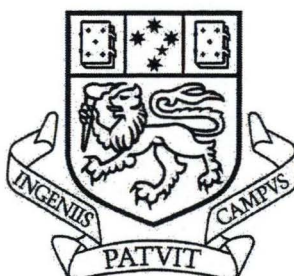


An Overview of Mobile Commerce from a Tasmanian End Users Perspective

By

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Completed in partial requirement of the degree of
Master of Information Systems



A dissertation submitted to the
School of Information Systems
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Declaration of Authenticity

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Abstract

As society has progressed into the 21st Century, conducting business via the Internet has become a common practice for many people. With the rapid innovation and advancement of mobile communication technology and the forthcoming third generation (3G) mobile network, a new way to conduct and deliver products and services has evolved. The concept known as mobile commerce (m-commerce) is now gaining more attention from both the IS research community as well as business organisations on a worldwide basis. However, at present there is only a limited understanding of how to promote the uptake of m-commerce by end users.

From a review of the literature it became apparent that there is a considerable body of knowledge in relation to m-commerce adoption from a perspective of end users as technology end users. However, it also became evident that the issue of the adoption of m-commerce from a perspective of end users as consumers has been largely ignored by IS researchers. In addition, the results of research that has focussed on the barriers and values related to m-commerce from an end user perspective have generally been inconclusive.

In response the objective of the research presented in this thesis is to gain a better understanding from an end user consumer perspective, of the adoption of m-commerce.

This research represents an exploratory study based on the general population in Tasmania, the island state of Australia. It was based on a quantitative approach with questionnaires administered to 300 people selected at random from the three Telstra telephone directories applicable in this state.

The major findings of this research have identified the services where end users as consumers are more likely to adopt m-commerce. It has also identified that efficiency and mobility were the key value dimensions viewed by the respondents as most important in m-commerce. Even though the respondents expressed a willingness to use m-commerce, paradoxically they indicated a preference to use the services via a stationary PC in a fixed setting such as at home and at work. Among these

respondents the difficulty inputting text data and perceived high usage cost were identified as keys barrier for end-user adoption of m-commerce. The findings were compared with research conducted in Finland. This provided an opportunity to consider the situation in Tasmania with respect to m-commerce adoption against that in a highly technologically advanced country.

It is proposed that this research has made contributions to both knowledge and practice in relation to the adoption of m-commerce from an end user as consumer perspective. Finally, based on the experience of conducting this research opportunities or future research were proposed.

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1 Introduction

The purpose of this chapter is to present a background for the research presented in this thesis. The aim of this research is to gain an understanding of m-commerce adoption from a Tasmanian end-user perspective. In brief, m-commerce is the ability to use mobile wireless devices as a secure method to purchase goods, services or digital content (Telstra cited in the Australia Communication Authority, 2003). This chapter will first present the background of m-commerce. Subsequently the perceived research problem coupled with the research objective and defined research questions will be addressed. The scope of research and the research significance for both researchers and practitioners will be presented.

This chapter will presented as follows:

- Definition
- Research background
- Perceived research problem
- Perceived research objective and questions
- Research scope
- Research limitation
- Contribution of the research – theory and practice
- Chapter summary
- Thesis map

1.1 Definition

m-commerce, has been defined as *“the use of a wireless terminal, such as a cellular telephone or personal digital assistant (PDA), and a network to access information and conduct transactions that result in the transfer of value in exchange for information, services and goods* (Consumer Affairs Victoria, 2004: iii).”

1.2 Background

Mobile commerce (m-commerce) has become a major topic of interest for the Information Systems (IS) research community and a key priority for many business organisations (Anckar & D’Incau, 2002).

Mobile phones can be used for a wide range of mobile transactions, either remotely over the digital mobile network, or locally at the point of sale (Nokia, 2001). According to Consumer Affairs Victoria, (2004) the Third Generation (3G) mobile network also known as the Universal Mobile Telecommunications System (UMTS) is likely to drive the development of a wider variety of m-commerce services and applications in the near future.

According to research conducted by Nokia (2001) an increased number of people will be willing to use their mobile phones for m-commerce than presently using electronic commerce (e-commerce) to make purchases over the Internet. It was also found that the number of people interested in using m-commerce is more than eight-fold in some markets compared to the number of people actually using e-commerce. The study also showed that nearly 90% of people interested in using m-commerce services will also be willing to pay extra for the convenience of making purchases using m-commerce.

Given that there are an estimated 14 million mobile phones in use by 65 per cent of the Australian population in over 50 per cent of households, the potential for m-commerce is huge (Consumer Affairs Victoria, 2004). However, because m-commerce is a relatively new concept, only a small number of studies have been conducted to investigate the adoption of m-commerce, thus the overall understanding in this area is limited. In addition, most of this research has been conducted was based on m-commerce adoption from end-user as a technology user perspectives, end-user as a consumer aspect has been almost been absent (Pederson, Methlie & Thorbjørnsen, 2002).

The lack of research on consumer aspect has been disturbing the IS research community since many of the 3G services available are consumer oriented.

Therefore, there is a need to conduct an investigation on the type of services, values and barriers perceived as important to the Tasmanian end-user.

1.3 Perceived Research Problem

Most of the previous m-commerce adoption research has been conducted based on end-users as a technology user perspective while research on end users as a consumer aspect has been largely ignored. Thus there is a need to conduct research from the perspective of end-users to overcome this problem.

