end users must be evaluated. The keys to success lie in the management of such barriers and drivers of adoption and delivery of expectations to the end users. This exploratory study identified six major user behavioural factors for wireless telecommunication services in Australia having impact on the end user choice of wireless services. The six factors are mobility, system interactivity, wireless trust environment, system interoperability, and user context – facilitating conditions-1 and facilitating conditions-2.

Firstly, it is apparent that the mobility associated with wireless services provided end users a sense of freedom and coverage apart from the availability of the information at any given place and time. Secondly, this study provided empirical evidence that system interactivity and its associated aspects, such as user-friendly interface, size and support for major functionalities of a device or service/application, are the key drivers for end user choice of wireless services. This would suggest that convenience and ease of use play a significant role on the user behaviour for their choice of wireless services. In the study, end users also emphasised trust in their details or information that is shared with the wireless service providers. However, end users raised security and privacy aspects of trust as grey areas for concern as wireless technology is still in the developmental stage. In addition, this study found that evidence that end users perceived system interoperability in terms of seamless connectivity and compatibility between wireless services/applications and devices is absolutely essential for their work or critical usage. Undoubtedly, facilitating conditions surrounding user context played an important moderating role on the effect of the factors discussed previously.

These findings are especially important for Australian wireless service providers as the field of wireless technology is growing faster, and the wireless service providers are seeking to improve their quality of services while simultaneously trying to retain their users. The adoption factors derived will help service providers to design the wireless services that end users would consider using.

6.4 Limitations of the research

Despite the mixed and robust method of research approach using convergent interviews and online surveys, this research has some limitations. These limitations are related to the generalisability of the research due to the data collection approach, context and scope of the study, the use of measurement items and scales during the survey, and with data analysis.

As already discussed in Chapter 3, the research methodology was the most appropriate to collect data in relation to the scope of the research question. However, as with all research strategies, there are limitations with mixed methodology. First, the online survey was only an extension of the convergent interview findings. These findings were judged to identify significant and insignificant factors for the purpose of inclusion in the second stage of research using online surveys. Insignificant factors were excluded from the online survey data collection process. Therefore, the online survey did not introduce any new factors beside those obtained from the convergent interviews that may serve as potential confounds. A longitudinal study would allow the researcher to observe the phenomena of interest over time, and greater access to a wide range of data sources can be achieved to identify and address the confounding variables.

Secondly, this study is limited to end users of wireless telecommunication services from Australian wireless service providers. This may limit the ability to generalise the outcomes of the study to all wireless service providers as the settings and context vary from country to country in terms of wireless infrastructure, regulatory, billing and other management policies. Furthermore, the scope of this study is limited to investigating the relationship between various services offered by the wireless service provider and its impact on end users' behavioural factors such as perceptions, intentions and attitudes while using these services. This study did not examine the specific characteristics and performance elements of various stakeholders that play a role in the delivery of wireless services such as network providers, networks, standards, applications, and devices.

As discussed earlier, the main form of data collection technique for this study is online surveys, which is subject to several limitations such as non-response bias and low response rate issues, which were discussed in section 4.3.8. Apart from those limitations, the generalisability of the research is limited as the web-based survey respondents may represent a portion of the end users of wireless services. Therefore, there may be a need to evaluate this study on a large scale using multiple methods of data collection to represent all sections of the end users. Additionally, the online survey used many measurement scales adapted from the technology acceptance theories and other studies, and refined them by using results from convergent interviews. However, care should be given in the measurement scales as it cannot ultimately be certain that they were measuring the same construct. The ability of these scales to reflect the complexities of end users' perceptions and intentions has not been fully explored.

Finally, the factor analysis was used to extract the questionnaire items fitting into the six major factors influencing the choice of wireless services. However, due to the time constraints, the survey did not measure the relationship and weights between each of the wireless services and factors identified. Therefore, it may not be appropriate to assume that this model will predict the actual choice of wireless services from respondents. Further, the factor analysis did not provide sufficient evidence on the data collected in terms of key behavioural components of technology acceptance theories (i.e., perceived ease of use, perceived usefulness and attitude) for its application in this study and development of comprehensive research model based on technology acceptance theories.

6.5 Future implications

The use of the wireless services has been increasing rapidly around the world, opening new arenas for business and communication opportunities through its various types of wireless services including email, SMS, internet, and RFID. However, only a few studies have been conducted to identify the user behavioural factors and their adoption patterns of the wireless services. The identified user behavioural factors in this study can be utilised in designing future wireless services and realising the full potential of business and other opportunities.

Literature reveals that wireless services and their adoption factors significantly vary with the regional and international context and settings (Gera & Chen 2003; Lu et al. 2003; Lyytinen & Yoo 2002). Therefore, there is a necessity to expand the target population to suit to the specific regional and international settings in order to have a comprehensive understanding of the adoption factors and behavioural intentions of wireless service users.

This study is related to wireless services in general and related user behavioural factors. However, there is a need to evaluate the various dimensions of each wireless service, such as RFID and wireless internet, and specific behavioural factors for acceptance of the technology. Further, there is a need to identify the exact relationship between the end user's preference/usage of specific wireless services and on each behavioural component. Future studies can extend this study and evaluate the behavioural components in terms of the attitude, perceived ease of use and perceived usefulness for their application of technology acceptance theories such as TAM and WIMD and develop a comprehensive model on wireless services.

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Appendix 1: Convergent Interview Protocol

Convergent Interview Protocol

Briefing the respondent

Thank you for agreeing to participate in this research. This interview is part of a university research project. Its *purpose* is to investigate the end user behaviours for their choice of wireless telecommunication services within Australia domain. Thus the findings of this research will assist Australian wireless service providers in improving their quality of services and fills-in gap in the literature.

Ethical considerations are important to me. This research is confidential and your identity will not be acknowledged in the research project.

I would like to *tape the interview* in order to assist me in the data analysis. If you agree to this, at points during the taping, you are welcome to ask me to cease taping or to push the pause button yourself at any time during the interview.

This protocol is not a questionnaire but provides framework for the interview.

Interview No. _____ Date __/__/____ Time Commenced_____

Interviewee's Name and details

_____

_____

_____

_____

___

Information and Consent Form for Interview Participants

Study into end user behaviours for Australian wireless telecommunication services

This interview is designed to gather data and to assist me in gaining a better understanding of the nature and insights into end user behavioural factors affecting the choice of Australian wireless telecommunication services. The interview will focus on wireless service characteristics such as mobility, interactivity, system interoperability and user context that have influence on the choice of wireless services in terms of behavioural factors such as attitudes, ease of use, usefulness, intentions to use, and wireless trust environment.

The term wireless services is used in a general sense, and simply refers to set of service functions offered to end user's devices using wireless interfaces and networks when requested. Examples of wireless services include personal messaging services, voice/video streaming and multimedia services, transaction oriented and business solutions' services.

Consent

I, the participant, have read the information contained in this 'Information & Consent Form', and any questions I have asked have been answered to my satisfaction. I agree to participate in this activity, realising that I may withdraw at any time. I agree that information and research data gathered for the study will be used in the analysis of the end user behaviours for Australia wireless telecommunication services. No personal identifying of myself as the participant will be made.

_____ Date: _____

Participant or Authorised Representative

_____ Date: _____

Investigator

This research is being conducted by Hari Prasad Ravirala, MITR candidature, University of Southern Queensland, to provide data for analysis as part of a Master of Information Technology (MIT) dissertation through the IS Department, Faculty of Business at USQ. Any questions relating to this study can be directed to Hari Prasad on (07) 4631 1550 (W), or (07) 4690 0540 (H). It is anticipated that the full study will be completed by end of 2006, and access to an online executive summary of the dissertation should be available in January 2007. You will be contacted with information on accessing this site as soon as it is available.

This project has been approved by USQ's Ethics committee for ethics clearance for investigations involving human research. The participants should retain a copy of the consent form.

Your cooperation and generosity in participating in this study is highly valued and appreciated. Confidentiality of all business information provided is assured.

Thank you,

Hari Prasad Ravirala

Section A: Demographics Information (Please tick for appropriate box)

i) Gender
□ Male
□ Female

ii) Age
□ under 18
□ 18-34
□ 35-49
□ 50-64
□ 65 or older

iii) Occupation
□ Student
□ Clerk
□ Manager
□ Salesman
□ Healthcare Professional (specify)……...
□ Other……..

iv) Level of Education
□ Secondary Qualification
□ Technical Qualification
□ Graduate Degree
□ Post Graduate Qualification
□ Other……

Section B: Wireless Services Usage Experience (Please tick for appropriate box)

i) What type/s of Wireless services do you use?

□ Email
□ SMS (Short Messaging Service)
□ MMS (Multimedia Messaging Service)
□ Internet
□ Video streaming/conference
□ Business solution service
□ Transaction oriented service (Banking, Shopping etc)
□ Location based Service (traffic information, weather, and travel schedules; facilitating emergency 911 etc)
□ Other …….

ii) What type/s of Wireless Devices do you use to access the Wireless services?

□ Mobile phones
□ Pager
□ PDA/Tablet PC/ Palm-top
□ PC
□ Sensor Devices (Bluetooth, RFID etc)
Specify ……
□ Other ……

iii) Please specify your Wireless service provider.

□ Vodafone
□ Optus
□ Primus
□ Telstra
□ IBurst
□ Other ……..

iv) What are the associated service plans and cost of your Wireless services?

□ Pre-paid
□ Post-paid/Contract (monthly/ annually etc)
□ Other……
Cost……..

v) Where do you access your Wireless services?

□ Both at home and at work
□ At home
□ At work □ Other …….

vi) How long have you used the Wireless services?

□ Less than one month
□ 1 to 6 months
□ 6 months to a year
□ 1 to 3 years
□ Over 3 years

vii) How often do you use the Wireless services?

□ Daily
□ Once/week or more
□ 1 to 3 times a month
□ Once/month
□ Every 2-3 months
□ 2-3 times a year
□ Other …….

viii) In a typical week, how many hours do you spend in accessing the Wireless services?

□ 0 to 5
□ 6 to 10
□ 11 to 30
□ More than 30

ix) How comfortable do you feel using Wireless services, in general?

□ Very comfortable
□ Somewhat comfortable
□ Neither comfortable nor uncomfortable
□ Somewhat uncomfortable
□ Very uncomfortable

x) Overall, how satisfied are you, with Wireless service?

□ Very satisfied
□ Satisfied
□ Neutral
□ Dissatisfied
□ Very dissatisfied

Section C: Interview Questions on Wireless Services

The following terminologies associated with wireless service characteristics will be used during the interview process and their description is provided below in a general sense.

Terminology

Mobility refers to the ability of users to access defined services from any terminal in the network, while maintaining their personal environment settings.

Interactivity refers to the capability of wireless devices with suitable interface design to access wireless services with convenience and ease of use.

System interoperability is the ability of different wireless systems and application services to communicate, to exchange data accurately, and consistently, and to use the information that has been exchanged.

User context refers to end user environment factors such as facilitating conditions, social influences, economic conditions and cultural differences.

Interview Questionnaire

Q1. Can you explain how do you select wireless services and what service characteristics influence in your selection/preference?

Q2. Would you explain how does the coverage and real time connectivity of your device and network affect the usage/ preference of services?

Q3. Would you consider that mobility has an impact on the performance of your tasks, productivity, and your intention to use the services? If so can you explain the impact?

Q4. What is your opinion on the way that you interact with the device and the application such as lengthy scrolling of pages, limited resolution & poor graphics, slow information retrieval, and loss of information while using the services? Could you please elaborate your experience on interactivity while using the services? (Hint: can easily notice the features of the services and make the choice of features available)

Q5. Would you describe whether you are comfortable with the service access facilitated by the interactivity can accomplish tasks and enhance the effectiveness of the job as expected using this interactivity option?

Q6. Considering the interactivity and efficiency of data transfer of your device, do you feel that there is enough managerial security protection while using the services?

Q7. Do you believe system interoperability issues such as accessing the same service such as email and Internet from different wireless service providers, networks and devices have an influence in your choice of services and how?

Q8. Can you explain your feelings in the way different standards such as WAP, 2G, 3G, CDMA etc, protection management and configuration techniques & performance issues affects the service that you have chosen?

Q9. Can you elaborate your experience with facilitating conditions such as wireless access availability, policies/regulations, training & resources, security and legal protection as you operate/interact with wireless services?

Q10. Can you explain the role of economic conditions, cultural differences and social influences such as image, education, and other influences on the preference/usage of wireless services?

Appendix 2: Online survey Questionnaire

Hari Prasad Ravirala
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Toowoomba, Qld 4350
Phone: (07) 4631 1550
E-mail: hariprasad.ravirala@gmail.com

09 October 2006

Project Title: Determining end user behaviours for wireless telecommunication services.

Dear Sir/ Madam,

I am undertaking research masters in Information Technology in the Department of Information Systems at USQ. I am conducting survey in order to investigate end user behavioural factors for their choice of wireless telecommunicaiton services as a part of research degree. The survey requires participants who are using services from leading wireless service providers. The survey aims to investigate those factors that are acting as drivers or barriers for the choice of wireless services in more detail, as well as to gather sufficient data to provide accurate report on the current scenario of choice of services and actual practice and the reasons for their behaviours in the wireless domain of Australia.

I would like to recruit participants for the survey to be conducted who will be identified by your organisation. This will ensure that the survey to be fully representative and that the findings are valid. Please be assured that responses obtained from the participants identified by your organisation for the purpose of survey will be treated in strict confidence. Your organisation and participants' data will not be identified in any research publications, and only statistical summaries and correlations of aggregate data will be reported. Results from this research will provide you with a better understanding of how wireless services are being influenced by the end user behaviours. Ethics clearance from the USQ Ethics Committee will be obtained for this research before proceeding for actual data collection.

It would be appreciated if the survey is completed by a member identified by your organisation who has a relevant experience on usage of wireless services. If you personally do not have time, will you please pass it on to an appropriate person to complete? The fill-in of survey questionnaire should take between 5 to 10 minutes. I would be grateful to you if you could provide the contact details of the members of your organisation who can't fill-in survey instantly as I can direct the members for the survey which can be completed online at USQ website to be informed later.

Should you have any queries please do not hesitate to contact me on 04631 1550/ 0402587290. I will be happy to discuss with you any concerns you may have on how this study has been conducted. If you have any concern regarding the implementation of the project, you should contact: The Secretary, Human Research Ethics Committee USQ or telephone (07) 4631 2956. Thank you for participating in this study.

Hari Prasad Ravirala

Encl: Survey form

Project Title: Determining end user behaviours for wireless telecommunication services.

Dear Colleagues,

I am undertaking research masters in Information Technology in the Department of Information Systems at USQ, Australia. I am conducting online survey in order to investigate end user behavioural factors for their choice of wireless telecommunication services as a part of research degree. The survey requires participants who are using services from various wireless service providers. The survey aims to investigate those factors that are acting as drivers or barriers for the choice of wireless services in more detail, as well as to gather sufficient data to provide accurate report on the current scenario of choice of services and actual practice and the reasons for their behaviours in the wireless domain of Australia.

I write you today to ask you to participate in this survey if you have experiences in using wireless services from any wireless device including mobile phone. The fill-in of survey questionnaire should take approximately 5 minutes.

The online questionnaire is available via the following link:
http://new.qualtrics.com/SE/?SID=SV_1yJCFrQrxBfzyfy&SVID=Prod

The evaluation of the survey results is anonymous and only statistical summaries and correlations of aggregate data will be reported. Results from this research will be offered early next year through the following USQ website link: http://eprints.usq.edu.au/

Should you have any queries please do not hesitate to contact me on 0061 7 4631 1550/0061 402587290 or my supervisor Assoc. Professor Raj Gururajan at 0061 7 4631 1834. I will be happy to discuss with you any concerns you may have on how this study has been conducted. If you have any concern regarding the implementation of the project, you may contact: The Secretary, Human Research Ethics Committee USQ or telephone 0061 7 4631 2956.

Please click on the following link to open the questionnaire:
http://new.qualtrics.com/SE/?SID=SV_1yJCFrQrxBfzyfy&SVID=Prod

Kind Regards
Hari Prasad Ravirala

****

Hari Prasad Ravirala (Research student)
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****

Section A: Demographics Information (Please tick for appropriate box)

i) Gender
□ Male
□ Female

ii) Age
□ under 18
□ 18-34
□ 35-49
□ 50-64
□ 65 or older

iii) Occupation
□ Student
□ Manager
□ Clerk
□ Salesman
□ Healthcare Professional (specify)……...
□ Other……..

iv) Level of Education
□ Secondary Qualification
□ Technical Qualification
□ Graduate Degree
□ Post Graduate Qualification
□ Other……

Section B: Wireless Services Usage Experience (Please tick for appropriate box)

i) What type/s of Wireless services do you use?

□ Email
□ SMS (Short Messaging Service)
□ MMS (Multimedia Messaging Service)
□ Internet
□ Video streaming/conference
□ Business solution service
□ Transaction oriented service (Banking, Shopping etc)
□ Location based Service (traffic information, weather, and travel schedules; facilitating emergency 911 etc)
□ Other …….

ii) What type/s of Wireless Devices do you use to access the Wireless services?

□ Mobile phones
□ Pager
□ PDA/Tablet PC/ Palm-top
□ PC
□ Sensor Devices (Bluetooth, RFID etc)
Specify ……
□ Other ……

iii) Please specify your Wireless service provider.

□ Vodafone
□ Optus
□ Primus
□ Telstra
□ IBurst
□ Other ……..

iv) What are the associated service plans and cost of your Wireless services?

□ Pre-paid
□ Post-paid/Contract (monthly/ annually etc)
□ Other……
Cost……..

v) Where do you access your Wireless services?

□ Both at home and at work
□ At home
□ At work □ Other …….

vi) How long have you used the Wireless services?

□ Less than one month
□ 1 to 6 months
□ 6 months to a year
□ 1 to 3 years
□ Over 3 years

vii) How often do you use the Wireless services?

□ Daily
□ Once/week or more
□ 1 to 3 times a month
□ Once/month
□ Every 2-3 months
□ 2-3 times a year
□ Other …….

viii) In a typical week, how many hours do you spend in accessing the Wireless services?

□ 0 to 5
□ 6 to 10
□ 11 to 30
□ More than 30

ix) How comfortable do you feel using Wireless services, in general?

□ Very comfortable
□ Somewhat comfortable
□ Neither comfortable nor uncomfortable
□ Somewhat uncomfortable
□ Very uncomfortable

x) Overall, how satisfied are you, with Wireless service?

□ Very satisfied
□ Satisfied
□ Neutral
□ Dissatisfied
□ Very dissatisfied

Section C: Wireless Service Characteristics

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Don't Know/ Unable to answer
Mobility						
1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	□	□	□	□	□	□
2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	□	□	□	□	□	□
3. Due to availability of wireless services, I am able to access information on the move.	□	□	□	□	□	□
4. I am much more mobile than I used to be.	□	□	□	□	□	□
5. My expectation is that I will be able to use wireless services at any place and at any given time.	□	□	□	□	□	□
System Interactivity						
1. When using wireless services, I feel frustrated as it is difficult to type using the small keys.	□	□	□	□	□	□
2. My wireless device will enable me to access all the services available.	□	□	□	□	□	□
3. Interface design of the wireless system enables me to use wireless services with ease.	□	□	□	□	□	□
4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.	□	□	□	□	□	□
5. Wireless services are flexible to interact with.	□	□	□	□	□	□
Wireless Trust Environment						
1. I feel that access to wireless services is secure.	□	□	□	□	□	□
2. I trust that all my details are secured while accessing wireless services.	□	□	□	□	□	□
3. My service provider provides adequate security protection mechanisms for wireless services.	□	□	□	□	□	□
4. I am restricted to use only security protection mechanisms that my service provider recommends.	□	□	□	□	□	□
5. I believe that wireless security would support in completing my job.	□	□	□	□	□	□
System Interoperability						
1. I am able to connect to wireless system that my workplace uses.	□	□	□	□	□	□
2. Interoperability would improve my job performance.	□	□	□	□	□	□

3. Standardised wireless services influence my decision to choose between service providers.	□	□	□	□	□	□
4. I would expect that my services are compatible between service providers.	□	□	□	□	□	□
5. Switching wireless services between service providers requires a lot of mental effort.	□	□	□	□	□	□
User Context						
Facilitating conditions						
1. I feel comfortable while dealing with wireless access to my services at work.	□	□	□	□	□	□
2. My wireless system has access to wireless services only at limited areas.	□	□	□	□	□	□
3. My workplace culture influences my decision to choose wireless services.	□	□	□	□	□	□
4. Policies on wireless services will help less informed users.	□	□	□	□	□	□
5. Training helps to explore wireless services that are available.	□	□	□	□	□	□
Cost						
1. Reduced costs influence my decision to choose a service provider.	□	□	□	□	□	□
2. I am confused by the different pricing plans that aren't comparable.	□	□	□	□	□	□
Reputability						
1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.	□	□	□	□	□	□
2. I prefer wireless services only from reputable service provider that has longevity in the market.	□	□	□	□	□	□

Appendix 3: Ethics clearance form

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AUSTRALIA

The University of Southern Queensland

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The Office of Research and Higher Degrees

Postgraduate and Ethics Officer
Telephone: 0746 312956
Facsimile: 0746 312955
Email: bartletc@usq.edu.au

20 September 2006

Mr Hari Ravirala
92E Student Village
537-561 West Street
TOOWOOMBA Q 4350

Dear Mr Ravirala

Re: Ethics Clearance for Amendment to Research Project, *Determining end user behaviour for wireless telecommunication*

The USQ Human Research Ethics Committee recently reviewed your request for ethics clearance for an amendment to the abovementioned project. Your request has been endorsed and full ethics approval is now confirmed. Reference number **H05REA478** has been assigned to this approval.

The Committee is required to monitor research projects that have received ethics clearance to ensure their conduct is not jeopardising the rights and interests of those who agreed to participate. Accordingly, you are asked to forward a **written report** to this office after twelve months from the date of this approval or upon completion of the project.

A questionnaire will be sent to you requesting details that will include: the status of the project; a statement from you as principal investigator, that the project is in compliance with any special conditions stated as a condition of ethical approval; and confirming the security of the data collected and the conditions governing access to the data. The questionnaire, available on the web, can be forwarded with your written report.

Yours sincerely

C. Bartlett

Chris Bartlett
Postgraduate and Ethics Officer
Office of Research and Higher Degrees

Copy: Associate Professor R Gururajan

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22 December 2005

Mr Hari Prasad Ravirala
T450.6
Department of Information Systems

Dear Mr Ravirala

Re: Ethics Clearance for Research Project, *Determining end user behaviour for wireless telecommunication services*

The USQ Human Research Ethics Committee recently reviewed your application for ethics clearance. Your project has been endorsed and full ethics approval is confirmed conditional upon obtaining written permission to recruit participants from the organisations referred to in your application. Reference number **H05STU523** is assigned to this approval that remains valid to 21 December 2006.

The Committee is required to monitor research projects that have received ethics clearance to ensure their conduct is not jeopardising the rights and interests of those who agreed to participate. Accordingly, you are asked to forward a **written report** to this office after twelve months from the date of this approval or upon completion of the project.

A questionnaire will be sent to you requesting details that will include: the status of the project; a statement from you as principal investigator, that the project is in compliance with any special conditions stated as a condition of ethical approval; and confirming the security of the data collected and the conditions governing access to the data. The questionnaire, available on the web, can be forwarded with your written report.

Please note that you are responsible for notifying the Committee immediately of any matter that might affect the continued ethical acceptability of the proposed procedure.

Yours sincerely

C. Bartlett

Christine Bartlett
Postgraduate and Ethics Officer
Office of Research and Higher Degrees

Copy: Associate Professor R Gururajan

Appendix 4: Online Survey Data Analysis

Table 4.1: Chi-square tests for test of differences between early and late respondents:

Crosstab

Count

		Gender		Total
		Male	Female	
Respondent	Early Respondents	102	60	162
	Late Respondents	16	10	26
Total		118	70	188

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.019(b)	1	.889		
Continuity Correction(a)	.000	1	1.000		
Likelihood Ratio	.019	1	.889		
Fisher's Exact Test				1.000	.526
Linear-by-Linear Association	.019	1	.889		
N of Valid Cases	188				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 9.68.

Crosstab

Count

		Age						
		Under 18	18-24	25-34	35-49	50-64	65 or older	Total
Respondent	Early Respondents	1	29	50	58	20	4	162
	Late Respondents	0	3	12	5	5	1	26
Total		1	32	62	63	25	5	188

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.076(a)	5	.407
Likelihood Ratio	5.310	5	.379
Linear-by-Linear Association	.169	1	.681
N of Valid Cases	188		

a 6 cells (50.0%) have expected count less than 5. The minimum expected count is .14.

Crosstab

Count

		Level of Education					
		Secondary Qualification	Technical Qualification	Graduate Degree	Postgraduate Qualification	Other	Total
Respondent	Early Respondents	17	5	53	83	4	162
	Late Respondents	0	2	12	11	1	26
Total		17	7	65	94	5	188

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	5.692(a)	4	.223
Likelihood Ratio	7.680	4	.104
Linear-by-Linear Association	.260	1	.610
N of Valid Cases	188		

a 4 cells (40.0%) have expected count less than 5. The minimum expected count is .69.

Table 4.2: Tests of Normality

	Kolmogorov-Smirnov(a)			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Mobility						
1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	.251	188	.000	.811	188	.000
2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	.266	188	.000	.782	188	.000
3. Due to availability of wireless services, I am able to access information on the move.	.266	188	.000	.852	188	.000
4. I am much more mobile than I used to be.	.220	188	.000	.872	188	.000
5. My expectation is that I will be able to use wireless services at any place and at any given time.	.226	188	.000	.860	188	.000
System Interactivity						
1. When using wireless services, I feel frustrated as it is difficult to type using the small keys.	.172	188	.000	.918	188	.000
2. My wireless device will enable me to access all the services available.	.190	188	.000	.922	188	.000
3. Interface design of the wireless system enables me to use wireless services with ease.	.229	188	.000	.913	188	.000
4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.	.296	188	.000	.856	188	.000

5. Wireless services are flexible to interact with.	.237	188	.000	.905	188	.000
Wireless Trust Environment						
1. I feel that access to wireless services is secure.	.177	188	.000	.908	188	.000
2. I trust that all my details are secured while accessing wireless services.	.195	188	.000	.909	188	.000
3. My service provider provides adequate security protection mechanisms for wireless services.	.192	188	.000	.913	188	.000
4. I am restricted to use only security protection mechanisms that my service provider recommends.	.164	188	.000	.912	188	.000
5. I believe that wireless security would support in completing my job.	.251	188	.000	.909	188	.000
System Interoperability						
1. I am able to connect to wireless system that my workplace uses.	.263	188	.000	.903	188	.000
2. Interoperability would improve my job performance.	.254	188	.000	.898	188	.000
3. Standardised wireless services influence my decision to choose between service providers.	.223	188	.000	.914	188	.000
4. I would expect that my services are compatible between service providers.	.284	188	.000	.855	188	.000
5. Switching wireless services between service providers requires a lot of mental effort.	.165	188	.000	.932	188	.000
User Context – Facilitating conditions						
1. I feel comfortable while dealing with wireless access to my services at work.	.246	188	.000	.903	188	.000
2. My wireless system has access to wireless services only at limited areas.	.232	188	.000	.919	188	.000
3. My workplace culture influences my decision to choose wireless services.	.181	188	.000	.935	188	.000
4. Policies on wireless services will help less informed users.	.218	188	.000	.917	188	.000
5. Training helps to explore wireless services that are available.	.267	188	.000	.889	188	.000
User Context - Cost						
1. Reduced costs influence my decision to choose a service provider.	.271	188	.000	.847	188	.000
2. I am confused by the different pricing plans that aren't comparable.	.212	188	.000	.905	188	.000
User Context - Reputability						
1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.	.190	188	.000	.924	188	.000
2. I prefer wireless services only from reputable service provider that has longevity in the market.	.262	188	.000	.887	188	.000

a Lilliefors Significance Correction

Table 4.3: Reliability Analysis tests on wireless service characteristics

4.3.1: Reliability analysis on Mobility

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.779	.785	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Mobility					
1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	15.99	9.332	.515	.305	.750
2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	15.93	9.374	.622	.414	.720
3. Due to availability of wireless services, I am able to access information on the move.	16.14	9.125	.576	.388	.730
4. I am much more mobile than I used to be.	16.23	8.466	.628	.412	.711
5. My expectation is that I will be able to use wireless services at any place and at any given time.	16.16	9.044	.454	.212	.777

Table 4.3.2: System Interactivity

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.588	.601	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
System Interactivity					
1. When using wireless services, I feel frustrated as it is difficult to type using the small keys.	14.35	9.789	**-.013**	.092	.723
2. My wireless device will enable me to access all the services available.	14.23	6.715	.497	.402	.438
3. Interface design of the wireless system enables me to use wireless services with ease.	14.09	7.056	.516	.499	.436
4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.	13.55	8.099	.383	.159	.516
5. Wireless services are flexible to interact with.	13.89	7.469	.444	.312	.479

Table 4.3.3: Wireless Trust environment

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.693	.699	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Wireless Trust Environment					
1. I feel that access to wireless services is secure.	13.82	11.571	.519	.559	.616
2. I trust that all my details are secured while accessing wireless services.	13.92	10.908	.553	.606	.598
3. My service provider provides adequate security protection mechanisms for wireless services.	13.48	10.016	.640	.430	.553
4. I am restricted to use only security protection mechanisms that my service provider recommends.	13.44	12.120	.273	.177	.728
5. I believe that wireless security would support in completing my job.	13.19	13.147	.307	.148	.696

Table 4.3.4: System Interoperability

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.625	.649	5

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
System Interoperability					
1. I am able to connect to wireless system that my workplace uses.	15.77	8.341	.336	.174	.598
2. Interoperability would improve my job performance.	15.47	8.593	.432	.278	.546
3. Standardised wireless services influence my decision to choose between service providers.	15.61	8.186	.479	.305	.521
4. I would expect that my services are compatible between service providers.	15.43	9.156	.482	.262	.539
5. Switching wireless services between service providers requires a lot of mental effort.	15.74	8.865	.242	.105	.651

Table 4.3.5: User context

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.685	.689	9

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
User Context - Facilitating conditions					
1. I feel comfortable while dealing with wireless access to my services at work.	30.29	23.406	.361	.146	.659
2. My wireless system has access to wireless services only at limited areas.	30.60	22.959	.322	.220	.667
3. My workplace culture influences my decision to choose wireless services.	30.77	21.795	.365	.241	.659

4. Policies on wireless services will help less informed users.	30.55	21.821	.500	.296	.630
5. Training helps to explore wireless services that are available.	30.29	22.625	.467	.282	.640
User Context - Cost					
1. Reduced costs influence my decision to choose a service provider.	30.30	24.148	.278	.101	.674
2. I am confused by the different pricing plans that aren't comparable.	30.48	23.449	.286	.102	.675
User Context – Reputability					
1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.	30.73	22.102	.407	.230	.649
2. I prefer wireless services only from reputable service provider that has longevity in the market.	30.41	24.233	.271	.105	.676

Table 4.4: Initial Factor analysis: Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.305	21.221	21.221	5.305	21.221	21.221	2.823	11.292	11.292
2	2.388	9.551	30.772	2.388	9.551	30.772	2.342	9.368	20.660
3	1.969	7.877	38.649	1.969	7.877	38.649	2.266	9.065	29.725
4	1.531	6.126	44.775	1.531	6.126	44.775	2.170	8.682	38.406
5	1.406	5.622	50.397	1.406	5.622	50.397	1.901	7.605	46.011
6	1.208	4.833	55.230	1.208	4.833	55.230	1.688	6.754	52.765
7	1.087	4.347	59.577	1.087	4.347	59.577	1.437	5.748	58.513
8	1.029	4.114	63.691	1.029	4.114	63.691	1.295	5.179	63.691
9	.909	3.637	67.329						
10	.855	3.419	70.747						
11	.828	3.313	74.060						
12	.750	3.000	77.060						
13	.723	2.892	79.952						
14	.631	2.524	82.476						
15	.587	2.349	84.825						
16	.556	2.225	87.051						
17	.528	2.112	89.162						
18	.441	1.763	90.925						
19	.423	1.692	92.617						
20	.385	1.541	94.158						
21	.360	1.438	95.596						
22	.339	1.355	96.950						
23	.310	1.239	98.189						
24	.257	1.028	99.217						
25	.196	.783	100.000						

Extraction Method: Principal Component Analysis.

Table 4.5: Initial Factor analysis - Unrotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
Mobility-2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	**.586**		**-.477**					
System Interoperability-4. I would expect that my services are compatible between service providers.	**.571**					**-.483**		
Mobility-4. I am much more mobile than I used to be.	**.563**		**-.515**					
Mobility-5. My expectation is that I will be able to use wireless services at any place and at any given time.	.543							
Mobility-1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	**.533**		**-.408**					
User Context - Facilitating conditions-4. Policies on wireless services will help less informed users.	.526							
User Context - Facilitating conditions-1. I feel comfortable while dealing with wireless access to my services at work.	.524							
System Interactivity-5. Wireless services are flexible to interact with.	**.515**	**-.474**						
System Interoperability-3. Standardised wireless services influence my decision to choose between service providers.	**.510**					**-.474**		
User Context - Facilitating conditions-5. Training helps to explore wireless services that are available.	.500							
System Interactivity-3. Interface design of the wireless system enables me to use wireless services with ease.	**.499**	**-.479**		**.426**				
System Interoperability-2. Interoperability would improve my job performance.	.487							
Wireless Trust Environment-2. I trust that all my details are secured while accessing wireless services.		-.616						
Wireless Trust Environment-1. I feel that access to wireless services is secure.	**.491**	**-.526**						
Mobility-3. Due to availability of wireless services, I am able to access information on the move.	**.441**		**-.637**					
System Interactivity-2. My wireless device will enable me to access all the services available.	**.402**	**-.456**		**.499**				
Wireless Trust Environment-3. My service provider provides adequate security protection mechanisms for wireless services.	.410			-.438				
User Context - Reputability-1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.								
User Context - Facilitating conditions-2. My wireless system has access to wireless services only at limited areas.					.505			
System Interactivity-4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.					**.468**		**.425**	

User Context - Facilitating conditions-3. My workplace culture influences my decision to choose wireless services.					.425			
User Context - Cost-2. I am confused by the different pricing plans that aren't comparable.								
System Interoperability-1. I am able to connect to wireless system that my workplace uses.	**.452**						**-.548**	
User Context - Cost-1. Reduced costs influence my decision to choose a service provider.							**.461**	**-.448**
User Context - Reputability-2. I prefer wireless services only from reputable service provider that has longevity in the market.	**.420**							**.570**

Extraction Method: Principal Component Analysis.
a 8 components extracted.

Table 4.6: Initial Factor analysis - Rotated Component Matrix

	Component							
	1	2	3	4	5	6	7	8
Mobility-3. Due to availability of wireless services, I am able to access information on the move.	.798							
Mobility-2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	.765							
Mobility-4. I am much more mobile than I used to be.	.753							
Mobility-1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	.640							
Mobility-5. My expectation is that I will be able to use wireless services at any place and at any given time.	.545							
Wireless Trust Environment-2. I trust that all my details are secured while accessing wireless services.		.867						
Wireless Trust Environment-1. I feel that access to wireless services is secure.		.788						
Wireless Trust Environment-3. My service provider provides adequate security protection mechanisms for wireless services.		.781						
System Interactivity-2. My wireless device will enable me to access all the services available.			.831					
System Interactivity-3. Interface design of the wireless system enables me to use wireless services with ease.			.815					
System Interactivity-5. Wireless services are flexible to interact with.			.607					
System Interactivity-4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.			**.484**					**.404**
User Context - Reputability-1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.				.670				

User Context - Facilitating conditions-4. Policies on wireless services will help less informed users.				.647				
User Context - Cost-2. I am confused by the different pricing plans that aren't comparable.				.588				
User Context - Facilitating conditions-5. Training helps to explore wireless services that are available.				.566				
User Context - Reputability-2. I prefer wireless services only from reputable service provider that has longevity in the market.				**.457**			**-.412**	
System Interoperability-3. Standardised wireless services influence my decision to choose between service providers.					.742			
System Interoperability-2. Interoperability would improve my job performance.					.688			
System Interoperability-4. I would expect that my services are compatible between service providers.					**.588**			**.410**
User Context - Facilitating conditions-2. My wireless system has access to wireless services only at limited areas.						.793		
User Context - Facilitating conditions-3. My workplace culture influences my decision to choose wireless services.						.725		
System Interoperability-1. I am able to connect to wireless system that my workplace uses.							.750	
User Context - Facilitating conditions-1. I feel comfortable while dealing with wireless access to my services at work.							.530	
User Context - Cost-1. Reduced costs influence my decision to choose a service provider.								.805

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a Rotation converged in 8 iterations.

Table 4.7: Communalities

	Initial	Extraction
Mobility-1. I believe that wireless coverage would facilitate mobility in order to improve my work efficiency.	1.000	.608
Mobility-2. When using wireless services, I feel comfortable with the level of freedom as I am able to move around.	1.000	.660
Mobility-3. Due to availability of wireless services, I am able to access information on the move.	1.000	.677
Mobility-4. I am much more mobile than I used to be.	1.000	.631
Mobility-5. My expectation is that I will be able to use wireless services at any place and at any given time.	1.000	.622
System Interactivity-2. My wireless device will enable me to access all the services available.	1.000	.673
System Interactivity-3. Interface design of the wireless system enables me to use wireless services with ease.	1.000	.716
System Interactivity-4. Wireless system will be more convenient for short tasks/small tasks thus requiring limited interaction with device.	1.000	.569
System Interactivity-5. Wireless services are flexible to interact with.	1.000	.576
Wireless Trust Environment-1. I feel that access to wireless services is secure.	1.000	.699
Wireless Trust Environment-2. I trust that all my details are secured while accessing wireless services.	1.000	.806
Wireless Trust Environment-3. My service provider provides adequate security protection mechanisms for wireless services.	1.000	.663
System Interoperability-1. I am able to connect to wireless system that my workplace uses.	1.000	.652
System Interoperability-2. Interoperability would improve my job performance.	1.000	.713
System Interoperability-3. Standardised wireless services influence my decision to choose between service providers.	1.000	.639
System Interoperability-4. I would expect that my services are compatible between service providers.	1.000	.645
User Context - Facilitating conditions-1. I feel comfortable while dealing with wireless access to my services at work.	1.000	.475
User Context - Facilitating conditions-2. My wireless system has access to wireless services only at limited areas.	1.000	.714
User Context - Facilitating conditions-3. My workplace culture influences my decision to choose wireless services.	1.000	.622
User Context - Facilitating conditions-4. Policies on wireless services will help less informed users.	1.000	.654
User Context - Facilitating conditions-5. Training helps to explore wireless services that are available.	1.000	.485
User Context - Reputability-1. I place more value on the financial liability aspects of a service provider prior to choosing a wireless service.	1.000	.535
User Context - Cost-2. I am confused by the different pricing plans that aren't comparable.	1.000	.417

Extraction Method: Principal Component Analysis.

Table 4.8: Final Factor analysis: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.989	22.677	22.677	4.989	22.677	22.677	2.827	12.848	12.848
2	2.328	10.582	33.258	2.328	10.582	33.258	2.314	10.518	23.367
3	1.919	8.723	41.981	1.919	8.723	41.981	2.206	10.027	33.394
4	1.509	6.859	48.841	1.509	6.859	48.841	2.125	9.660	43.053
5	1.316	5.981	54.822	1.316	5.981	54.822	2.000	9.091	52.144
6	1.184	5.380	60.202	1.184	5.380	60.202	1.773	8.058	60.202
7	.992	4.511	64.714						
8	.876	3.983	68.697						
9	.796	3.620	72.316						
10	.773	3.514	75.830						
11	.723	3.284	79.115						
12	.623	2.830	81.944						
13	.599	2.723	84.668						
14	.540	2.455	87.122						
15	.491	2.230	89.352						
16	.439	1.993	91.345						
17	.400	1.818	93.163						
18	.369	1.679	94.842						
19	.343	1.559	96.401						
20	.313	1.421	97.822						
21	.266	1.210	99.032						
22	.213	.968	100.000						

Extraction Method: Principal Component Analysis.

Appendix 5: Convergent Interview Transcripts

Legend:
Int1 = Interviewer
Int2 = Interviewee
[ ] = unsure of word
..... = couldn't understand word/s

Interview with A

Int1: Ok so if we can just go through some terminology to start with.

The *mobility* that as referred to in the questionnaire refers to the ability of users to access defined services from any terminal in the network while maintaining their personal environment settings.
Interactivity refers to the capability of wireless devices for suitable interface design for access wireless services with convenience and ease of use.
System interoperability is the ability of different wireless systems and application services to communicate to exchange data accurately and consistently and to use information that has been exchanged.
The user context refers to end-user environment collectors such as facilitating conditions, social appliances, economic conditions and cultural differences.

So the first question, can you explain how do you select wireless services and what service characteristics influence your selection or preference and we're just looking for a story here?

Int2: So um you're talking from a provider like Optus or something like that. Is that the actual thing we're talking about?

Int1: We just want to explain what characteristics that you're looking for when you're choosing a wireless service?

Int2: Ok so from a service provider point of view right, so this is somebody like I might buy an enabling service off like a broadband service or something like that. I'm basically just looking for someone that's reputable, right so it's not just Joe Blow sort of service provider but just looking for someone that can provide a broad coverage you know so I can get access from different places. I mean price is very important - how much this stuff is going to cost me and that's from a service provider. As for the services that they provide me I get webmail OK so access my email from the web. I wanted a blog service right. I wanted to make sure that I could be confident that the log on stuff is encrypted you know that type of area.

Int1: So security?

Int2: Security. You know a lot of everything you know but just mainly

Int1: Authentication?

Int2: Well authentication is fine. The main thing is that when that is set that it is actually set in encrypted format. You know so mainly that. I'm looking for, say from the phone network I like to have some type of web interface to their services so not just a phone but so I can go somewhere and log in under me and see my bills and so on like that.

Int1: Like you want to manager your account online?

Int2: Yes I definitely want to do that. I'd like them to recognise that I'm doing that and that's saving them money.

Int1: So by saving?

Int2: Well you know by having that recognised from them that they're not providing some services that I use but I'm actually managing myself and managing my bill on their behalf. They don't have to have people ringing me up asking me for money and people sending me accounts in the mail so I prefer to have all the billing and all that stuff done online where there's a record of it – a transaction record of it.

Int1: So how would you like that to be recognised?

Int2: Oh well you know it would have to be secure obviously by someone.

Int1: No I mean you said that you want that to be recognised, so you want that to be recognised at a price saving?

Int2: Yes sure

Int1: Or a better service or?

Int2: Yeah well I think that if I'm going to get a fully managed service where someone is basically account managing me at that level well then you know I don't want my service that I do it all myself to cost the same amount. You know it needs to be recognition to me that they don't have to provide an account manager style person for me and that I can do it myself but it's a bit rich to charge me the same amount of money because if I can afford to have someone look after me well I'd prefer to do that you know.

Int1: OK.

Int2: But its too expensive a lot of the time so. OK is that OK?

Int1: Yes that's great. Would you explain how does the mobility of your device affect the usage or preference of services?

Int2: Well its really important but I think that the whole when I say phone for example coverage of the phone I've got wireless broadband right so which works very well in the areas that I've been to but that's just in the major areas so Brisbane, Sydney, Melbourne, Hobart – you know the main areas. My

wireless broadband works fine, my phone works fine but you don't have to go too far away from those areas before it doesn't work fine and you know you lose access or it drops in and out – that type of stuff. So I think its really important I think that some of the advertising that say one of the major suppliers has been doing that people in a combi van driving around with their wireless access going is a bit rich I think. You know I don't think that works like that and but for my uses it works fine.

Int1: So would you actually, is mobility one of the key things that you look in a service provider?

Int2: Well it's not a key thing that I look at – it's a key thing that I expect.

Int1: So that's just an expectation?

Int2: Absolutely that's a minimum expectation is that in the major areas it's going to work.

Int1: But you to have just in the major areas you accept that at the moment.

Int2: Yeah well you know I accept it because that's all I use it for work. You know privately I don't travel as much as I used to so its not as much of an issue to me these days that my phone works if I was to go to you know on the drive from here to Mt Isa for example. I know it's going to go in and out so you know if I needed that for work well then I'd be looking for different type of service like satellite or something like that where it didn't go on and off.

Int1: So would you consider that mobility has an impact on the performance on your task productivity and your attention to user services and if so, can you explain what impact that mobility has?

Int2: Well it's important – it's really important that in the major areas that I work that you know these services are able to be provided to me because it means that I don't have to be as well prepared. I can just make sure that I've got everything I need on my computer or via intranet and I don't have to spend hours and hours with checklists going through do I have all the documents I need for this particular task. I can just go and know that they're all there and I can just need to be able to access them some how so that's why its important that it works in the areas I need it to work.

Int1: So it's a real time saver actually for you and the quality of your work?

Int2: Oh yeah well time saving – I don't know I suppose it does save me time. I just means that I get more time to do less um you know leading up to certain types of events and that type of thing. So, but its one of these things that for me I just expect it, right. You know 10 years ago I wouldn't have expected it. As an early adopter in some of these things I was grateful but no I'm not grateful – I expect it.

Int1: Yes. Have any of the services that you use or prefer have been influenced by the interactivity influenced facilitated by the service and/or wireless devices?

Int2: Um well I'm not exactly sure. I just you know

Int1: So you can't only download, you can change things and actually interact with those

Int2: Oh yeah well in that context, that's completely expected, right.

Int1: So that's just an expectation.

Int2: Yes I absolutely expect that I can change my password that I can, for the services that I use ,that I can pay for them when I'm online you know basically point of sale for example I have a couple of phones say the Vodaphone that I have, Vodaphone has a thing where I can just go and I can pay on line and that's connected to my bank and so I can BPay from my bank to pay my Vodaphone at the time that they send me a text message to say that my bill's ready. I think some of them I think would be good is if I could pay my bill for the phone – you know I could just pay for it on the phone. They could send me the thing and do you want to pay this and this is the bill and you press a button and you go yes and it's paid for.

Int1: So you've already given them your bank account details?

Int2: No I don't give them my - oh well you know in their instance there would be some new type of technology that would allow that to be secure but that would be really handy I think but at the moment it doesn't exist. I'm happy with the way that it works. I can see my bill on this website. I can go to this website where I can have my bank and I can say via BPay and I have it already set up in my bank and I can say pay this bill and it's paid. Yes. So I like that.

Int1: So the services you use has been influenced by the interactivity?

Int2: Ah yes I don't know whether I can go because I do things like normally as well without doing it that way so you know I understand I have been influenced by it but I guess.

Int1: It's more a convenient .....

Int2: That's right yes so if I was to, but it's not everything to me right. Its just convenient but if my supplier annoyed me that much you know that that wasn't as easy or they started – you know or I started getting errors on my account, I could you know quite easily go back to paying cash for it, right. It's no problem. I don't know how other people would feel but at the moment because they haven't done anything to make me unhappy and its all working – you know there haven't been those charges on my account that I, that weren't mine which you hear about on the TV or something like that - my

account hasn't been accessed by people other than me that I don't know about then I think its all working pretty good.

Int1: OK and I think we've talked about this one a little bit but would you describe whether you're comfortable with the service access facilitated by the interactivity can accomplish tasks and enhance the effectiveness of the job as expected using this interactivity option?

Int2: Ah well yes, I think so. I just find that if I can find something – if I can find anything that makes my daily job easier well then I'll give it a go. But I'm also willing for it to take a little bit of time for me just to get used to how it works so you know I've got no problem providing there's some light at the end of the tunnel that this is actually going to be better for me.

Int1: You're willing to learn the service?

Int2: I'm willing to learn how to use it, yes and you know but that's just me. I know say other people I know find those things very difficult to come to grips with but I seem to I can persevere with it a little bit to see whether its going to make a difference to how I work and if it does well then I'll give it a go. But you do become reliant, right. You know if you go away and something goes wrong, then you're in trouble.

Int1: What is your opinion on interactivity in terms of efficient data transfer and security, privacy and other issues? So could you please elaborate your experience on interactivity while using the service?

Int2: Well most of these things as an end-user you have really no idea. You just trust that it's working. You know sometimes if you're working with another group you may, you know they have a presence on the web which you may, you have to put some trust in, right so if you don't know who they are and you haven't used that person before or that group before, that can be a bit dodgy because you don't actually know who you're talking to at the other end or where your data's going.

Int1: So that's actually demand that your service be [riskable]?

Int2: Yes that's right. So this one? OK so efficient data transfer yeah well you know I expect I wouldn't know – its' got to work, you press the button, it's got to do something in a reasonable time frame. I know that as a user of some of the stuff if it's encrypted, it can take longer, it's slower but you know you understand you're doing that for a particular purpose. So you know as long as it's working at a reasonable timeframe, if you're willing to accept that that's the way that it works at the moment, so that's alright. Security, privacy – certainly privacy is a big issue. I think I'm, well I don't know whether I'm like other people but what I do is that if I'm going to someone I expect that's my details aren't given to other people unless they ask me first. So you know especially things to do you know I don't like trickery involved in the interface so I don't like people saying you know having a box that says that's already been picked for me that says they're going to share this with their partners.

Int1: So you've got to be able to [opt] then in any marketing?

Int2: Yeah and that's fine. Generally if its not a major supplier or someone that I use a different email account and in that area you know like to test them out. So I have one email account that I put down basically for the first bunch of transactions for people and that gives me a bit of a test to see whether I'd be interested in doing any – see how far it goes. See what lists I end up on against my will.

Int1: OK so you actually test if your privacy is secure?

Int2: Yes

Int1: And you feel that you need to do that?

Int2: Absolutely because the Marketing Departments in most businesses aren't connected to the reality of the rest of the operational side of the business and so people you know someone comes out with a nice spiel about how something works, about all of these things, about how you might be treated, but how that actually works inside the organisation usually there's a huge divide so and that's with all of them so usually I'll start off with a you know another way to contact them and see how we go.

Int1: OK. Do you believe system interoperability such as accessing the same service from different wireless service providers, networks or devices have an influence on your choice of services? Now you know what an interoperability is?

Int2: Yes. Well I just haven't had to um I don't really know because I haven't really you know I have – these things need to happen for example if I was to webmail you know other intranet that type of thing – if I had to go through another service provider, now I would just expect that would work. Right if my wireless didn't work and I had to use a dial-up from a different provider, that's what the webs about as far as I'm concerned. I should be able to get to these other services. As the end-user I don't care how it works. They are the ones providing the service. They should make it work.

Int1: Again interoperability is an expectation?

Int2: Yes, yes. So if I'm going to, if I need to I don't know how the telecommunications network works but if I'm on my mobile phone and it has to go through another network potentially to connect that phone call well then it should work. That's the service they're providing and I'm paying them money.

Int1: So you don't think about interoperability when you're deciding on a service? That's just an expectation that they all will provide?

Int2: Well especially anything that's well established. I mean I understand that you know as new things come out that there might be new areas that take a little while for them to mainstream a little bit but anything's that mainstream, you expect that to work and you expect that to work every time. I do, that's why you pay them the money.

Int1: So can you explain your feelings in the way systems interoperability affects the service that you have chosen standardisation and performance issues and time factors to realise the factor? I know we've sort of discussed this.

Int2: Ah, yeah I don't know. I just um its if they said – if I was told that for example it would affect my choice if they told me that if I was to go with this particular company, any company, and they said I could only access their resources from this service, right, well then that would be a real consideration for me not to use them. If I can't access my [broad] .....I just I don't know I haven't got an example of that because it hasn't happened.

Int1: So if they said that these services were proprietary that would be enough for you to – doesn't affect service?

Int2: No not necessarily, right.

Int1: So you would definitely take it into consideration?

Int2: Yes, yes

Int1: OK.

Int2: Right you know because some of these things you know if you need it bad enough they can be proprietary for a while right.

Int1: OK. So you're willing to accept a new technology?

Int2: If I can't find some other way to do it, you have no other choice. If you need it you know so but if you had choice well then you'd want these things to work more broadly.

Int1: Can you elaborate your experience with facilitating conditions such as wireless access, availability, policies, regulations, training and resources, security and legal protection as you operate/interact with wireless services?

Int2: Um which one is it, this one?

Int1: Number 9

Int2: Yeah OK. Well see I've never actually read a policy right. I've never read a privacy policy on the web, ever. When I go to these things I never even look at them, yeah so you know what I do is I just because you know what is your come back anyway as a normal person? They could say whatever they wanted and you know you had no way of you know you could complain I

suppose if you found out so I just prefer to just do other things like other ways for me to test it like only give them partial, my details and test the service and usually I do that for quite a while. And then if I feel like I can trust it then I will give them my main account right. This is especially to do with internet stuff. So to do with say my wireless broadband, I'd say that they don't provide any training or resources you know for that. It was, in fact it was difficult to even find it right but you know when I discovered that this service was available to me well then you know I was doing all this. I had to be their salesman for them – their salesperson for them because you know you just don't know the amount. There's no way of comparing those types of things between suppliers. It's very, very confusing to have like all these different plans that aren't comparable. You know that certain prices for this will be you know you think you've found a comparable product but elements will be missing so you can't- you end up choosing something else you know. It's very, very confusing so even for someone like I think like me that has a bit of experience in these areas like choosing a mobile phone plan. That's very confusing. Choosing broadband, wireless broadband, that's confusing. But you know you end up just working through that stuff probably taking a lot longer to make a choice. So you know that's, but they didn't provide me with any training or resources for my wireless. They just said stick it in and it will go. It didn't go and I basically had to sort that out for myself, which I did and so I don't know. I seem to be able to work my way through these things but I just don't know how the average person from the public that might be less you know like been around

Int1: Technically minded?

Int2: Yeah or a person, persistent, you know to find the answers. You know I don't think I've ever put in a call to anyone's help desk right because its too much of a hassle so I would just work it out for myself you know like throw the thing in the bin and not talk to them again. So is that the answer to that question?

Int1: Yes that's fine. So can you explain the role of cultural differences and social influences such as .....status and other influences on the preference of usage or does it influence you at all?

Int2: Well say um no. It doesn't worry me. I don't care.

Int1: Its not that you've got really cool phone or

Int2: No. That doesn't worry me because you can tell from my phone that I bought the cheapest one I could get and you know so because I'm not into all that. I don't use it to record music. I don't use it to take photos. You know I just need it to work when I want to ring somebody. I don't send a text message. Sometimes I receive a text message and I can't stand texting so that's not important to me. I don't mind receiving it if they're going to send me a message saying my bill's ready because the last thing I want to do is to press

the button is to be words so I find that really annoying. So if – put it this way. If I had

Int1: Economic costs (impact). Oh you want the economic factors as well so?

Int2: If there was a global I know that they had a crack at this – if there was a global wireless service provider where I didn't have to just choose one of the local ones right, well I'd be interested in knowing about it. I think the monopoly that Telstra's got on Australian telecommunications you know as the main supplier of all the lines and stuff. I understand why it exists and everything which is great but if I did have a choice of a wireless service provider I would definitely look at it. For example, the minute I can get away from my landline right, if I can get a decent wireless service in Toowoomba which I can't at the moment. It works but it works at slow speed right. When my wireless broadband works at the same generally the same speed as my home broadband, well then I'll get rid of my landline and just have mobile phone because I've got 2 home phones and I've got a fax line and I've got broadband right and but my phone bills are low so $30 for each of the lines and my phone bills like all up is like $40. So they're taking $30 of my money to provide the copper line and I'd be more than happy for them not to have to supply me with the line and for me not to have to pay them $30.

Int1: So you'd rather put that into a wireless service that perhaps provided you with other services?

Int2: Yes well I just think the home, my home line phone is not providing me that much of a benefit right? Its handy to have but I'd rather have a couple of mobile phones with business plans out there that calls between business phones you know that they're doing deals between say these 2 phones is free or you know whatever. So I'd rather my wife had one of those and me have the other one so I could take to her for nothing and then [not/I'd] have the home phone.

Int1: OK.

Int2: So you know they've got to, for me they've got to provide a - you know, that's just revenue to them. I know they've got to maintain the network so that's good right. So I understand that but someone else can pay for it.

Int1: OK. So and you don't feel that wireless services have any particular status, you don't talk about them or?

Int2: No I don't care.

Int1: No cool factor?

Int2: No cool factor for me because I'm uncool but you know I don't see it as prestigious or anything like that. Going back a couple of years I would have. I would have thought that would be really cool to have that but these things that they're mainstream so you know quickly now that they just become –

they're utilities you know, like it's a utility. Like you pay for your water, you pay for your lights you know so in that regard you expect them when you turn on the switch – the light comes on and I expect the same from these services really.

Int1: Ok well thanks a lot 'Interviewee A'. I think that's OK. Can I just get you to fill out this?

……..

Int2: $100 something a month right which is pretty low. I feel that I'm managing that all the time. I've got friends that they have a $300 landline bill and a couple of hundred dollar mobile phone bill every month and to me that's just – so that must be who they're directing all this crap to because all these services to because there's people out there who are willing to have these huge phone bills every month where you know that's why I don't have any of that stuff on my phone. I won't have internet on my phone because I can you know pay, it's included in my broadband. I've got my own wireless network at home so I've got all my computer in different rooms whatever and I can access all of that stuff – streaming video or whatever for just a cost of that. On the phone it's like $20, $30, $50 here – watch the cricket– you know pay an extra $200 a month or whatever.

Int1: And that's why 3G Services have been [slow on the uptake] I think. Now I'm not being impartial because I actually have a 3G phone and I don't use any of that stuff.

End of interview.

Interview with B

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word

Int1: behavioural factors by giving a choice of .....telecommunication service with a focus on wireless service characteristics such as mobility, interactivity, system and [talkability] and user context that has influence on the choice of wireless services in terms of behavioural factors such as attitudes, ease of use, usefulness, teaching to use, and wireless trust environment. The term wireless services is used in a general sense and service functions offered to end-users, devices including wireless interfaces, and networks ..... Examples of wireless services include personal messaging services, voice video streaming, multimedia services, transaction oriented and business solution services.

So we'd just like you to consent to having the interview taped?

Int2: Yes.

Int1: So if you could just sign this for me?

Int2: This one here?

Int1: Yes, that's great, thanks 'Interviewee B'. No 19th. I know the month it slips away doesn't it? The research is being carried out by .....and I'm the mutual interviewer.

Int2: OK.

Int1: Can I just ask you to fill in some demographic information as another ...there 'Interviewee B' before we start? I know ..... Sorry just this information here too would be great.

Int2: OK.

Int1: So I just want to ask you these questions now and if you could just tell us a type of story about how you feel about that, that would be great. I will leave

those for you if you like just in case you like to read them as well as listening to them being read out. So we'll just go through some terminology quickly.

So *mobility* refers to the ability of users to access defined services from any terminal on the network whilst maintaining their personal environmental settings.

Interactivity refers to the capability of wireless devices, receitable and ...designed to access wireless services with convenience and ease of use.

System interoperability is the ability of different wireless services, systems sorry, and application services to communicate, to exchange data accurately and persistently and to use that information that has been exchanged.

End-user context refers to end-user environment factors such as facilitating conditions, social influences, economic conditions and cultural differences.

So can you explain how do you select wireless services and what service characteristics influence your selection or preference?

Int2: Well basically recently I tried to get PC access wireless access and it was incredibly confusing and particularly from the point of view of dealing with the University. They have no standard way of giving you sort of mobile services. We ended up with a Telstra thing called Minimax which is on the CDMA deal or something so in that case we just took the advice from the Telstra rep here at the Uni so in terms of selecting wireless services, that's how we got it and that plugs into a PC.

Int1: So was the fact that it was Telstra who were an established company?

Int2: No it was the fact that at the University you have to deal with Telstra.

Int1: OK so that was the only

Int2: Yes and about the same time I bought a new mobile and I wanted to be able to use – I'm not particularly interested in using the mobile for internet access very much but I wanted to be able to use it as a modem with the PC but the rates are just ridiculous so

Int1: So the cost was a factor?

Int2: Yes

Int1: OK but other than that you've only got choice of Telstra?

Int2: From a Uni point of view, yes.

Int1: And personally you found that it was price that affected your choice. Would you explain how does the mobility of your device affect the use of preference of service?

Int2: I'm not sure if I understand that question.

Int1: So like the coverage – whether your service is going to drop in or out or not.

Int2: Yes. Well you just have to buy the appropriate thing. The stuff we got for the Uni is mostly used for business travel so it's mostly in capital cities in Australia and that's the service we picked has got coverage there, so. Well mobility to define it up here in terms of being able to access defined services from any terminal I don't care about changing terminals because I carry my terminal around with me. If you mean terminal is actual the device, I tend to carry the PC around with me so.

Int1: OK. So but in terms of coverage, would that affect your choice? I know that you only have Telstra but

Int2: Yes well we wouldn't have bought it if it wasn't going to work in the areas we wanted it to so.

Int1: So would you consider that mobility has an impact on the performance of your tasks, your productivity and your intention to use the services? If so, can you explain that impact? So the fact that you can use those wireless devices over a wide area, does that actually allow you to perform your tasks better?

Int2: Yes probably the biggest thing is having with this wireless thing with the PC it means that I can be in a meeting and use Chat to talk to the people back in the office. So if we're running a meeting (a) you can do it when you get bored but more importantly we've actually got pretty direct access to the technical team back here so we can ask them. I can be sitting in a meeting and hear a question and I can just go and type to somebody else and get the answer back quickly.

Int1: And that's discrete and is that important in a meeting?

Int2: Oh well people know that you're doing it. You do it to get information from so and so, yeah that works.

Int1: OK. So does the mobility actually affect your intention to use the service? Was that the main reason that you wanted the service?

Int2: Well yeah, it's a mobile service, yes.

Int1: OK. Has any of the services that you've used been influenced by the interactivity facilitated by the service and/or the wireless device and if so, how?

Int2: No I'm just looking at like basically for raw network access so the service has got nothing to do with it. It's just a carrier. I just wanted to have my

standard internet basically standard internet access. So nothing - I bring my own client to it. Its' just the same software as I've got on the wire network.

Int1: OK. So therefore you want it to provide, it's just that mode of communication?

Int2: Yes.

Int1: OK. Could you describe whether you're comfortable with the service access facilitated by the interactivity and can accomplish tasks and enhance the effectiveness of the job as expected using the interactivity option?

Int2: Yes I'm comfortable that it gives me network access so yes.

Int1: OK. So what's your opinion on interactivity in terms of efficient data transfer and security, privacy and other issues and can you elaborate your experience on interactivity whilst using these services?

Int2: I don't know much about the security. I'm assuming the stuff that comes through is reasonably secure but I don't know, I haven't checked. So security and privacy I don't' know. It had better be secure. They didn't warn us that it wasn't.

Int1: What about efficient data transfer?

Int2: Well that seems to work pretty well.

Int1: No, yes. You've just ..... the same kind of performance that you're getting on your wired network?

Int2: Yes.

Int1: So do you believe system interoperability issues such as accessing the same service from different wireless service providers, networks and devices have an influence on your choice of services and how?

Int2: I'm not sure that these questions are really aimed at the sort of thing you're talking about here because you're just basically buying network access and the internet by definition is interruptible and we're just using a transport layer. I mean this might make more sense if you were talking about things like hand held devices with different browsers on them kind of thing but

Int1: Yes so like PDAs or you don't use any of those devices?

Int2: Well I do have a phone and I have used the web browser on it a couple of times but it – I only looked at a few pages, checked mail once or twice, did a couple of weather maps and it cost $18 and I decided not to do it anymore so.

Int1: So the cost was just

Int2: Yes it would be just impossible for anybody to actually use the services that like without doing some kind of going into it and doing some sort of deal or something. It's just ridiculous.

Int1: OK can you elaborate your experiences with facilitating conditions such as wireless access availability, policy regulations, training and resources, security and legal protection as you operate/interact with wireless services. So if we can take those one at a time. Like your wireless access availability, have you always found that it's there and available for you?

Int2: With this Telstra device it's been pretty good except that in the depths of buildings. It only works near the windows.

Int1: OK and you just work around that at the moment.

Int2: Yes we have to live with that. The wireless is going to be like that though.

Int1: Yes you can't .....wireless access points?

Int2: Well these are done off the, this is done by the cell mobile cell network so

Int1: Oh OK

Int2: If there are spots where mobile phones will never work so.

Int1: Yes and you just accept that that's part of the service?

Int2: Yes.

Int1: OK. What about the policies and regulations? Do you look at those?

Int2: I don't have anything to say about that. There's no training or security or any of these issues. I don't think I could say much about any of those.

Int1: OK. What about, can you explain the role of cultural differences and social influences such as image, education status, and other influences on the [preferenced] usage of wireless services?

Int2: Don't think so.

Int1: So it's had absolutely no impact on your whatsoever that wireless might be considered cool or that there might be some status in having wireless access?

Int2: Um well I've been reading stuff coming out of the States for several years, people having mobile access. You know .....in airports and things long before it turned up in Australia so I think its just knowing that it could be done. I just wanted to have it from a practical point of view.

Int1: So you kind of feel that it's not a, it's lost its cool factor because it's already been

Int2: It should be. It's pretty hopeless in Australia and it's particularly hopeless in this University where they can't, like we had to really push to say OK we're going on the road with a laptop, what should we take with us and the University didn't have an answer. So the Telstra rep came up with something but the whole thing is really half baked and it shouldn't be a status symbol, it should be a basic part of doing business.

Int1: So you want it to be a utility like the electricity?

Int2: There's no status in having your laptop plugged into the network at work. It's just a given so these things should be available. I know that there are managers around here who could have their own Blackberries who probably see that as a status

Int1: Symbol

Int2: Symbol, yeah well it is a status symbol because you can only get it from the University if you're at a certain levels and they won't let anybody else have it but you know.

Int1: You could buy it yourself,

Int2: Yes sure but these things as I found out, they're real expensive to buy domestically and it's a work tool thing so they should pay for it.

Int1: OK. So is there anything else you want to add about the wireless service that you have? What was that? Oh the economic cost factor? That was, was that a factor for you? Did you actually have to cost it and say that it was going to be economic?

Int2: No but obviously if it was going to be too expensive we wouldn't have got it through. The thing we've got is $50 a month on like a 2 year contract. It actually seems like a reasonable deal except that there's a 20hour limit and but that's not as bad as it might be given the cost of some of the other things that are around so. So, yes but we would have bought it if it was more expensive than that.

Int1: Ok. So the economic cost certainly played a factor but it is actually at a reasonable level?

Int2: I think this Minimax service is pretty reasonable. I think others have got $100 for all you can eat network access and that's OK too. .....but we only use it when we're on trips so.

Int1: So that's OK.

Int2: Yes.

Int1: OK I think that - is that OK Hari? Thanks very much ‘Interviewee B’. Thanks for your time.

Int2: Cheers.

END OF INTERVIEW

Interview with C

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word

Int1: ...end-user behaviours for their choice of wireless type communication services within the Australian domain. This research will be used assist Australian wireless service providers in improving their quality of services and .....

So ..... situations are important to yourself and [Hari] and this research is confidential and your ID will not be acknowledged in the research project. I would like to tape the interview in order to assist me in the data analysis. If you agree to this ..... during the taping, you're welcome to ask me to cease taping or to push the pause button.

So the interview is designed to gather data and to assist Hari in gaining a better understanding of the nature and the types of end-user behavioural factors affecting the choice of Australian wireless telecommunication services. The interview will focus on wireless services characteristics such as mobility, interactivity, system interoperability and user context that has influence on the choice of wireless services in terms of behavioural factors such as attitudes, ease of use, usefulness, [attention to use], and wireless trust environment.

The term wireless services is used in a general sense and subsequently refers to a set of service functions offered to end-user devices using wireless ..... interfaces and networks when requested.

So examples of the wireless include personal messaging services, voice video streaming, multimedia services, transaction oriented and business solution services.

If I could just ask you to sign the information and consent form, and it's the 19th. Thank you 'Interviewee C' and if I could just have that a moment and I will sign it myself and then we know it's done.

If I can just ask you to take a few minutes and fill out the information there on your ..... You need that.

Int1: ..... as well and these are just open ended questions and we'd just like you to describe your experiences about these questions, OK? So, if we can just go through some terminology first.

Mobility refers to the ability of users to access the defined services from any terminal on the network while maintaining their personal environment setting.

Interactivity refers to the capability of wireless devices with suitable interface design to access wireless services with convenience and ease of use, so accessing web pages on a PDA or that sort of thing.

System interoperability is the ability of different wireless services and adaptation services to communicate to exchange data accurately and consistently and to use the information that has been exchanged.

So can you explain how you select wireless services and what service characteristics influence your selection or preference?

Int2: Well first and foremost is cost. The cost of the services provided. Being, living on a budget for my living expenses, of course the cost will be number 1 choice. Secondly is the well shall I say friends choice of the services. I need to be on the services that my friends use the most so that its much more compatible so that the facilities I use is compatible with my friends.

Int1: Ok so it fits in with your social network?

Int2: Yes, it fits in with my social network.

Int1: So what about what sort of coverage your service provider provides? Would that influence you?

Int2: Well not in the beginning it would be after a while I find that because I'm not travelling – I don't travel a lot so sufficient coverage is enough. I don't need a very wide coverage. So basically if my friends are within that coverage area I will go for that service.

Int1: OK. So I see you use email on your wireless device?

Int2: Well I used it on PDAs for one thing but the other one is using the USQ Wireless Network. It's the Wi-Fi network but in terms of mobile phone services, that would be SMS and MMS more. I do occasionally use mobile phone videoconferencing, 3G when I'm within the 3G network coverage area. My friends down far away in Melbourne they have better technology and I can use it.

Int1: And you like being able to use it? You would use it more if you had the coverage here?

Int2: I would yes because as long as it doesn't incur too much cost, yes.

Int1: OK so you would find those facilities useful if they were available?

Int2: Yes.

Int1: So can you explain how does the mobility of your device affect the usage or preference for the services? So how do you feel when you go somewhere and there might be you might not be able to get access because of the lack of coverage?

Int2: Well I would anticipate that if I go to that place that coverage might not be strong. I would not be – it would not affect me much unless it's an emergency and I don't use mobile phones to communicate a lot so it's not a very big concern to me but it depends. If I know earlier that area has low coverage, I have anticipation then I won't be bothered with it. I will have all the coverage with it. I would do all the preparation I need to get that limitation works out.

Int1: So the mobility of the device, you just assume that you're going to be able to get good coverage?

Int2: Yes

Int1: And the area, because you're quite static?

Int2: Yes because I'm, yes it's mostly because I'm static. I don't move around a lot so mobility is not an issue for me. I'm usually within range of good coverage areas.

Int1: OK. So but even though you know you're static, would you consider that mobility has an impact on the performance of your task? So, productivity and intention to use the service so if you could move around more with a device, would you be able to use it more?

Int2: Yes I would. If well before I'm just talking about mobile phone technology but if we're talking about wireless network technologies, then I would say that it would hinder a lot of my work because I use my notebook for access at the University and I use University resources to access information but when I move out of that range I can't do a lot of things. I pick up external services for my notebook and it's usually much more costly.

Int1: So it definitely does have an impact

Int2: Yes it would hinder a lot of my work.

Int1: OK. So and how do you feel when you go somewhere and you find that you're out of range of the University coverage? Do you find that?

Int2: Probably a little frustrating.

Int1: Frustrated?

Int2: Yes but its reasonable but I would feel frustrated sometimes if I didn't expect it then it would be really frustrating for me.

Int1: So how about within the University, are there areas within the University where you have difficulties with coverage?

Int2: ....coverage it doesn't really matter that much but it does occasionally have connectivity points. The wireless will disconnect itself although it does reconnect sometimes after 1 or 2 seconds but its within that 1 or 2 seconds that sometimes when you're sending an email or reading an article and the connections .....that way it increases a lot of frustration because all your work is halted (tasks) and you have restart all your work again.

Int1: So it immediately impacts that you can do?

Int2: Yes.

Int1: So have any of the services that you use or prefer been influenced by the interactivity facilitated by the service or the wireless device? So, we are talking in here you know how you have to scroll pages on your phone or maybe access to a qwerty keyboard on a wireless device?

Int2: Well it depends on the device anyway. In terms of wireless devices, there are so many types. First of all we have the pager, mobile phone, PDAs, and your notebook is all mobile devices. In terms of notebook it's a large item and all the necessary interfaces is there – its easier to use. If you move to something smaller like PDAs and mobile phones, PDAs is something that you have to get used to.

Int1: So what's your experience with using the PDA and interactivity?
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Int2: Well again PDAs come in different softwares and if it so happens that your software are used which is called Palmaware, it has a less user friendly interface. It does all the scrolling with a stylus pen on the touch screen but on the tablet screen actually but it does not offer – its not a user friendly interface because you have to its basically you have to do like press a few buttons just to get to one task. In terms of using something like Windows based software you basically only need to press 1 or 2 buttons to get to the task you want.

Int1: So when you're using Palmaware how does that, the fact that it's more difficult to use, affect your use of that device?

Int2: It would take longer time.

Int1: Longer time and does that, how does that make you feel?

Int2: Ah well

Int1: Do you feel like it impacts on your productivity?

Int2: Ah basically I don't use it for, I don't use it, if I'm not writing anything - I don't use it for writing. I basically use it for reading mails, access some of the contacts because I know its going to be slow if I try to write something on it. But I would say that it does get a little frustrating because of all the keying. All the data entry it's very slow, slower than PC and notebooks so it gets me, I get impatient sometimes just to get to the task I want on my PDA.

Int1: OK and what about your mobile phone?

Int2: Oh mobile phone is a little bit more accessibility and convenient because you don't use a pen. You just press buttons on the mobile phone keypad and it's easier with the numbers but even limited in terms of functions compared to a PDA. PDAs you can probably have more storage, more processing power than a mobile phone and it will go faster but for mobile phone it will be more convenient for short tasks/small tasks. I can send small messages and bigger recording and voice recordings.

Int1: So you actually let what task you've got to do influence what wireless device you're going to use?

Int2: Yes because different devices have different multiple uses in terms of the tasks. For mobile phone it is very small tasks – very small and for PDAs, if I don't feel like bringing a big notebook with me then I use a PDA to read all the necessary articles and documents that I need you see. But when I need to do a lot of jobs and I need to move a lot, then I use the big – I use the notebook.

Int1: So would you describe whether you're comfortable with the service access facilitated by the interactivity? So service access facilitated by the interactivity and can accomplish tasks and enhance the effectiveness of the job expected using this interactivity option? So do you find that the ability to use these devices increases your opportunity? You know do you find them useful?

Int2: It does have certain positive impact. First of all I get more access to information and email and basically also any time I need it but the next thing would be the it would still be the data entry point where I need to put in the data is all the wireless devices are still much slower and it does have occasional connectivity problems with other devices, let's say when I use it in the area of the university compound and in terms of interactivity

Int1: So what about meaning interact with the device you know you were saying that the PDA is by the stylus and you find that a little bit frustrating.

Int2: Yes because the re....., the character recognition software is not that advanced because different people have different handwriting styles and [part of the thing with the] technology they need the users to fit to the standard of the device instead of the device to fit with the user style.

Int1: So but the interactivity still allows you because that device has that interactivity, it still gives you the ability to do your job better or worse?

Int2: It has positive impact on my work. It does help a little but in terms when I use it for reading it helps in that way because I don't normally read things in my office so I would choose to go to a quieter place or a better environment to read my electronic documents and it provides that kind of options for me whereas if I need to read something on the PC then I would stay in my office the whole day whereas the wireless devices allow me to move to a different location and provide a better environment for me to do my work.

Int1: So what's your opinion on interactivity in terms of the efficient data transfers, security, privacy and other issues? So ..... usefulness?

Int2: Usefulness - lets say for data transfer wireless devices is benefit for ..... and I like because I usually read items on the internet and on the internet all the files are not very big so it provides sufficient time and traffic for the data can be loaded from my mobile devices and now it all falls on the processing power of the mobile devices and usually the mobile devices have sufficient power to run all the documents that I need unless it's a movie file or a big music file. Especially movie files, it will run - it will not run very smoothly on a PDA but it will run very well on a notebook because depending on the size of the movie file and in terms of security and privacy, so far I have not encountered any security or privacy issues because they do so that wireless services are much more vulnerable than wired services so I've yet to encounter anything that would say that the security and privacy of information is [compromised].

Int1: So you use WEP?

Int2: WEP, yes I do use, it is the most common one I use. I still try to draw on other alternatives but mainly because the university uses WEP and there's no other options for other security mechanisms - so I have to follow the university's, I believe it's the specification of the university wireless local area network.

Int1: And does that change how you feel about using the device at all, the fact that you have to follow the university's policy?

Int2: No as long as I get my to do my work on the wireless devices and as long as there's no problems coming up like say somebody stole the information on my wireless devices then I'm all right with it but if some day I find the information I have on my wireless devices is stolen or anything then it would cause some trouble.

Int1: Yes so you're saying at the moment you've had no problems?

Int2: No I'm satisfied with the performance.

Int1: OK so you just find that it's adequate?

Int2: Yes it's adequate.

Int1: And it doesn't affect your performance in any way?

Int2: No.

Int1: So do you believe that systems interoperability issues such as accessing the same service from different wireless service providers, networks and devices have an influence on your choice of services and how?

Int2: Well I'm definitely go for more standardised access to wireless services. I'd really hate to go and choose between service providers because each service provider has different benefits – offer different benefits to their services and like Telstra usually has the most coverage in terms of wireless services but Optus has a better, usually has a better customer plan and all my friends are on Optus services but if you're talking about wireless LAN and for now the thing that is still very standardised because the university is just using the 802.11 b service and there have not been any compatibility issues with students computers so far and.

Int1: So you actually choose Optus because your friends are on that?

Int2: Yes and its more compatible for me to connect with them. I used to have Telstra and it cost me a lot quite some heaps of money just to communicate with them. So I would be very happy if say one day Optus and Telstra had a combined services offered to us. I would certainly use the coverage and social network.

Int1: Do you think it's because that the difference is not because of interoperability but because those service providers are penalising you for calling outside their service?

Int2: Yes it's true it's mainly just the cost

Int1: And how does that make you feel about using the service?

Int2: It makes you feel broke!

Int1: Yes, but does it change your mind about using the service at all?

Int2: No it doesn't because I will use it because if I want to use Telstra that would be because I'm going out to a very far places - out of my usual activity places.

Int1: So because you're on Telstra and Optus. You have plans on Telstra and Optus?

Int2: Yes also I used to have 3G with me before but to use that I have to go Brisbane to access, but I the frequent one I use is Optus then if I have to

travel somewhere very far that is only Telstra has the coverage, then I'll use Telstra.

Int1: OK and you don't mind having to use both of those services to provide that?

Int2: No it's within my budget I can use the services?

Int1: So the cost is the main driver for you?

Int2: Cost, yes is basically the main driver.

Int1: OK now you're saying that you can't use 3G in Toowoomba?

Int2: No

Int1: So do you feel that impacts on your job productivity?

Int2: Um no it doesn't. Basically 3G is basically just for entertainment.

Int1: Ok so you just feel 3G is just for entertaining?

Int2: Entertaining and fashion and technology trend. I am interested, I am always interested in new technology coming up and so far it has not been disappointing the technology because you can view news on the mobile phone and popular friends features.... and it can do a lot of wonderful things. – Social Influences

Int1: But you still really feel it has entertainment value rather than business .....

Int2: Yes.

Int1: OK. So can you explain your feelings in the way system interoperability affects the service that you've chosen, standardisation such as WAP and performance issues and contracted to realise this? So does it make you do your job faster, the system?

Int2: Um faster – yes, that would be for me. They are very I think no one would argue that we can do it a lot faster with the device or the service is definitely a good thing. But also I would like to see more information especially when I need that information I need to find something on the internet when I'm somewhere in the middle of town. I don't have to look for an internet café just to go to search for the information. I can just go to my PDA and I can find that information through my PDA, if the PDA has the wireless service. And time factors is it does save time because I don't have to walk around looking for places to access information. Information is here already in my hands and standardisation is like .....I would be happy because even though it's a matter of cost as well. I don't have to switch from one it saves me the trouble of switching from one service to another and I think that's because if the service talks to each other then I don't have to like to switch to one

mobile phone and change my SIM card each time I have to switch and use the other service.

Int1: OK. So can you elaborate your experience with facilitating conditions such as wireless access availability and policies, regulations, training and resources, security and legal protection and as you operate/interact with wireless devices? So maybe if we can take those one at a time. What about wireless access availability?

Int2: Well mobile phone – let's say if you are located in the area of Toowoomba, mobile phone has very good coverage. PDAs and notebooks, if you are using wireless networks then it would be a much more bigger concern because you USQ uses a different network setting but if you've been to places like McDonalds hotspot services, then it would require another set of settings so you have to change the settings often and it does create a lot of problems in terms of time to configure the settings to suit the environment.

Int1: So would it change your mind about using that service – having to change those settings?

Int2: Yes it would. I would like to maintain my devices on one area because if I use my notebook at the university and I bring the notebook back to my home where I have another wireless network, I have to set it up all over again if the network settings in my browser so I use ..... I usually don't bring back my notebook because I'm not very comfortable, I don't have the time to change all the settings and it would definitely save a lot of time if I stick to one network.

Int1: OK. What about policies and regulations you know and it might be at the university or your service provider's policies and regulations?

Int2: Well in terms of policies I actually don't know the policies that well. All I know is that I have to get the registration from the university and in terms of policies; they didn't tell me anything about wireless network policies at USQ. They do have, all they did was they just register my notebook on the service and basically all the service are under restriction. They control all the restrictions electronically without me knowing it.

Int1: So the policies and regulations don't change your mind about how you're going to use the service because you don't really

Int2: Well yes if the policy has too much of a restriction on you

Int1: But really if it doesn't impact on you at all?

Int2: Then I wouldn't consider changing anything.

Int1: So you don't take any notice of the policies – is that a fair comment?

Int2: Yes. Let's just say I don't know anything about the policies at all. I wasn't told of any.

Int1: OK. So if it doesn't impact on your use.

Int2: No.

Int1: You don't care.

Int2: Yes.

Int1: OK. What about the training and resources?

Int2: Training and resources – well basically I'm self trained in using all these devices.

Int1: So was there any access to training in the devices or would the provision of training and resources change your mind about which service provider to use?

Int2: Basically ..... resources are well like at ITS they provide the [solutions] resources like how to set up your system so that you can connect into the USQ network but in terms of how to use the devices if its not a device from the USQ, if the device is not USQ property they basically you won't provide too much support in training specially PDAs into the ITS service desk a few months ago. They were quite surprised at the device because they have not used it before in the university and basically in terms of support they're doing quite a good job.

Int1: So let's say as a internet service provider, wireless internet service provider offered a lot of training or resources as part of their service, would that change how you felt about that service provider?

Int2: Yes it would because it would if I had a running of problems with the device I use on their wireless network, I would like to know where to find answers to solve the problem. I can basically solve the problem myself but I need to know where to look for the solutions and if the service provider can offer the solutions to problems that other users face on their service, that information if it is readily available it would be a great help because I run into service providers that do not offer this kind of service like information on how to solve problems with my network and it straight away turns me away from that services and I change to a new service provider.

Int1: OK. Do you, when you look at those training and resources, would you prefer more like a Help Desk where you talk to somebody or the ability to interact with an automated help system?

Int2: I would prefer an automated help system actually. If I call up the Help Desk, then it would have to be really something serious that I can't solve.

Int1: So you want a Help Desk as a last resort?

Int2: Yes.

Int1: OK. So what about security and legal protection? Do they impact on your decision about using the wireless services at all?

Int2: Well again like policies and again like policies, I don't really know what's the protection I guess. Policies don't really involve me I guess because and all the things because I own the device – it's completely owned by me but as I said I just use the services they provide unless the device ..... and I will have to know what the regulation would be.

Int1: OK. So what about the role of cultural differences as social influences such as image, education, status and other influences on the preference or usage of the wireless services. So do you feel when you pull out your PDA, that having a good device like that has some status with it?

Int2: Well it's just for friendship but no, because it's basically for work and everything. It's for my convenience but if you are talking about 3G phones, yes, it definitely draws a lot of attention from friends and but in terms of PDAs, I would say it would not draw that much of attention because

Int1: So would it actually change your mind about using one of those devices if you thought that its use was going to give you some prestige or a higher status or just look really cool?

Int2: It would – just thinking about it.

Int1: Yes so if there was some device that you could afford that was a new technology, that would definitely influence your choice?

Int2: Yes it would because for technology for people will..... Australian technology it would be proud to own something that no one has yet to own.

Int1: So like to be the first adopter, a really early adopter of something that is really good?

Int2: Yes, it would make you feel special for a while but after that you would get used to it realising

Int1: Yes so it has to offer that functionality behind the cool, so. Ok, thank you very much 'Interviewee C'. Was there anything else you wanted to say about what influences your choice of wireless providers that we haven't asked about?

Int2: No I think that's about all.

Int1: ..... the whole thing?

Int2: No it's just .....

Int1: Ok, thanks very much ‘Interviewee C’.

End of Interview

Interview with D

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word

Int2: You just want this as a back up do you?

Int1: Yes.

Int2: So this is now recording is it?

Int1: Yes.

Int2: OK.

Int1: So I'll leave those with you 'Interviewee D' if you would just like to read them at the same time.

Int2: OK.

Int1: Sometimes it just helps doesn't it to be able to read them.

Int2: Yep.

Int1: OK if we can just go through some terminology. Mobility refers to the ability of users to access defined services. Interactivity refers to the capability of wireless devices with suitable interface design to access wireless services with convenience and ease of use. System interoperability is the ability of different wireless systems and application services to communicate to exchange data accurately and consistently and to use the information that has been exchanged. User context refers to end-user environment factors such as facilitating conditions, social appliances, economic conditions and cultural differences.

Can you explain how you select wireless services and what service characteristics influence your selection or preference?

Int2: Oh that's easy. (1) coverage; (2) speed and (3) cost.

Int1: So and what about whether the service provider is reputable or the user concerned .....

Int2: Um I'm not that interested in reputability. No .....characteristics.

Int1: OK. And can you explain how does the coverage in real time connectivity of the device and network affect your usage or preference of services?

Int2: Well I've had experience in buying switching to a mobile phone company for example and it was at the time of GSM or digital coming in and it was too early to make that switch because they really didn't have the coverage at that time. So it was a mistake and so getting that coverage and the convenience of usage is quite important.

Int1: So and how does it feel when you couldn't do something because of the lack of coverage? Was there.....?

Int2: I was actually a manager for an organisation and I switched the organisation over to digital and they never forgave me – the staff there – because I mean over subsequent years GSM did get the coverage but people were quite angry so many of them switched back to the analogue system.

Int1: OK. So would you consider that the mobility, the ability to work anywhere has an impact on the performance of your task, productivity and your intention to use the service? If so, can you explain that impact?

Int2: Yes well these days' people expect others to be available. People expect to be able to do business not just any time – 24/7 – which is what the internet has given us but wireless has given us any place. So now we can do our business at any time and in almost any place. There are you know there are limitations. You've virtually still got to have some kind of link in or you've got to pay for those services where you need to plug a device into your PC or PDA and pay for that roaming email service.

Int1: But has it impacted positively on your productivity?

Int2: Oh without a doubt.

Int1: So what is your opinion on your way that you interact with the device and application such as linkage, volume of pages, limited resolutions or graphics, wireless information and retrieval and ..... using the services?

Int2: I think the technology has still got a fair way to go and there's likely to be a bit of a fallout of devices. I did try a PDA for a while but I found it was too much of an overhead to maintain a PDA and a laptop and as I took my laptop everywhere anyway, and after a while I thought why am I taking this PDA around. I now I know the PDAs and laptops are a bit better integrated but still I generally largely prefer to take my laptop around with me and that has limitations because the laptop is obviously bulky. Whether tablets replace laptops I mean that's probably unlikely. I mean we're going through a transition phase so in today's Australian there's an article about mobile phones there's a likely or increasing a user interface device so we could see the demise of – the continued demise of PDAs and tablets and those kinds of devices and instead we'll end up with ..... large amounts of functionality we need on mobile phones . I mean Nokia are probably (interrupted by

telephone call). So the technology, there's yet to be a shake out in the technology.

Int1: Do you use your mobile phone?

Int2: As an application device, no. Now I understand looking at the article in the paper today Blackberry I understand is the most, the best device for accessing email but apparently its a very poor mobile phone so the trend is for Blackberry users to use the Blackberry device for email and still carry a mobile phone. So we've got this situation at the moment where we've got a range of devices and there needs to be some sort of shake out so we end up with a smaller number of devices that will meet all our information needs for both data as well as voice and location services as well.

Int1: So and do you think it was the fact that it's difficult to use the telephone that the laptop is far easier to use that affects that choice?

Int2: Well the most popular technologies around, the most successful ones would be mobile phones and laptops. PDAs, tablets are not quite – things like Blackberry are not quite there because they don't, they're not going to displace those other devices very easily. If you've got a ..... acceptance of mobile phones is extraordinary, the adoption takeup. Geriatrics, you know my 80 blind mother has a mobile phone. She didn't adapt to a PC but lots of geriatrics do take up PC and use the internet and are avid emailers and searchers searching through the databases for health information and other things they need.

Int1: So would you use, you work in the health system as well?

Int2: I do occasional consulting.

Int1: Just occasional consulting? Do you find that the mobility really helps there?

Int2: Oh well that's something that the health industry is very excited about because the adoption of computing, particularly for a thing that the doctors use which is primarily online orders is very poor (Wireless access availability). You know they don't, doctors don't use computers. They might, your GP might use a computer for accessing your previous appointment details and the drugs you're on and they'll get laboratory results sent to them by the private laboratories. That's [currently] in hospitals doctors still write on bits of paper and they drop those bits of paper with orders for pathology, radiology, drugs and other services into a ward out tray ..... in their computer system because doctors are mobile going from bed to bed and ward to ward, clinic sessions, off to another hospital, operating theatres, surgery. So they're not going to, they don't have the time to find the free device, sit down and use it so around the world in health care, there's a lot of excitement about mobile – the mobility and wireless devices.

Int1: And interoperability? You know you were saying they move from one facility to another.

Int2: Yes that's right that's going to be a big issue for example you know would they be happy using one device for communications within the campus and then having to go and use another device outside like a GPRS device? So they could use a wireless LAN device both for voice and data on a hospital campus but then when they leave, that's not going to work out in the street so another device? The devices don't, they are not yet ready to flick between modes and then of course there's the application side to it as well because if they go from one facility to another facility it might be a different application that they would need to interact with, plug in, learn how to use and so on. But I think the consensus is there that wireless devices have to be the solution for mobile workers and we have a lot of mobile workers and parking metre readers, gas metre readers, field staff, visiting home nurses, hospital staff. Even though hospital staff work in a building, they're work practices are very mobile and nurses don't sit at a desk. Nurses are all over the ward, on their feet all day and similarly with hospital doctors.

Int1: That's great, thanks. Would you be ..... comfortable with the service access facilitated by the interactivity and so can accomplish tasks and enhance the effectiveness of the job as expected using this interactivity?

Int2: Well I'm comfortable with the limit to which I use – what I would like to have would be mobile email which I don't use at the moment. I have used it in the past and that was good. You could sit in a meeting and happily interact with your email. That was a long time ago that that was available. It is available now but I haven't plugged into it partly because my choice and adoption of technology is largely driven by who I'm working for and what they will pay for (Wireless access availability). So I pay for my own mobile phone but my computing services are paid for by my employer. Now I do have some grant money I could go out and buy other devices but I'm not quite familiar at this stage as to what would be the best to buy.

Int1: So do you believe that system interoperability issue such as accessing the same service and email and internet from different wireless service providers, networks and devices have an influence on your choice of services and how?

Int2: I well not really because I already [construct] 2 email services but it doesn't matter because I can plug into one and get the emails added from the other or I can plug into the other and get the emails added across.

Int1: So the webmail works seamlessly.

Int2: Um well when I'm at USQ, USQ will go and search for my IINET mail server and dump it into my Outlook and I can see that and similarly if I'm out in the field or at home and I dial into IINet, oh no, no I go through a VPN. I plug into IINet then I go through a VPN to USQ, run Outlook and Outlook goes finds the mail on IINet and pushes it through USQ. So it works fairly seamlessly for me. In terms of provider, here we have our LAN line obviously through Telstra. We have mobiles through Telstra and we have our internet and broadband through IINet and our long distance calls through

IINet as well. Now would go to the one provider like Telstra if it was economically feasible to do that but we've done our sums and its not.

Int1: So can you explain your feelings in the way different standards such as WAP, 2G, 3G, CDMA, protection management and configuration techniques and performance issues affect the services that you've chosen?

Int2: I would want to go towards standard or common standards only because that gives you some protection in terms of shelf life or redundancy but if you've bought history ..... with examples of superior technology being overtaken by inferior technology because for various reasons. I mean Microsoft products there's what was there before the PC, yes ....., or [MSDOS] ..... OS2 that IBM had or MPM, EPM which was prior to PCDOS which is a far inferior product but we moved down that pathway because of marketing and also the availability of 3rd party products. The 3rd party suppliers marketed, developed products for the PCDOS market. BETA versus VHS for standards I understand that BETA is regarded as a superior standard.

Int1: To VHS? Now so really what [protocols] are used or what standards are used does actually impact on your choice of service?

Int2: Yes .....I would want to go down a path where what I was buying was the current or the emerging standard or the dominant. There are lots of different standards. If you look at things that are frustrating and even quite dangerous they're often where we don't have standards like which side of the road do we drive on? Power adapters. You've got to carry in your luggage when you travel a little bag full of different power adapters. It's quite frustrating.

Int1: So can you elaborate your experience with facilitating conditions such as wireless access availability, policies, regulations, training and resources, security and legal protection as you operate/interact with various wireless services? I often .....take it one at a time or just go through?

Int2: Yes well I've had lots. I've been an IT manager jobs so I've decided or made decision/choices acquisition choices for hardwaring services and we including wireless on behalf of my users ..... healthcare as also in police in New Zealand. Police used, police were the biggest private operator of telecommunications within New Zealand and we provided services to the Fire Services which (interrupted by telephone call). So my experience has been in developing, just going through the standard acquisition processes, developing, determining user requirements, determining the state of the art in terms of the which way forward, which technology do you choose and that is always a difficult one. I mean 10 years ago I put in, I revamped the telephony as well as the radio systems for Police and Emergency Service in New Zealand and at that stage there were people saying voice over IP we didn't go down that route and I think for good reason although it was very very difficult to know whether we were doing the right thing because I don't think the technology was there at that time. We did go down a particular route as far as a radio standard. We went down the European model – the European standard which was probably the right way to go. So and then there are issues of usage,

policy, how do you and that's something we like in other areas – if ..... kind of got it worked out user wireless integrated into their work practices so when cops come back off a shift they're trained to take off their utility belt, take off their radio, take the battery out of the radio, put the battery in the charger and there would be a bank on the wall of slots for battery charges and they rotate the batteries around. So the cops going out on shift know they get a fully charged battery, put it in their radio, strap on the utility belt and off they go catching crooks.

Int1: Do you think that was because they actually merged from like radio to wireless technologies now?

Int2: No I think its because its identified as critical for their own effectiveness as well as their own safety.

Int1: To being confident.

Int2: That's right.

Int1: So it was a critical

Int2: It's a drop dead critical tool and they continually interact with the radio all the time. There are lots of policy issues for example with modern radio systems, it's a bit like taxis. You get into a taxi these days, the taxi driver never picks up the microphone even though it's sitting there. He never picks up the microphone to talk to base. You just don't see it. Instead everything happens electronically through pushing at a small number of buttons. Police have that kind of technology but it did require a lot of work practice and policy issues for them to make the move from voice driven to pushing a few buttons and it's a cultural thing as well. So Police continually interact with the radio so say stop the car. They'll tell the radio operator you know I'm pulling up a car and the registration number is whatever. They find it's Jacquie, they'll take your licence, go back to the police car, read your licence details to the radio operator who will do a check and so they like the sense of control. Now an issue with Police and wireless technology in the US, we haven't seen it yet in Australia because we haven't tried to push the same thing is that all that can happen automatically. So the technologies are there and we do have them now but in Queensland – Victoria has it – that they know where the cars are and the stages can all happen you know – push a button – I'm on a job. Push a button – I'm free you know like cab drivers do.

Int1: Oh OK so ..... hasn't actually started by voice. All it's got to do is alert them by the push of a button.

Int2: Yes that's right.

Int1: That will maybe change lives.. or

Int2: So it's been an issue in the US that cops don't like the idea of their bosses being able to see exactly where they are and also see their status. They want

to control all that so if they want to go and have a cup of coffee with their friend or they want to control their work space and their environment. So that's an issue.

Int1: So they feel in that case the wireless technology is intrusive on their ability to tell anyone.....

Int2: Yes that's right, that's right so I mean in the future I think everything is going to be equipped with wireless, absolutely everything. Your moggy will have electronic tag that will automatically open the pussy cat door when you're not there and the door will shut to not let other moggies in. You won't loose your pets because they'll all have tags. We'll be tagging our children. When kids borrow the family car, we'll be able to know exactly where they are, what speed they're going and we can switch on the camera to have a look and see who else is in the car with the camera in the car. Just like taxis have cameras in their cars. (interruption by telephone call). So you know everything is going to be wireless, absolutely everything. I mean especially with RFID everything we buy will have a wireless tag on it. I mean that doesn't mean that we can automatically track everything because the passive tags that don't have their own power supply, the range is quite limited. They really need to the scanner quite close to them. But things that do have power supply like transponders that are in the tollway tags, you know we'll be able to track those cars from anywhere.

Int1: Well can you explain the role of economic conditions or cultural differences and social influences such as image, education and other influences?

Int2: Yes absolutely.

Int1: Now what we're asking you here is would you buy a Blackberry because one of the reasons is that it has prestige, was cooler, high profile?

Int2: Yes that's a good one. I mean if you look at the success of IPODs. You know IPODs I mean basically they're a storage device, a media player. You know big deal. I mean but they're cool. Every adolescent wants one. Every adolescent gets one.

Int1: Sometimes even adults.

Int2: Even adults, that's right. They're a must have. I mean if you look at the with mobile phones, I'm amazed at the number of mobile phone outlets. If you go over to the nearest big shopping complexes like Carrindale, there's 3 or 4 shops, they're all there. Vodaphone's there, Telstra's there and there are independent outlets, there's those little stores in the walkways selling mobile phone. There are those shops that sell almost nothing else but mobile phone covers. Mobile phones are definitely cool.

Int1: So but would it impact on your decision to buy a device?

Int2: No because I'm inherently a dag and I don't, I rarely buy things for image.

Int1: So you really look for functionality?

Int2: I look for value for money and functionality.

Int1: OK, thanks ‘Interviewee D’.

Int2: Pleasure.

END OF INTERVIEW.

Interview with E

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word

Int1: ....write them down .....some of those. So can we just go through some of the terminology or are you quite comfortable?

Int2: No, no, yeah go through the terminology that's fine. I didn't read that sorry.

Int1: Mobility refers to the ability of users to access defined services from any terminal in the network while maintaining their personal environment settings. So we're really just talking coverage and the ability to move around with the user device.

Interactivity refers to the capability of wireless devices for suitable interface design to access a wireless service with convenience and ease of use.

The system interoperability is the ability of different wireless systems and application services to communicate, to exchange data accurately and consistently and to use the information that has been exchanged. So we're really talking about interoperability of applications and .....devices.

User context refers to end-user environment factors such as facilitating conditions, social appliances, economic conditions and cultural differences.

So could you explain how you select wireless services or even why you wouldn't select wireless services and what service characteristics would influence your choice?

Int2: OK. With wireless services I take it more as a case of need if you have a need to use them then um just at this point I haven't had that much of a need so then service characteristics that would influence would certainly be depending on that need if its mobility that you were requiring security being a background of mine would certainly raise its head again. If what you were wanting to use it for was of a secure nature. I personally don't have too many privacy issues if it's just my own stuff on it. I'm not somebody who's ultraconservative about what goes out onto a network but if it is confidential information then that's a concern from a business setting.

Int1: So and how about maybe you really haven't found the need to be mobile with moving your laptop around or you don't use a laptop? You prefer desktop or?

Int2: I have a laptop on my desk at work but that's purely for the occasional times that I take the laptop home and yes, then I just use it as a desktop at that time once I get there. So no.

Int1: Are there any sort of things that would actually drive you to adopting wireless like maybe if the cost was significantly less or you found that wireless was a really good quality of service? So you may..... your download rate was really good or that it was really trustworthy? You know increased security?

Int2: Yes it still comes in a need so that's what would have to change for me to use it.

Int1: Do you enjoy the feeling of actually being disconnected?

Int2: Probably yes. I'm not someone who embraces technology in a huge way so the fact that I can leave the computer, phone whatever behind and just go outside and forget about it is probably yes, a benefit.

Int1: So the fact that you're not connected?
1

Int2: Yes so if I was in a work situation however where you needed to be and that would enable you to have actually involved doing other things and still be compactable to be able to do your job. I'm just thinking back now when I was in full-time employment. I'm half-time here but in full-time employment and having to be on call 24 hours and in that situation, then it would have been wonderful back then to have that portability of being able to access back into our network to diagnose problems without at that time physically having to go into work which is what I used to have to do at 2:00am in the morning you'd have to go in to resolve issues. If I would have been able to do things differently.

Int1: So if you'd been able to tunnel in wirelessly, that would have been a real difference?

Int2: That's right. In a secure manner if that was something that was found to be secure so in that application, confidentiality would have been a big issue.

Int1: So you don't have a wireless LAN at home do you?

Int2: No.

Int1: You use plug in?

Int2: Yes just plug in.

Int1: ..... considering .....to have our PC dial up?

Int2: Honestly I'm just not somebody who embraces technology (overtalking).

Int1: Yes but you have to need to do it.

Int2: It's a means to doing something rather than a joy.

Int1: So would you explain how does the coverage in real time connectivity of your device and network affect your usage or preference of the service? So again maybe if you would use it

Int2: So look at an application that I, you know a past application that I may have had if it was available then certainly coverage would have been an issue because if not, if you didn't have that coverage then that would deteriorate ability to serve that purpose. It would reduce its ability to allow that portability or mobility of me from base (so to speak).

Int1: So let's say that the coverage actually stopped away from your home, how would you have felt about that. You know there was wireless coverage that didn't actually reach your home.

Int2: Yeah I suppose some people would feel isolated. Again, if I was, I would feel frustrated if I was in that situation of are you trying to use it as a tool to mean that I didn't need to go in, then that would be a frustration because if I then had to go elsewhere anyway to be able to

Int1: That's right so you knew that that service was available but it didn't reach

Int2: And I do live outside of Toowoomba so that is something that would have been, could have been an issue.

Int1: So would you consider that the ability to be mobile has an impact on the performance of your task, productivity or your intention to use the service? If so, can you explain the impact?

Int2: OK so again we ..... example and I'm sorry that I'm

Int1: So how about with a mobile phone? Do you use a mobile phone? You don't use MMS or SMS or any of those services?

Int2: We do have, yes I do have a mobile phone that yeah my husband has and so forth that I use occasionally.

Int1: But you're even just an occasional user of the mobile phone?

Int2: Yes, yes.

Int1: Do you do SMS?

Int2: No

Int1: Pick up milk on the way home?

Int2: No, no. So yeah and again I think that's a case of being able to, you not be tied to the phone so.

Int1: Not being tied to the technology.

Int2: Yes.

Int1: Is that feeling of disconnectedness that you really like isn't it of being able to walk away from work?

Int2: Yes.

Int1: So and being able to shut your door on that and move to maybe your other life. You like that ability.

Int2: Yes.

Int1: .....intruding

Int2: That's right. Again obviously mobile phone was the contact back when I was on call and I always had to have that phone with me and that was probably what sort of turned me off them.

Int1: Yes so that was the driver – lay back.....

Int2: I don't like to be contactable at home – quiet sessions.

Int1: So what's your opinion on how you interact with a device? You know by your mobile phone you could actually interact with your web pages. Would the fact that it took you a long time to scroll between the pages or the connection was really slow, the resolution was poor, poor graphics – would that drive your choice of your service provider?

Int2: OK from a useability perspective, yes. I think that quality is going to drive it so if it was frustratingly slow and obviously we're used to being almost at that broadband speed at work etc. so you get spoilt and I think going too far back beyond that you tend to become

Int1: So you actually demand the same kind of performance?

Int2: Not as much but if there was

Int1: Too big a difference?

Int2: An option, if there was an option of being then the one that was getting closer. I think if you go too far down the line, yeah because it already is a step back. It's not a benefit so much. .....tossing it up. If the coverage therefore was better but quality was lower then tossing up those things compared to quality, then I'd probably go the coverage.

Int1: Yes so do you feel that that's a disadvantage of wireless service that the fact that it isn't as far as internet [covering them]? Is that one of the things that means that you really insist .....or is it more the security concern?

Int2: Just haven't had the need. So I am trying to do this now from what I would, what would be my driving forces and as I said if it was in that business sense, then security would come top of my list actually reputable company and its you know you are comfortable with the way that they transact and whatever it is that they have portrayed as their coverage in that security line and then it would be the places that I would want to use it, if that coverage ..... coverage .....security side – if that coverage was going to allow the areas I'm wanting to use it in, doesn't mean that I want something that covers all of Australia. I would be particularly looking at my common areas of use and then probably quality comes after that and speed.

Int1: OK. So would you describe whether you're comfortable with the service access facilitated by the interactivity that you use now. You can accomplish any task that you need to do, enhance the effectiveness of your job that you want to use it for, using that interactivity.

Int2: If I was using it then that would be what you would want to use it for – wanting to achieve with it.

Int1: So you don't ..... your laptop and when you're giving a lecture or a tutorial and take it away wirelessly? You just use the one that's there?

Int2: Yep..... but I don't take my laptop.

Int1: So do you feel that it's just more secure if you leave your laptop locked in your office? That you're happier with that and you really just like having the USB? I don't know if you use a USB or not?

Int2: No I don't. I don't even use a USB drive. I just access the network drive and access that through and have a floppy as a back-up but I think it is more a case of a need. OK – I didn't have a laptop to begin with when I first started teaching Oncampus and going ..... when I was in the workplace I didn't have a laptop either ..... back then so it's a case of yes, remaining with what was needed and if I was able to fulfil my role without changing, even though I got that latter technology if I didn't need to use it, it was still working fine if I wasn't having any issues with the existing – I don't use technology for the sake of it.

Int1: So you're not going to change your work practices just because you can do it?

Int2: That's right.

Int1: Yes. So considering the impact on the efficiency of data transfer of your device, do you feel there's enough managerial security protection while using the services?

Int2: I've gone to mini seminars and things on wireless security and from at that stage I know that it is a maturing area but it certainly has been raised a lot that wireless if not set up correctly is not secure and that's not necessarily meaning the provider. If and we're just implementing around a little wireless LAN at home etc. so if I was to go, branch into that, then yes, I would be checking to make sure that things that should be done.

Int1: How about because of you're using USQ as your service provider Oncampus, how would you feel about the fact that you wouldn't actually have control over a lot of those security settings? Would that impact?

Int2: No because personally because it is USQ and the only things I'm really concerned about are USQ based you know ..... confidential, then yes, I feel comfortable that if they get it wrong it's not, that's not my role. However if I was say my previous role at Heritage Building Society and if I was transacting over someone else's network, Heritage Building Society confidential information, then I would want to know that Heritage was comfortable with the quality of those services.

Int1: So it really is when you're using wireless you really want to be able to trust that the wireless network that you're using is set to your security specifications and has been assessed?

Int2: Or at least has been, yes, especially in the business sense. As I said, personally I'm not someone who is concerned about privacy issues. I don't fear having the telephone tapped or anything like that.

Int1: No paranoia?

Int2: No. So I don't have an issue there so if I was transacting myself personally unless I was .....banking details etc. then I wouldn't be concerned about my provider security necessarily however if we're talking of 3rd parties information that I'm using, then I would want to ensure that I was following their guidelines ..... Pass the buck. Its just about being comfortable and wouldn't want to expose and make that call.

Int1: So do you believe system interoperability is used – and maybe if we could think about how you would have used this in your previous well maybe you know if you'd had a PDA or a blackberry-kind of thing, do you believe system interoperability issues such as accessing the same server such as email and internet from different wireless service providers, networks and devices would have an influence on your choice of service provider or you know

Int2: Yes I think choice of services definitely. Again it would be a case of you're wanting to use it to enhance what you could do or to provide a need. So if you are able to have that interoperability so that you're not having to add those extra steps in between, then yes you'd go that.

Int1: Yes that's right so your device shouldn't add to your work?

Int2: No that's right. You don't want it to become a burden. It's got to work for you, not the other way around.

Int1: So that, you really want that tool, you want your Blackberry to seamlessly interconnect with your laptop .....

Int2: Yes and not provide frustration because oh it's down again or whatever. I think that's the other thing which is an availability issue even though it's not value added – the coverage is but how stable it is.

Int1: Yes you demand that 24 hour wireless

Int2: Because if you're going to rely on it, then you have to feel comfortable within reason that it's reliable.

Int1: So can you explain your feelings in the way different standards such as WAP, 2G, 3G, CDMA, protection management, configuration techniques and performance issues would affect the service that you have chosen or might have chosen?

Int2: I haven't got knowledge of the different

Int1: So you know 3G you can do video calls, you could browse the web on your phone or you know you could check in your emails?

Int2: OK

Int1: So the availability of those different standards. So ..... now look I really need a 3G ..... voice service and

Int2: Well that comes down to the need ..... which one enables you which because I haven't looked into it but if yes, if this is what you're needing to do to say provide the role or whatever you're having to use it for, then yes, certainly.

Int1: So how about say you had a little like a 3G phone or a PDA and you have to configure it differently to use the USQ service to using your home service, would you find that frustrating, irritating, a reason enough not to use it?

Int2: Yes, yes I think so. It's getting back to that overhead of use.

Int1: So really it can't have an overhead for you to use it?

Int2: No, no. For me it has to be a you know almost off the shelf benefit without you having to play around too much to get it right.

Int1: So could you elaborate your experience with facilitating conditions such as wireless access, availability and as we were talking before you really demand 24 hour access.

Int2: It's always got to be up ..... or within, if they say that they can have down time etc and or understand that things do go down or but it's just overall, it should be reliable.

Int1: So policies and regulations and that might be government regulations or the regulations with USQ or you know a way of restricting – have you felt restricted by any of those regulations?

Int2: I'm not someone who's for policies and regulations. I think that they're necessary for administrating and keeping things in line for those who don't want to take all the time to check out this, this, this is right. If we can be told well this policy will mean that you can be comfortable this is all being met and then know that something has satisfied that, then yes, I find that that's an advantage for the less informed users.

Int1: So and what about say a wireless service provider had some training or resources available. Would that affect the decision to use that service over another service?

Int2: For the users? Training for the users?

Int1: Yes

Int2: OK. Um it would certainly be a consideration because (overtalking)

Int1: Because ITS will actually set up your laptop to use wireless won't it?

Int2: I don't know..... But yeah, that's certainly that if it was made available as a user, that would mean then yeah I'll put my hand up for those sorts of things to feel more comfortable about the bigger picture but yes to go out and pay for training and resources, might be a bit different.

Int1: So it's really got to be freely available?

Int2: Yes. It's got to be something that is

Int1: And beyond maybe a part-payment?

Int2: Yes, that's right.

Int1: What about in a role of economic conditions like the factors if the cost of a wireless service was exactly the same price as your plug in? Would that affect your choice of using that service?

Int2: Only if it was a need and this is unnecessary risk I suppose even though I'm not (overtalking).

Int1: So would you choose the wireless .....?

Int2: Yes if I didn't need to use a wireless, yes I would probably stick with the status quo. However if it was the other stage where I was looking at setting up a new ..... new network, at that point then yes I would consider them all on an equal basis and it might be that your way out with security concerns is no more vulnerabilities .....etc and decide that the wireless might be the way to go for the future.

Int1: So to future proof your network you would definitely look at wireless?

Int2: Yes if you were looking at a change or setting up a new one.

Int1: So how about if you could get some kind of device you know like a Blackberry and it was perceived as being very cool or don't care?

Int2: No.

Int1: I just saw you shake your head then.

Int2: I'm really not interested.

Int1: That doesn't impact on you at all?

Int2: No I'm a Camry driver.

Int1: I used to be one too. OK thanks very much 'Interviewee E'. Was there anything else?

Int2: OK a barrier can also be a lack of knowledge of what it could do for you whereas I'm saying at the moment I'm not looking for it because I don't feel that I need anything better than I have now but that could be because I'm not aware of what it could do for me and what it could enable.

Int1: Although it is coming through quite strongly that you really like being able to shut your office door and walk away and be uncontactable for that time.

Int2: Or whether being uncontactable and compared to it enabling me to do things that I've got to do in a way but doing them in a better, faster way that I'm not aware of. I just don't tell people the number. I have a fight with my husband – don't give out my mobile phone number.

Hari: How about pricing policies do you think that affect in choosing?

Int2: Pricing policies. Um yeah I'm currently considering going broadband at home and so yes, I will certainly try things is something that I'm looking at.

Int1: So when you go broadband there's really no difference in price between wireless or wired. It's just the modem that you've got to buy. You wouldn't choose a wireless modem to future proof yourself in case you'll need it?

Int2: Yes I'd certainly look at that.

Int1: You know because you can turn it off.

Int2: Yes that's right because you can turn it off and so because if I'm going to do it anyway, as I was saying before it's something that's new coming in. It's not just change for the sake of change. I'm making a change anyway and at that time I will weigh up all the best options there and if it is future proofing, then I'll certainly look at that and even if that means paying more in the shorter term I would do that.

Int1: Yes because we've not really talked about future proofing as a driver have we? And really quite strongly that would certainly drive me as well.

Int2: Yes and that's probably the only thing. That's the main thing I suppose I pulled in there as being if you're tossing up between 2 things that are otherwise are comparable, would be future proofing if you don't need it now – you might in the future.

Int1: And potentially when you have capability of turning it off if you don't want to use it.

Int2: Yes and it is such an immature area that you are expecting it, like development is happening in that area so from a future proofing perspective you are expecting that things are going to go that way. That is making a bit of an assumption.

Int1: So those [protocols] are often been backwards compatible haven't they? Like you know 802.11B is sort of backwards and [more] compatible with the other ones.

Int2: To my knowledge I don't yeah I don't

Int1: I think its something they're getting at isn't it? Is looking at (overtalking) backwards compatibility. They're not saying you're going to move to a whole new network here.

Int2: Because of demand to get people to do it without having to spend all their money out again type thing. I think industry has pushed that – not industry sorry but business has pushed that. They don't like the throw away system any more.

Int1: And aren't willing to put up with that anymore. You know at one time they kind of accepted that they had to replace their PC every 2 or 3 years just to keep up but if we can't get faster than instantaneous, why replace it?

Int2: That's right, yes. No I think there has been a shift.

END OF INTERVIEW.

Interview with F

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word
(overtalking) both parties speaking at the same time

Int1: Thank you 'Interviewee F' for agreeing to participate in this research. The interview is part of the university research project ..... to investigate the end-user behaviours for their choice of wireless telecommunication services within the Australian domain. So the findings of this research will assist the Australian Wireless Service Providers in improving their quality of service and it fills in a gap in the literature. So [equal] considerations are important to Hari and myself so this research is confidential and your identify will not be acknowledged in the research project. We'd like to tape the interview for subsequent transcribing so in order to assist Hari in the data analysis. If you agree to this, at points during the taping please feel free just to push the pause button or to ask me or Hari to do it.

So we're looking into the nature and insights into end-user behavioural factors affecting the choice of Australian wireless telecommunication services so the interview will focus on wireless service characteristics such as mobility, interactivity and system interoperability and user context that have influence on the choice of wireless service in terms of behavioural factors such as attitudes, ease of use, usefulness, intentions to use and the wireless trust environment.

So if we can just get you to turn the page and just sign that you agree to participate in the research there 'Interviewee F', that would be great.

Int2: What's the date?

Int1: It's the 24th and then maybe if I could just sign it too. Now please feel free if you don't understand any of the terms, just ask.

Int2: And that may happen.

Int1: That's fine.

Int2: I'm not technologically oriented.

Int1: That's OK. Could you just fill out the demographics and a little bit of your usage experience? It just gives a background to the research so we know what you're using.

Int2: You only want me to tick one of these occupations?

Int1: Well you could tick more than one couldn't you Hari? You could tick more than 1 occupation because obviously 'Interviewee F''s a student and a manager.

Int2: So that's the demographics completed.

Int1: So if you could just fill in the next bit about what types of wireless services you use.

Int2: For other, if I access university databases

Int1: Through your laptop, wirelessly?

Int2: Put that down?

Int1: Yes, that's fine.

Int2: PC you mean laptop, is that correct?

Int1: Yes anything with a wireless card.

Hari: ....using USQ ..... here .....

Int2: Oh OK as well?

Hari: Yes

Int2: I use both. With the cost I really should look at the combined cost of my mobile phone and my broadband which is about $130 over a month I think. Do you want per month?

Int1: Yes if you could just write in next to it so that we know it's monthly. That's great. Just month.

Int2: Both at home and at work. With my laptop its .....any specific places with my mobile phone its anywhere.

Int1: That's OK you can just in general so you know both home and at work.

Int2: Yes .....and at the university, yes.

Int1: Yes so we're really just talking about what where you access the service.

Int2: And my friend has got wireless at well so I go to their place.

Int1: Yes so you know that's both at home, at work and other maybe friends.

Int2: Used as wireless service – OK. For my mobile I've used it for a long time. For my laptop I've used it for 12 month. How do you want me to relate to that?

Hari: .....

Int1: You could just write

Int2: 6 months to a year is laptop

Int1: Yes

Int2: Over 3 years is the mobile.

Int1: Yes, that's great thanks 'Interviewee F'.

Int2: Gladly. Number of years been accessing wireless service? More than 3. Mainly on my laptop.

Int1: Yes.

Int2: Very comfortable. Very satisfied with what I need it for at the moment.

Int1: OK. We'll just go through a couple of little pieces of terminology. When we refer to mobility we're really talking about the coverage. So it refers to the ability of the users to access defined services from any terminal in the network while maintaining their personal environment settings. Interactivity refers to the capability of wireless devices with a suitable interface design to access wireless services with convenience and ease of use. System interoperability is the ability of different wireless services and application services to communicate, to exchange data accurately and consistently and to use the information that has been exchanged. So it might be say you had a PDA you know that interacted with your wireless laptop and the applications you could do some work on your PDA and that would go straight into your laptop – that's the kind of thing we're talking about there. The user context refers to the end user environment factors such as facilitating conditions, social influences, economic conditions and cultural differences.

OK so can you just explain how do you select your wireless services and what sort of characteristics influence your selection or preference?

Int2: OK so by wireless services are you talking about provider?

Int1: Yes

Int2: OK well probably I fell into it more than selected it because I think we had Telstra as phone normal telephone line provider and then we before I got wireless I got internet connection through Telstra and then I went from dial up connection to broadband through Telstra.

Int1: OK so you sort of trusted them to provide that service and you let that .....through?

Int2: I did and I was under, I had the perception that they provided a broader coverage than other providers that I could not provide coverage everywhere but provide it in a greater geographic expansion localities than any other providers.

Int1: So your ability to move around ..... you thought that that was pretty good with Telstra?

Int2: Well probably better. Not exactly – good, but not excellent and better than the other providers.

Int1: But you thought it was better than the other providers? Was there anything else that would kind of stop you moving to another provider that Telstra provides? Or is there something that Telstra does that would drive you to make a choice to another service provider?

Int2: Yes there's not a lot that Telstra does that would stop me from moving elsewhere other than my own lethargy in getting up and doing it. One of the things that I find Telstra doesn't do is remain competitive in pricing where other providers do and in fact I have been thinking without actioning of ....[cannibalise] because I notice that service costs are being reduced and reduced but not that Telstra doesn't stay at that level, you know? So if anything prompts me to move it would be reduced costs.

Int1: And would you look at the mobility and whether they were reputable when you moved as well or would you just look at costs?

Int2: No I'd look at reputation to a certain degree because there's no use me changing I think, no use me changing to another provider if they're not going to be there in 12 months time. So they'd want to have proven themselves in being in the market for a little while.

Int1: But like is a static email address an important consideration in not moving?

Int2: It hasn't been but it's becoming so to the point now where I'm thinking of getting, maybe getting a Google address so it doesn't matter what provider I go to, I maintain that Google email address. One of the things, in fact one of the things that stopped me from going to another provider was the name of the provider because I've got a business – I run a business so I have bigpond.com which doesn't sound too bad. But I didn't really want my business email address to be at Dodo. I mean it just sounds a bit immature.

Int1: And so you felt that was really aimed at the residential market?

Int2: Yes possibly, yes.

Int1: That that didn't .....

Int2: Well it didn't seem to be aimed at the professional area, no.

Int1: OK so would you explain how does the coverage and real time connectivity of your device and network affect the usage or preference for using that service?

Int2: Well once again I think Telstra provides a wider coverage than most other users.

Int1: So the fact that you have that broad coverage, has that really impacted on your ability to do your work?

Int2: Not yet but that doesn't mean to say that it won't in the future. I'm now thinking of upgrading from my mobile phone which is a sort of standard ..... it can do email which I've never done but to one which incorporates like a mini PC as well. (Choice)

Int1: So like a Blackberry?

Int2: Something along those lines and if I do that and then start utilising it not only for voice and SMS but for data transmission in the way of Word or Excel then I'll want greater area coverage and I might find that then I'll start appreciating Telstra more for their wider coverage than I do at the moment.

Int1: So let's say you move to something like a Blackberry. What kind of things would you actually look for in that device?

Int2: OK. Generally I find, and I've done some research on it over the last couple of months that the higher end products all offer reasonably the same services. The one I'm looking for that I find is reasonably scarce is the ability to write on a touchpad and have it transcribed into printing. I've seen it one.

Int1: And you want that to be able to automatically sink back into your laptop?

Int2: Well it could either automatically sent back or I could download it later. As long as I could get it back

Int1: But it has to be compatible between your laptop?

Int2: Oh well it would have to be or I can via email. If it's not compatible in so much as – it's got to be compatible that if I'm putting data into Microsoft Excel then I've got Excel. I mean that's got to be compatible. It's how I get it from there to here that that's the problem and if I can't do it via wirelessly which I should be able to in the form of sending a, transmitting a document via email then I'll have to just download it with a call.

Int1: So and would you consider that the mobility or the coverage, the ability to work anywhere you want to has an impact on the performance of your task, your productivity or your intention to use your service?

Int2: Yes. At the moment other than with my laptop I'm really restricted to areas that my laptop has access to. I have a wireless LAN in my house so I'll be stucking anywhere in my house. My friend has a wireless LAN in her house so obviously I can go anywhere in her house so here at USQ it's the same. Down at Griffith it's the same. But other than those 4 areas most other, there's not a lot of areas where you can go to and just sit down and know you've got wireless connectivity.

Int1: And how do you feel if you were somewhere and you had a spare ½ hour, not enough time to go home to work but you had ½ hour that you could work but there was no connectivity? How do you find that?

Int2: Um it's probably a little bit frustrating but not totally. I mean I don't know of too many situations where I would need absolute instant access. There are a lot of situations where I would need eventual access so if I had to write a report, do some calculations, then I would just have to save it and download it later or send it later if I didn't have the access at the time which is one of the reasons why I want to go to this mini computer type set up with the phone because it will access anywhere whereas my laptop won't.

Int1: .....access is like (overtalking) doesn't it?

Int2: .....(overtalking) I think I can pick up one from Hong Kong for about $600.

Int1: Almost pay the price of your fare.

Int2: Exactly.

Int1: So what's your opinion in the way that you interact with your device and application? So say you were using your Blackberry and it took you a long time to scroll down the pages, you had limited resolution, or poor graphics, slow on information retrieval, loss of information while using the services? How would that impact on how you felt about that?

Int2: I'd stop using it, full-stop.

Int1: You'd stop using it?

Int2: But I'm not technically minded. If something goes wrong with my computer or my phone then it stays wrong because I can't fix it so I have to rely on technology of the instrument as it is in order to do what I need to do.

Int1: So it needs to be quite intuitive?

Int2: And it needs to be reliable. It can't be slow you know because everything else is fast paced around you so you know no one's going to slow down while you say can you just hold on a minute while I scroll down here. I'll be 5 minutes just sit there. They're not going to do that.

Int1: Yes, so you just wouldn't use it?

Int2: I wouldn't use it. I'd find another method.

Int1: So have you had any experience with those kind of using interactivity like even how you interact with services on the net when you're using wireless at home or here?

Int2: In what way sorry?

Int1: Like with your laptop.

Int2: Have I had any problems in accessing?

Int1: Yes

Int2: Oh there's always problems, some problems will crop up in some areas. I think unless it's a major concern, unless it's really stopping me from doing my research or downloading some business applications for my business, unless it literally stops that, then it's not going to be a big concern to me. It will be annoyance and I might go later and find someone who has more expertise in this area and ask them to resolve the problem for me but other than that I'll just keep trudging on and maybe go in a different direction.

Int1: OK. So it would actually impact on it?

Int2: Yes.

Int1: So would you describe that you're comfortable with the service access facilitated by the interactivity you can accomplish tasks and enhance the effectiveness of the job that you're doing as expected using that interactivity option?

Int2: Yes in fact ever since I bought my laptop you really get a level of freedom that you didn't have before because you're not constrained to finding something that's tied down by cords somewhere you know you can sort of – like I can come here, I can go almost anywhere at this university. I'm not constrained to having to go to the library and having to sit in place and wait for one of the static PCs to become available. I can open up the laptop and sit down anywhere and get access to USQ. I can get access to Griffith through USQ or down at Griffith I can get access to Griffith anywhere so yeah the level of freedom that's come in, I feel really comfortable with it. In fact it would be like mobile phones, I know at some stage I never had a mobile phone and I must have lived but I don't know how I could do it now. You know it's the same with my wireless laptop. I don't know how I'd get on without it now.

Int1: And potentially in your job if we look at your research as being your job it really positively impacts on that job.

Int2: Oh 100%, 100%, yes.

Int1: So do you believe that system interoperability issues such as accessing the same service as email and internet on different wireless service providers, networks and devices have an influence on your choice of services and how?

Int2: Well I haven't noticed any impact.

Int1: So now let's say I know that the devices you're using now probably you don't have those same kind of issues but when you use a Blackberry do you find, or do you think that it's really got to be (I'm trying to put it in a non-technical way)

Int2: Please do because I probably won't understand it otherwise.

Int1: It's really got to be a seamless connection between your Blackberry and your laptop to make that really effective for you?

Int2: Exactly, exactly because I don't want to notice the problem.

Int1: It's got to be transparent for you?

Int2: Yes I'm not a technician.

Int1: Yes

Int2: You know I just want to press a button and have it work.

Int1: OK.

Int2: Perfectly you know so and I haven't noticed any problems yet but that could be coincidental. Maybe everywhere I've been the providers have been the same providers I have and there's been no problem. Maybe I haven't been anywhere where there's been a different provider. I don't know.

Int1: Do you synchronise your mobile phone and your laptop, you know your contacts or anything like that?

Int2: I haven't but I haven't had the need to either I guess so mainly because – I probably will do as I say if I go along the Blackberry or whichever one I go to I think there will have to be some sort of alignment. You know when it really becomes interconnected, when there's a lot of interconnectivity, then I'll probably need to look at it then.

Int1: Have another [draconian] look, personal .....

Int2: Maybe.

Int1: Considering the interactivity and efficiency of the data transfer of your device, do you feel that there's enough managerial security protection while using

that device? So when you're using a laptop and you're maybe you were sitting in the library and you want to do some banking, do you feel quite comfortable about accessing your bank details through the wireless?

Int2: You do, I do, you do initially through ignorance I think and then as your experience gives you or decreases that level of ignorance you probably start being concerned more about security for instance it wasn't that long ago that I walked into the library, sat at a desk, opened it up, logged on, opened it up, turned it on and then logged on to USQ and the instant I logged on my Norton came up and said you're being attacked. Someone's trying to get into your computer. The very instant I logged on to USQ. I thought oh what's happening. Who's doing this to me and why is it happening through USQ? I want some protection. So then I started looking at being a bit concerned. With my own household LAN that I've got installed I've got security installed so that no one can access it other than if they've got the code.

Int1: So do you feel like you may be more of a target when you using the USQ service?

Int2: Well there's got to be, it's a focus area for a start. There's got to be a lot of IT students here who might think oh I know what we can do and then go ahead and do it so perhaps only because of that I might find myself a bit more of a target.

Int1: Do you fell maybe more comfortable at home because it's under your control?

Int2: Mmmm, I don't say I feel more comfortable because you tend not to think the control aspect of it while you're doing it. It's just there you know and I tend not to think about the lack of control or control at USQ until something comes up that says your computer is being attacked. It's in the back of your mind before that. I think all I can do is keep up the security software that I have – keep it updated to make sure that nothing happens.

Int1: So can you explain your feelings in the way of different standards and that's like WAP, 2G, 3G, mobile phones? Do you know about those?

Int2: Oh a little bit.

Int1: Or CDMA? You know the type of network that you use protection management and configuration techniques and performance issues affect the service that you've chosen?

Int2: OK well CDMA, as far, I can only go on what my knowledge is which is fairly low level when it comes to IT but I think CDMA relates to coverage in rural areas more than anything and I'm not a rural person. I stay out of rural areas as much as I can so I don't feel the need for CDMA right.

Int1: So what about 3G?

Int2: 3G I find out about 3G which from my perspective I think is like video connectivity between 2 different units. That's about 3G level is it?

Int1: So yes you can make a video call ..... (overtalking).

Int2: Exactly and ..... got the same .....

Int1: It's that interoperability that we were talking about before.

Int2: Right however and I've looked at it, but I find that it's not something that I need at the moment and not only that, but I've heard so much talk about 4G that they were passing 3G, I'm not sure what 4G is but if its close, I'm not going to be bothered with 3G. Alright? It's sort of bypassed me too quickly to worry about.

Int1: Yes so you just feel that it's irrelevant.

Int2: Irrelevant to me.

Int1: Yes

Int2: Irrelevant to me. Same as if I've got a mobile phone that says you can download 3000 songs from phone- I'm not interested. That's not where I'm coming from. It would be something my daughter might be. She's 22 or my friend's daughter who's 16 might be interested in that sort of software on the phone but I'm not.

Int1: You're just not interactive.

Int2: It's all business related.

Int1: That's right. So if there's no business focus

Int2: Yeah I'm not interested really.

Int1: So can you elaborate your experience with facilitating conditions such as wireless access, availability so you know the ability to always get on the network, the policies/regulations, maybe the USQ policies, training and resources that are available, training and resources are available? Security and legal protection as you interact with your wireless services?

Int2: OK that's a lot of different things in there.

Int1: It is. It's OK we can take them one at a time. How about just wireless access availability? You know the fact that you can always get onto that network.

Int2: Well it has to be because I can come in here and say if we're talking about the access at Griffith or the access at USQ, I can be there at 8:00am in the morning and not leave until 9:00pm at night and I have to have access during the entire time because that's what I'm doing. I'm studying, I'm accessing

databases, I'm accessing it through my laptop. So that wireless connectivity has got to be there. Is that what we're talking about?

Int1: Yes.

Int2: At home obviously its 24 hours.

Int1: So it's always on.

Int2: Always on and at my friend's place it's 24 hours.

Int1: And so you just haven't had any experience where the networks down?

Int2: Not, I've had experience where elements of the network have been down but not, it hasn't affected me adversely so maybe you can't get in to see your results this semester. I don't care because I'm accessing the library databases.

Int1: So and so that hasn't really happened to you?

Int2: No.

Int1: How about do you find the policies and regulations of using the wireless service like at USQ here, do you find those restricting or they don't trouble you?

Int2: No in fact I probably don't know what they are. I don't know what USQ policies or regulations are. I just come in, open up my computer, turn it on, I get access.

Int1: Yes.

Int2: Obviously you have to be registered student and if you're not, then you're not going to get access so that would be the only regulation that I know about and I've had no problems with them, yes.

Int1: OK so it doesn't matter really. Then how about training and resources? Have you had access to any training or resources? Would that affect your choice of service provider?

Int2: No. It's the sort of thing you learn by doing it I think rather than training. The only problem I have is it's a literal connection. When I got, when I bought the laptop obviously you then have to have the connectivity to the USQ site and that's inputting maybe IP addresses or whatever – I had no idea so I had to go down the computing department here and get them to do all that. So that's inputting and they said to me you've got it – go away so I was able to go away and that was it.

Int1: So really that was a resource that they provided that they could actually set it up for you.

Int2: Yes and it was a resource that I would have had problems if I didn't have it, yes.

Int1: So have you had any impact by the government and regulations?

Int2: No. Probably and I hope next, probably I mean the government bought out and I don't know if its related, the anti spam legislation which I think was tremendous. Unfortunately so much of the stuff comes from overseas that it isn't affected by Australian legislation so you know I probably get 3, 4 or 5 emails a day that are unsolicited and I really don't want but that's the only legislation that I can think of that has anything at all but as for wireless legislation, I don't know of any.

Int1: So what about, can you explain the role of the economic conditions, cultural differences and social influences such as image, education and other influences on your preference usage? Now what we're really asking here is maybe would you choose a service like 3G because the phone was cool, because it was just new out, because it was, you were going to be the first one to have that kind of connectivity?

Int2: OK obviously if I'm going to carry around a wireless device, I don't want it looking like a brick, right but on the other hand I wouldn't pick something just because it looked cool if it did not have the services, resources and facilities I needed.

Int1: But would it kind of affect your decision to choose that phone over another phone or that service provider over another provider because they were offering that kind of device or that kind of service you know the ability to read emails on your phone or?

Int2: Oh yes. If I had, well if I had 2 phones and if we assumed that they had, if there were 2 providers and 2 different devices and these devices and this is looking at it from a different perspective, both devices did exactly the same thing, all of which I wanted and needed but this one is like a brick and this one looked really cool, I'd probably go for the cool one right but on the other hand if one looked really cool and one didn't look so cool but the not so cool one had everything I wanted and the really cool one had minimal but I could download 3000 songs which is irrelevant to me, then I wouldn't go for it. I would go for the other one mainly because of the business applications and I've thought about that because when you start looking at these mobile phone, PDA combination things, they're not small by any stretch of the imagination you know so you lose a bit of that coolness but you're going for the business application.

Int1: But you get to say you've got a Blackberry.

Int2: Who am I going to say it to? Half the people don't care.

Int1: You see you just don't hang around the IT bar enough.

Int2: Obviously.

Int1: OK I think that's great, 'Interviewee F', thank you very much.

Int2: Finished, superb.

Hari: How about economic conditions?

Int1: Economic conditions? Oh sorry I thought we'd covered that. Just about you know the cost of the service. Does that really have an impact on your decision?

Int2: Not, it probably could have. It depends. If I had 2 different providers both of which were reputable, both providing the same coverage but one had a significant advantage in cost, I might go for ..... Not that I mind, I wouldn't change to save a couple of dollars.

Int1: So at lets say you know you're with Telstra now so you're probably paying $29.95 for a 200meg download and there's another provider that you could maybe pay $40 but you would have like a 10G download limit, would that affect your choice?

Int2: At the moment it wouldn't because I am with Telstra and if 200meg download is the limit and I don't know, maybe it is – it's sufficient for me. I haven't yet got to the point where I need to start looking at increasing the download. I might do in the future in which case then I'd start looking you know. At the moment because I haven't needed it, it's sort of like I don't go out and buy a Ferrari because I don't need to do 160klms an hour. In fact if I did, I'd get fined so I'm quite willing to settle on something that does 100klms now. So I'm quite willing to settle on something that gives me 200meg download because I haven't felt the need to go above that level.

Int1: OK so the cost does definitely affect your choice?

Int2: Oh the cost could affect my choice.

Int1: Yes that's a better way of putting it. OK, thanks very much 'Interviewee F'.

END OF INTERVIEW.

Interview with G

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word
(overtalking) both parties speaking at the same time

Int1: So the findings of this research will assist Australian wireless service providers in improving their quality of services and it fills in a gap in the literature. So [equal] considerations are important to Hari and myself so this research is confidential and your identity will not be acknowledged in the project at all. We'd like to tape the interview to assist us with data analysis later but please feel free just to ask me to stop the devices or just to reach forward and push pause yourself.

Int2: No, that's OK. I don't have nothing to hide. I'm a family person so my family's viewpoint also sometimes come in.

Int1: So Hari is looking into the nature and insights into end-user behavioural factors affecting the choice of Australian wireless telecommunication services. The interview will focus on wireless service characteristics such as mobility, interactivity, system interoperability and user context that have influence on the choice of wireless services in terms of behavioural factors such as attitudes, the ease of use, usefulness, intentions to use and the wireless trust environment.

The term wireless services is used in the general sense and simply refers to a set of terms or functions offered to end users devices using wireless interfaces and networks when requested. The examples of wireless services include personal messaging services, voice video streaming, multimedia services, transaction oriented and business solutions. Can I just ask you to sign that you agree to those? Just up the top there and it's the 24th today, and if I can sign it as well, then it's all finished. Now over the page there are some demographic information and some information on just what type of services that you use. If I could just ask that you fill that in there as well? So you could put 'Other' if you wish to, if you like. So if you could just make a note of which service you do actually use.

Int2: OK the Digiplus service because the reason is they're cheaper.

Int1: Yes I think that's the same as aaNET.

Int2: I don't know aaNET yet because we just got into Digiplus .....

Int1: So and what about USQ? Do you use the USQ?

Int2: Yes I use it here for everything but when I go home to ..... I use Digiplus.

Int1: So maybe if I could just get you to put USQ beside that as well.

Int2: OK USQ. (talking to himself whilst completing form – did not transcribe).

Int1: And there's just some demographic information up the top there.

Int1: OK. Now you're welcome to read along with these questions as I say them. It just helps you understand them. If we can just quickly run through some terminology and how it's used in these questions. Mobility refers to the ability of the users to access defined services from any terminal in the network while maintaining their own personal environment settings and we're really just looking at coverage there. So interactivity refers to the capability of wireless service devices with a suitable interface design to access wireless services with convenience and ease of use. System interoperability is the ability of different wireless systems and application services to communicate, to exchange data accurately and consistently and to use the information that has been exchanged. User context refers to end user environment factors such as facilitating conditions, social influences, economic conditions and cultural differences.

So the first question is can you explain how you select wireless services and what sort of characteristics influence your selection or preference for one service?

Int2: Because I'm a family man so I live within a budget so I live within a budget because I can't claim anything from my tax as to computers. Those things, budget is the main consideration unless trying to find out for my wife which is cheaper or which is reasonably OK. Not the cheapest. Cheapest would/might backfire because after a certain number of bytes or kilobytes because of [all the extra charges is given].

Int1: Sorry keep going 'Interviewee G'.

Int2: So as I was saying the prices depend but it depends on the company also because sometimes they just shut down in a few months after they've come into business and we have experience also, that it's cheap but it just disappeared. So and so we say we want to spend $50 or $52 around that because it comes together – all the computer, plus the telephone bill comes together so if we say $52 a month or so and no extra bills, then we know where we stand.

Int1: So cost is a consideration but it also has to be a reputable service that has longevity in the market?

Int2: Yes see like the Digiplus has been around but we didn't know very much until they'd been advertising but we do not keep changing for example to do with other companies yet because we do not know them very well – perhaps in the near future.

Int1: So the fact that you can trust that that service provider is going to be there for a considerable time in the future is important to you?

Int2: Yes.

Int1: Is there anything else that would affect your?

Int2: One likes the ability to download and also to get into the system at a reasonable speed of time – not too slow.

Int1: Yes so you also want (overtalking) characteristics as well?

Int2: Yes because we don't want to sit 1 hour at the computer when it comes in very slowly that with big files spending all the time or because sometimes even my wife or me sometimes we want to go down to the computer late. When we start at 9:00pm at night we do not want to finish at 1:00am in the morning so when it comes through faster it's alright.

Int1: So could you explain how the coverage in real time connectivity of your device and network affect your usage or preference for one service? So the coverage, yeah your ability to move around and still be in that Digiplus wireless environment or in a USQ environment?

Int2: Oh USQ because it's limited amount of bytes and so forth for students so sometimes its a bit difficult to check everything because it cuts off before one has gone and researched or before I've read all my own emails and sent off replies. Sometimes some people write long emails to me so I have to think and write back letters. A friend she is going to get promoted so then I've got to write a congratulations letter or something like that so it takes a bit of effort. So sometimes always takes too long to reply so in between it cuts off .....

Int1: Oh I see because it's inactive for that

Int2: Oh yes and all though I keep typing but the number of bytes also you know are really a ..... limited amount.

Int1: Oh I see

Int2: Yes so it cuts off sometimes I get too many emails and stuff like that. Attachments from other countries but the good side at USQ is there's a lot of you can say empty ..... in between so if there's anything wrong at least it says, a sign comes up saying "Do not open this".

Int1: So you quite like the security?

Int2: The security of it is very important here but in my home I've got to buy ..... security and put it in.

Int1: So when you have a look at it when you are choosing which service provider to use, would the coverage area does that affect which one you're going to use?

Int2: Well yes to buy extra security because sometimes when it works too slow then we alert ourselves maybe there's a bug in the system that's making it work slow because sometimes it goes slower and slower .....too slow then the user will say .....maybe there's something or it's got a bug. It's happened before.

Int1: So do you think that your ability to be able to carry around your device like maybe your laptop – do you use a laptop?

Int2: Oh not presently because I'm using the facilities here so I feel I don't have to spend $1000 for a laptop.

Int1: What about a PDA?

Int2: PDA yes, I used to use but then it just, ... dropped it into the water and that was the end of it so presently I'm without but everyday I ..... I check whether its 5 minutes or 10 minutes to see if there's any lectures in the system. If anybody sends me any important emails or things like that. It's just important because I don't want to get, don't want to read the same emails in the library as well as on my ..... as well.

Int1: So you actually get on the phone?

Int2: Some messages I get from the phone. Some but my phone is too old you see so I need to get some new electronic phone.

Int1: So do you feel that the coverage though that you use, that that has impacted you know your ability to move around the house maybe you use wireless in your house?

Int2: In the house yes, but of late no, I don't. I use it in the Gold Coast because that's where my family stays so I know what's going on. I do know what's going on if they say something's happening in China, I say yes, I know. Or this has happened in another country, I say yes because I'm with it and also I'm interested in certain programs on TV which means I buy ..... to get more ....., to get more idea what's going on.

Int1: So but do you find that your ability, the coverage has affected your ability to do your job?

Int2: In the positively, yes. In the positive it's given me more ideas, more knowledge so I find that yes, I'm learning faster, I'm thinking better because as people get older, sometimes they start to think slowly. Some people want to think fast because I am doing the opposite way. I think just always looking on the bright side but technology can help us so whether we want to try to adapt or push ourselves to get more technology or to understand more.

Int1: What's your opinion of the way you interact with the devices and applications such as you know if you have to do lengthy scrolling of pages and that took a long time, there was limited resolution or poor graphics on the device, slow information retrieval or loss of information while using the services – have you had any experience at those kind of things?

Int2: Yes sometimes it happens because some ..... are too old and sometimes if I'm too long on the computer it gets a bit slow.

Int1: And how do you feel when that happens?

Int2: Well just like anybody else sometimes everybody gets a bit angry or confused or a bit impatient as well with technology but its better than not getting the information but I try to do my level best so I say oh well I might switch off and try again tomorrow you know instead of losing sleep over it and because tomorrow is another day and as we live, we try to do something positive. So ..... today, I say OK, I'll try tomorrow or if worst I try to get a friend to help. If worst ..... I should look for any help then someone helps me so.

Int1: But if that performance is down from what you expect would that say that you wouldn't use that service?

Int2: If it's down today and I can't

Int1: Or would you wait until instead of using a wireless service, would you wait until you could get to a wired service?

Int2: Yes if I could because the only way to learn is to keep asking others how can you do it – can you help me so if I don't have information or I'm not available to asking any lecturers or so or even ..... I ask somebody and ..... keep asking until along the line I get some information or someone will say I've got something else in my house – do you want to come and use? And so it makes it easy. It's one reason to have a good network of friends you know.

Int1: So can you describe whether you're comfortable with the service access facilitated by the interactivity? So we're just talking about how you interact with the device here or the system to accomplish tasks and enhance the effectiveness of your job. So wirelessly, you know if you're logging into the library databases are you comfortable with that service access, wirelessly?

Int2: Well yes and no because when I'm comfortable I can keep going but sometimes I get stuck so I've got to ask someone like not just switch off and go off. That's a bit drama I think so ..... this is a learning institute so I am learning to be better for future. If I give up then later when I start working I might give up while working you know so the only way if I cannot get it done, I try to ask someone and if advice is shut it down and try later, then I follow.

Int1: So but do you find it frustrating?

Int2: Sometimes yes.

Int1: And would you say I won't use that service because the level of interaction that you get from them isn't good enough – I'm going to go and wait until I can use a wired service even though it's not mobile? By wired service I mean like

Int2: Yes like plug in service, yes. Ah not actually. I am trying to challenge myself so sometimes if it doesn't work I try to do it. Yes if I couldn't get a wireless, if my wireless service is out, then I will look for a wired service but I wouldn't just give up and say no I won't do it anymore.

Int1: So you would persevere?

Int2: Yes because time is all we have. If it's ..... later sometimes that new technology comes in, it comes in. Since I've been overseas working I've seen that other ..... all try to do things in around about way so perhaps I should follow them or learn from them.

Int1: OK. Considering the interactivity and efficiency of the data transferred to your device, you know how fast those pages are downloading or how fast you can download something, do you feel that there's enough managerial security protection while using the device?

Int2: At USQ, yes. It will come up and says "not allowed" or it's a site which is not for studies like adult sites which are not for studies. Sometimes I just log in because somebody else sends me ..... its gone into junk mail so it just could be from a magazine but it's not allowed such as maybe you know readers confessions or something so I just log in to see what that says – not allowed you know. You know so well I think for uni, security is there, yes.

Int1: So what about at home?

Int2: At home because some of this services provided, they don't have a proper ..... but free ..... it's not free because it's been my own experience and also that in books and magazines people just log in, sometimes a bug comes through at the same time. So the wireless had to ..... so I've been told at home not to do it because we've, well if a bug comes in then the whole system ..... You know so we have to spend another few hundred dollars.

Int1: So you're actually happier using the USQ system because of the security?

Int2: Yes the more security and also it searches ..... I'm not going to get anything hidden. Yes, more security, yes.

Int1: So do you believe system interoperability issues such as accessing the same service such as email and internet from different wireless providers, networks and devices have a choice of your services? So here we're looking at being able to use your mobile phone and a PDA and a laptop and all have them

being able to work together so you're not doing something on one device and then something on another device so that the same thing.

Int2: Well it depends on the level of the job, what jobs people are doing because some people they can't live without their machines the reason being that they have to take a PDA when they're going off camping. .....

Int1: So but would you find that would influence your choice that you had that ability to interact with other devices?

Int2: For me personally, no. I would say if I don't have a choice its better because if I was into a forest camping or I was going to ..... for 3 days, so for ..... get some air and do some meditating I think I don't want to be disturbed by any device. If my company closed down well it's just too bad but I do not want to be disturbed because that's a bit of personal space.

Int1: So do you update your contact list on your computer off your mobile phone?

Int2: Oh no I don't because my phone is too old so it doesn't.

Int1: Would that be something that would drive your choice of service provider if it had that kind of capability though?

Int2: No it wouldn't because my phone is cheap so the reason because I am a full-time student so if the company I was working for any company ..... if they say they are willing to pay ½ the cost of this because that's new technology, yes so and also in a way it also helps the next generation because if I'm doing the right thing at home well my son will follow the same. So that you're doing the right thing so yes I think I would also like to have the same so that means the technology is being learned faster which means there's less of a generation gap and less problems at home.

Int1: Can you explain your feelings in the way different standards so we're talking about WAP (you know wireless application protocol), 2G and 3G, mobile phone services, CDMA, protection management, configuration techniques and performance issues affects the service that you've chosen? Would any of those impact on your choice of service providers?

Int2: Yes I would say so because they all be different and like CDMA, in China I noticed that's a lot of influence of CDMA and so you know sometimes you get influenced by new technologies and so forth but whether I'm using it – its something like buying a radio, yes I can get Russia but I don't listen to Russian so if ..... but in Australia the down side is management has the, you know they have all these ideas of many ..... have the right to raise the prices up to sometime ..... conditions but that is not a good side of it. This is ..... I'm living here for many years ..... if management has the rights to raise up, I would not be able to save ..... so to be on the safe side of life I don't want to get more bills so I stick to the basics. Otherwise I would be quite happy to get all this but unfortunately after a few months they keep raising the prices. The bad side is they insist if they can try to get a credit

card number so that they can take our funds and I wouldn't be aware, you know. So that is what I'm afraid of because I'm not keen on too much of this reason being I don't want to get bogged down so that I'm paying out so much but I'm not able to save so because

Int1: And you're not using those services?

Int2: I'm not using those services and one has to keep up with the technology. I might have to go to extra classes to learn more or TAFE college because I want to get more technology.

Int1: Say Telstra offered 3G mobile phone coverage in Toowoomba, would that actually affect your choice of maybe using them as a service provider?

Int2: Oh not Telstra. Telstra

Int1: I was just saying that as an example. You know one company says we're going to use 4G in Toowoomba.

Int2: For me I would not go for it. The reason being I don't use the presence of that service but if there was a need, I would say yes. If there was a need, the company I worked for ..... said yes you're doing it, I said OK then, how can you help me? How can I help you? Yes.

Int1: So something actually has to push you into using that new service? Its not something you're going to choose to do on your own?

Int2: There must be a reason behind it. If my company wants me to do because I want to travel around the world which means it's a bit of an anti-Australian attitude sometimes because Australians believe we must go around the world when you're young and then they go around the world again when they're old. But what about middle years? So my ways, yes I want to have some money all the time so I can keep travelling so if I spend on all this I would be quite broke.

Int1: So you have different priorities – that's not a priority?

Int2: Yes, one priority is to have this wealth as you know so I'm honest. If you give me a choice of getting 2G or buying a great big bottle of vitamins, I would take the vitamins instead.

Int1: So can you elaborate your experience with facilitating conditions such as wireless access availability, you know it's always up, policies/regulations, training and resources, security and legal protection as you operate that wireless device or interact with that service provider? So you know even if we just look at wireless access availability to start with, do you have any experience with that, you know the service being down?

Int2: Sometimes it's been down in different areas, yes because I even heard that somebody bought some other ..... devices in Brisbane, they went up to Roma,

they couldn't use it but they've paid for it unfortunately so I listen to this whole story and I think there's something wrong with the system. It's a bit difficult to know off the top of my head but yes, I am quite willing to understand but the trouble is sometimes they've got regulations which don't make quite a lot of sense sometimes. Regulations they sort of you know make us dependant on them.

Int1: So it that service provider regulations or government regulations?

Int2: Oh sometimes you know like government regulations. Like if I want to take something off SPSS and be able to use it in class or something like that, the regulations say no, this is copyright of SPSS and you've got to get permission before it can be used. It might take too long. So if I'm studying .....what's going on in Solomon Islands and things like that or East Timor then I ..... to take it off and use it for class and say yes, we are doing this.

Int1: Do you find though that those copyright restrictions?

Int2: Yes, yes the problem's like that because it's too slow. If I wish to phone them up or write to them and say I want to use this, and that is too late sometimes.

Int1: So what about if a service provider offered training or other resources, would that drive your choice towards that service provider?

Int2: Yes, yes

Int1: So like an online training?

Int2: Yes if somebody gives training, why not because some jobs they give training before people take their job – but not all but I've come across, so and then they did the training but the didn't really sign for the job because they saw the training was good. But when they were ..... getting the job done itself, it's too difficult. So yes, but if they're willing to train, why not?

Int1: Yes so that you're positive, (overtalking)

Int2: Because the training, they've got to pay for training you see otherwise any training they go for even if I go to TAFE College, yes. So if they're willing to train, yes, why not?

Int1: So what about security and legal protection as you use your wireless?

Int2: For me because I keep an open mind. Sometimes people say the knowledge is there but we cannot download it or we cannot use it. I said but if the knowledge is there, then we should be able to use it because knowledge belongs to them then we can't, it's difficult to teach others so life is a bit more practical than anything.

Int1: So you think knowledge should belong to everyone?

Int2: Oh up to a point, yes. But I say you can't give too much free knowledge away also because for example, medical procedures, you can't be giving the new way of doing things to another country for free so up to a point, yes. As long as its quite harmless knowledge, yes.

Int1: So what about, can you explain the role of economic conditions, cultural differences, social influences such as image, education, or other influences? So let's say you were able to have a device within your budget that was the latest device out that nobody else had really got. Would you find that very attractive?

Int2: Because in my opinion, this is honestly, I've gone through this situation myself. The difficulty is in buying this which is very attractive to show that yes, I've got something new which is very good. But the problem which comes in is after sales service. If there's nobody in the town of [Toolbar] which can fix it if it doesn't start or it doesn't work, then who is going to fix it if it doesn't work you see. It might be because of the warranty but the workshop would be in Sydney and within the small writing regulations they'll say yes the owner or the user must take it down so I have to spend quite some money sending it down to Sydney to get it fixed. That is why, not anything else because I've lived in Darwin before and they said it can't be fixed in Darwin. So they expect me to do so then I must send it down. I said if I send it down to even to Brisbane from Darwin its too expensive to fix it.

Int1: What about education? Say that you had been educated about a new system like the benefits of 3G mobile phone coverage – would you find that was a proviso to you adopting that service?

Int2: Yes if, it would you see I would always think of usage even at work. If there's a chance of being used at work at least then the company or ..... whichever agency I work for, they would have a hand in ..... being responsible at the same time. I don't want to buy it as a private device I use at home and maybe it gives way or it gives trouble because I've noticed over many years it's very, there's less after sales service in Australia. How and why I do not understand but it's a bit of a throw-away service. I mean if they can't fix it, the first thing the salesman will say is "how old is it?, is it out of warranty?" I said yes it's 7 years old and they say oh time to get a new one. I say but it's ideal, I can still repair and get ..... and then because that ..... word, they repair things so that there's a repairman who gets a job as well. That's throw-away society ..... or someone could say yes we've got this new device from Japan that's very good, isn't it and then after 6 months I phone up and they say oh the mother company in Japan has closed down. So I said where do I stand now? That is, I'm interested in after sales service also.

Int1: So but would the fact that you'd be educated on the advantages or perceived advantages of that service, would that actually make that service more desirable?

Int2: Yes, yes at the beginning, yes but then before spending they always say like the Australian way, shop around, find out first, does anyone have any device of that kind before spending money because I've had my fingers burnt before.

Int1: How about everybody, a lot of the students that you noticed all had wireless laptops?

Int2: Yes, yes

Int1: And you noticed them using them, would that kind of make you think that it was more desirable to owning a wireless laptop because the other students had them?

Int2: Um not more, not to copy them but for my own use, yes.

Int1: Well you know as they're obviously finding them being ....., you would think well I'm missing out because I don't have one.

Int2: I do agree but you see it's not cheap to have a device like that. It's $1000 and to look at it in one way if I always think what can I do with $1000 if there's an ultimatum.

Int1: How much of an ..... is that?

Int2: Well in a way it's very, sometimes I say for $1000 I can go back to Asia and come back because if I were to go into another environment, I learn more. I learn faster, I see different thing then I can discuss and I have some information to talk about. It's not like standing ..... today, that's all. No it's more information but if there was a need, yes, I'll buy one.

Int1: Yes but the fact that all the other students had one wouldn't actually drive your choice?

Int2: Oh no because I've been through life and I've seen people who say yes we have used it but it hasn't done good or the other students maybe their parents bought it for them then so I'm earning my own living so perhaps I think in another way but there's a lot to say the uni said everybody had to buy it, I said yes, then I have to buy it.

Int1: OK so you would accept that?

Int2: I'll accept that because that's part of the technology of the future that we must have one because I've seen that Singapore is learning their students so that maybe countries investing in education which means Australia must not be left behind so I would say yes. If everybody is using it and I need it, yes I must buy it.

Int1: So thank you very much 'Interviewee G'.

Int2: I keep an open mind on everything. **END OF INTERVIEW.**

Interview with H

Legend:

Int1: Interviewer
Int2: Interviewee
..... Unable to understand
[ ] Not sure of word
(overtalking) both parties speaking at the same time

Int1: The purpose of this research project is to investigate end-user behaviours for their choice of wireless telecommunication services within the Australian domain. So the findings of this research will assist Australian wireless service providers improving their quality of service and it fills in a gap in the literature. Careful considerations are important to Hari and myself and this research is confidential and your identity will not be acknowledged in the research project. We'd like to tape the interview in order to assist in the data analysis. If you agree to that, at any points during the taping you're welcome to push the pause button or to ask me to stop.

So Hari wants to gain a better understanding of the nature and insights into end user behavioural factors affecting the choice of Australian wireless telecommunication services. The interview will focus on wireless service characteristics such as mobility, interactivity, system interoperability, end user context that have influence on the choice of wireless services in terms of behavioural factors such as attitudes, the ease of use, usefulness, intentions to use and the wireless trust environment.

The term wireless services is used in the general sense and simply refers to a set of service functions offered to end users devices using wireless interfaces and networks when requested. The examples of wireless services include personal messaging services, voice video streaming, multimedia services, transaction oriented and business solution services. Now if I could just get you to sign the consent form there 'Interviewee H'? Today's the 24th and if I can sign it as well otherwise I'll take off straight after this interview and Hari will go, "she didn't sign it". Now over the page there are some demographic information and what wireless services you actually use - information. If we could get you just to fill that in just to provide some background to your wireless use, thanks?

Int2: What type of wireless service do you use? Now email, that's not including normal?

Int1: So say you use your laptop and you're on a wireless connection, then that would count.

Int2: Oh OK then that would count, yeah. .....broadband

Int1: So you actually have a wired?

Int2: .....yeah broadband, yes. I use SMS.

Int1: Do you use any information services like you know your Lookup, databases with some of your devices?

Int2: No, no. I just basically the mobile phone. I'm not going to be a very rich source of information.

Int1: That's alright. That's all a lot of people use. You don't use a Bluetooth handsfree car kit in the car?

Int2: No. It allows for it but I don't use it.

Int1: I have one and they're excellent.

Int2: OK.

Int1: Not one on your ear because that looks a bit too space aged but you know it sits up on the sun visor.

Int2: Oh OK. And I can't even tell you a lot about this because it's supplied by my company..... I do the work for.

Int1: OK if I could quickly run through some terminology and how it's used in the questionnaire. So mobility refers to the ability of users to access defined services from any terminal in the network while maintaining their personal environment settings and we're really talking about coverage there. So you know the range that your device has.

Int2: Right

Int1: Interactivity refers to the capability of wireless devices with a suitable interface design to access wireless services with convenience and ease of use. System interoperability is the ability of different wireless systems and application services to communicate to exchange data accurately and consistently and to use the information that has been exchanged. User context refers to end-user environment practice such as facilitating conditions, social influences, economic conditions and cultural differences.

Can you explain how you select your wireless services and what service characteristics influence your selection or preference?

Int2: Um it was supplied by my company is all I can say.

Int1: What sort of things would you look at?

Int2: If I was choosing one? Um mainly look at cost and looking at ways of minimising cost. I've looked at, I mean I've looked at possibility I may have to get my own service and so I've looked at some of the cap plans that are

coming out now. We have our phone, our home phone on a caps plan which is we're very happy with because for instance we get all our calls for mobiles, calls overseas and STD calls are all capped in the sense that you can make up to $100 worth of calls and only pay $25 so we just don't worry. We never pay more than $25 and we can just make as many calls as we like so I found that a very attractive package and so I'd be looking for something the same in a mobile phone.

Int1: What about the amount of coverage that the mobile phone provider had? You know would you accept a cheaper plan with less coverage or would you demand the wider coverage and be willing to pay for that?

Int2: Probably coverage isn't an issue because it mainly just contact people locally or maybe in Brisbane and all the major suppliers do that. Yes its only I guess people who are wanting to go outside the main centres, population centres who'd be looking at something with a wider coverage included by all the service providers.

Int1: How about how reputable an organisation is? You know would you be more inclined to choose a well establish service provider in the market or would you be willing to go for a new player if they offered the right kind of plan?

Int2: Yes well with our home phone for instance we've gone with the best offer even though they're a little known brand because we haven't prepaid anything. We're just [post paying]. If they go bankrupt or whatever then we just change to somebody else. We haven't lost anything but if I was going to go into a longer term contract, I'd probably look more at the financial liability of the provider.

Int1: So as long as it's a short term month by month arrangement, you're not really that fussed? Now how about say in a wireless broadband provider and if it affected your email address? Would that change your mind if your email address changed or would it be quite easy to change that?

Int2: I've just changed it actually so it's a process because it's recorded in so many places with different people and different organisations and then you've got to, you've really got to allow quite a long change over process to make sure that everybody has caught up with your new email address so that would be significant because of that.

Int1: So that would be quite detrimental to you if you got a service provider and you didn't have them for a long time?

Int2: Yes and I had to, for instance if my email address was one supplied by them, yes that would be a different, that would be significant.

Int1: So then you would really at how reputable they were and how well established they were and whether you could trust that they would still be there?

Int2: Yes but on the other hand with emails you can always go to a

Int1: Like a webmail account?

Int2: Yes, yes which is huge anyway.

Int1: So can you explain how does the coverage in real time connectivity of your device and network affect your usage/preference of services? So your coverage, your ability to always be able to use the device?

Int2: Hasn't been an issue.

Int1: You just accept that it's always going to be there?

Int2: Yes the only time occasionally when I'm on the road between here and Brisbane it will drop out. The one I have, the Vodaphone will drop out but that's not an issue because I don't need to make urgent calls on the road. It's not like I'm a salesman or doing I have some critical need to make calls on the road.

Int1: So really the device that you're using is not critical for your function?

Int2: No, no.

Int1: So and it then that in itself impacts on your choice of service provider?

Int2: That's right, yes. So it's convenient but its not critical.

Int1: Yes. Would you consider that mobility has an impact on the performance of your task, your productivity and your intention to use the service? So the amount of coverage?

Int2: No, not really.

Int1: That fact that you're contactable by phone, does that impact on your productivity or does it give you more freedom?

Int2: Yes, that's right it's a matter of convenience more than productivity.

Int1: Yes you're just not tied to the phone but it actually doesn't impact on your productivity?

Int2: No, no. Its basically if the company wants to call me in but all my work is actually done in the office for instance so you know as long as they can contact me at some stage to let me know.

Int1: That's what happens.

Int2: Yes.

Int1: So what's your opinion, and I don't know whether you use on your telephone, do you use any of the services such as being able to access web pages over your phone?

Int2: No.

Int1: And can you tell me why wouldn't you use a service like that?

Int2: At the moment I don't because my old phone doesn't support it. I may use it if I haven't ..... with it but if I found that it was something that was easy to use and convenient then I may use it.

Int1: So would your interactivity, so if you found that your phone had you know it took you a long time to scroll down the pages or there was poor resolution or poor graphics, it was quite slow to download things, would that, even though you could have that facility, would that affect your decision on whether to use it or not?

Int2: Yes it would because for me it would be a matter of convenience – not a matter of necessity so I wouldn't put up with

Int1: So you wouldn't be willing to put up with any downgraded service?

Int2: No, no. If it wasn't easy and straightforward and reasonably quick I wouldn't bother with it. I would just use the laptop or whatever. I would use sort of the ..... service.

Int1: Yes you would just wait until you – so mobility isn't really a big issue for you being able to use that device anywhere?

Int2: No.

Int1: So would you describe whether you're comfortable with the service access facilitated by the interactivity so that you can accomplish tasks and enhance the effectiveness of the job as expected using the interactivity options?

Int2: That's a big question.

Int1: Now I know that you're only using the phone and maybe that's aimed more towards a laptop, a PDA type device but and you don't use your phone at all to – in your tasks at work?

Int2: No – its just for calling or if I'm away from the office you know then they use the phone to contact me if there's something urgent.

Int1: And does that happen very often?

Int2: No.

Int1: So it's a very rare occasion that that would actually impact on you.

Int2: That's right, yes.

Int1: So considering the interactivity and efficiency of the data transfer of your device, do you feel there's enough managerial security protection while using that service?

Int2: I have no concerns about it (overtalking) it's not been an issue.

Int1: It doesn't impact on your mobile phone?

Int2: No, no.

Int1: So do you believe system interoperability – you know you would say a your work gave you a PDA – would you believe the system interoperability issue such as accessing the same service such as email and internet from different wireless service providers, networks and devices would have an influence on the services and how? So we're talking here about with your PDA you're accessing email but you really want to be able to [link] that in with your laptop or you want to be able to go using the USQ service you want to be able to connect through to your other service that your work uses. Would that impact?

Int2: Yes I think that would be, if they were both useful you know for work or for critical usage, I think that would be very important.

Int1: So you would just demand that? You would just expect it?

Int2: Yes otherwise you can't function fully.

Int1: So you won't accept any overhead in the use of one of those devices you know with maybe having to do work twice?

Int2: No, no well I'm talking hypothetically.

Int1: Yes I know

Int2: But in my situation it just wouldn't be worth it if I have to do that because it's not that critical for me to have that additional access but if it's there and it's clean and straightforward then it would be a helpful, very convenient addition to what I already have.

Int1: Yes and that's the thing, it's got to be a convenient addition.

Int2: Yes

Int1: It can't impact on the amount of time that you have at all.

Int2: That's right, that's right because I don't need, it's not critical to the function. Its' only useful if it's convenient.

Int1: So can you explain your feelings in the way different standards such as WAP, 2G, 3G, CDMA, protection management and configuration techniques and performance issues might affect the service that you would choose?

Int2: I don't have any background or experience in that area.

Int1: So you know 3G you've got the ability to make video calls, you can also look at your web pages on your phone and it's got some other, you've got the ability to say get weather services. You know it can tell you the weather. Would you find any of that useful? Would that be enough for you to say yes, I want to use that service?

Int2: I can't think of any valid reason to, that I would need it, yes. It would be a novelty to me. That's about all.

Int1: So it would really be like a toy that kind of well it's cute but it actually doesn't help me do my job?

Int2: That's right.

Int1: Yes OK. So can you elaborate your experience on facilitating conditions such as wireless access availability you know the fact that you always want your phone to be available, the policy. Well maybe we can go through these one at a time. So how would you feel if you picked up your phone and there was no network available? You know the network was busy, it just wasn't available. Would that worry you? Would you find it frustrating?

Int2: Ah it depends on the frequency and duration. If you know if it was for a long period or if it happened often, then it would be a concern. It would be frustrating but if it was just once in a blue moon just for a short time then it wouldn't be a real concern.

Int1: You would just accept that that happened.

Int2: Yes and if people can't get through or you can't get out, you just try again later.

Int1: So what about policies and regulations? Do you find any policies or regulations restrictive in the user or surrounding the use of your phone?

Int2: I haven't come across anything.

Int1: So they just don't impact on you?

Int2: No

Int1: They might be there but you don't know about them?

Int2: That's right. I live happily within the boundary.

Int1: So what about training and resources? If there was a wireless service provider that actually offered training and a resource, would that be a positive factor for choosing that wireless service provider?

Int2: Um it would if I was moving to something with new features which was a little more complex than I was used to, then that would be helpful.

Int1: So like how much of a positive thing would that be? Would it just be kind of nice or would it be quite a significant factor?

Int2: It would just be a reassuring backup because with most products I find I can work it out with the instructions or whatever you, I mean I think ..... you try and work it out for yourself rather than

Int1: Before you read the instructions.

Int2: That's right even before let alone call somebody else for help.

Int1: So what about security and legal protection? Any concerns about security or legal protection?

Int2: No it hasn't been an issue.

Int1: So again, that's like your policies and regulations – you live inside the boundary and it doesn't impact on you at all.

Int2: Yes.

Int1: Can you explain the role of economic conditions, cultural differences and social influences such as image, education or other influences on your preferences or usage of wireless services? So, let's say you know a lot of your friends were actually starting to use 3G devices, would that be a driver to push you towards adopting 3G as well?

Int2: Only if there was a practical advantage (Relative Advantage), not just the peer pressure.

Int1: What about if it was really cool though?

Int2: I'm too old to worry about cool.

Int1: So it wouldn't be – look and the phone is really bright pink – that wouldn't affect your decision at all?

Int2: No, no I've had to put up with it from my children. They've all got more advanced phones than me, as long as it works and does the job.

Int1: Yes. So you know let's say a lot of the people at your work were using wireless laptops, that wouldn't drive your adoption or would getting wireless LAN at home and saying you know this is really good?

Int2: No, not at home. If the company were supplying it to the others and not to me, that would be a concern.

Int1: But would that be a concern not because you wanted the facility but more because they were getting something that you weren't?

Int2: Yes in that case. In the case where the company is providing it, it has reflection on your status, I mean within the company. But on the personal side at home well I think it wouldn't worry me.

Int1: Now how about if you were educated. Let's say you went to a seminar and they told you how great 3G mobile phone services were. Do you think that would be a driver towards adopting that or would you go yes, it looks good but I'm still quite happy with what I'm using?

Int2: Only if there was a significant practical use you know – it provided some significant improvement in the way that I could use it. Not just for the sake of having it. You know if it was a practical benefit.

Int1: So it can't be like those twiddly things on the edges like video phone calls? It's got to be a real clear business benefit to drive your adoption?

Int2: Yes.

Int1: OK, thanks very much. So is there anything else you wanted Hari? Is there anything else you wanted to ask or talk about?

Int2: No I think we've talked about more than I ever knew I knew.

END OF INTERVIEW.