1.4 Research Objective

The objective of this research is to gain an initial understanding of the adoption of m-commerce from the perspective of potential end-users in Tasmania, taking the view of an end-user as a consumer.

1.4.1 Secondary objectives

- To find out what are the important mobile services and values offered by m-commerce.
- To determine the channel preference between stationary PC and mobile devices, for end users to engage in m-commerce services.
- To investigate the key barriers for the adoption m-commerce by Tasmanian end-users.

1.4.2 Research questions

- (1) What are the m-commerce services that are most likely to be used by Tasmanian end-users?
- (2) What mobile values do end-users perceive as important?
- (3) What channels in terms of PC and mobile are preferred by Tasmanian end-users?

-
- (4) What are the key barriers perceived by Tasmanian end-users to the adoption of m-commerce?

1.5 Research scope

The context for this research is to gain understanding of m-commerce adoption from a Tasmanian end-user perspective. The target population of this research will be the general public of Tasmania.

A random sample selection process was adopted to identify potential research participants. This was based on the three Tasmanian telephone directories. Subsequently, 300 surveys were mailed out the sample population.

This research was based on a cross sectional sampling. That is the data were collected at one point in time.

1.6 Research limitation

This research will be conducted as part of the Masters of Information Systems degree in the School of Information Systems at the University of Tasmania. Budget and time were the constraints. Only 300 questionnaires will be mailed out, that may limit the possibility of reaching a greater number of potential respondents.

1.7 Contribution of the research – theory and practice

It is proposed this research will provide researchers with a better understanding of m-commerce adoption from an end-user perspective. From the literature it has been determined this is an area that has been largely overlooked by the Australian IS research community. The findings of this research will also provide more detailed understanding of end-users, thus it may provide a point of departure for future research into m-commerce adoption.

1.7.1 Significance of the research to practitioners

Practitioners such as business leaders, entrepreneurs, e-commerce directors, e-commerce managers, strategic IS managers as well as telecommunication managers might be able to gain a better understanding of the end user adoption of m-commerce. This research can also provide practitioners a more accurate projection of potential market of m-commerce, since many of 3G services will be consumer oriented. Thus, practitioners can develop strategies to encourage the adoption of m-commerce; on the other hand, perhaps they need to take a negative stance in investment in the technology.

1.8 Chapter summary

This chapter established a foundation for the research presented in this thesis. The chapter first introduced a background and definition of m-commerce. Subsequently, the perceived research problem, research objectives and research questions were presented. The research scope was then established. Based on these foundations, the chapter can now progress to a dissertation map.

1.9 Dissertation map

Looking forward the remainder of the thesis will be structured as follows:

Chapter 2 – Literature Review

In this chapter previous research that is relevant to m-commerce adoption will be reviewed. It will focus on the following aspects:

- E-commerce and m-commerce
- Adoption of m-commerce
- Barriers for m-commerce Adoption

Chapter 3 – Methodology

This chapter provides full details of the methodology used to conduct the research. The chapter will be presented in the following sequence:

- Philosophical Stance
- Ethical Compliance
- Research Method
- Data Coding and Analysis

Chapter 4 – Results

This chapter presents the overall results of the research. The chapter will be presented in the following sequence:

- Response Rate
- Representativeness of the Data
- Demographic Results
- Main Results

Chapter 5 – Discussion and Conclusion

This chapter will discuss the findings from Chapter 4. The following topics will be discussed:

- Discussion
- Conclusion
- Limitations
- Contributions
- Potential Areas for Further Research

2 Chapter 2 – Literature Review

2.1 Introduction

The purpose of this literature review is to provide a clear logical presentation of the relevant research carried out in the area of m-commerce from an end user perspective (Cavana, Delahaye & Sekaran, 2001). Thus the objective of this chapter is to identify and highlight the important variables, and to document the significant findings from earlier research in relation to m-commerce (Cavana, et al., 2001).

This chapter will be presented in the following sequence:

- E-commerce and m-commerce
- Adoption of m-commerce
- Barriers for m-commerce Adoption
- Chapter Summary

2.2 E-commerce and m-commerce

Since there are number of similarities between m-commerce and e-commerce, many view m-commerce as a subset of e-commerce. When comparing the two in a general sense, the most vital aspect of both e-commerce and m-commerce is the ability to conduct commercial-related activities over the Internet. However the most obvious difference is e-commerce focuses on data and information transfer via the Internet using wired technology and a stationary PC, while m-commerce achieves this transfer via wireless Internet and mobile device. Thus, m-commerce can be used anytime and anywhere, that overcomes the traditional limitations of e-commerce. Wired Internet accessibility is no longer a prerequisite for end-users to engage in e-commerce activities.

Research conducted in mainland Finland and Åland Island, has identified the key benefits of m-commerce to be:

- Enhanced communication

-
- Flexibility – anywhere, anytime
 - Real – time alerts and information services
 - Convenience and handiness (Carlsson & Walden, 2003).

Kukkonen & Kurkela (2003) have summarised the key differences between the web and mobile services according to four dimensions. These are the:

- devices
- network
- user
- usage context

Despite the differences between e-commerce and m-commerce this new channel offers an alternative way for conducting commerce-related activities. However, it also creates many issues and challenges for businesses and end-users. While some of these issues and challenges have long existed in the e-commerce era, others came into realisation simultaneously with the evolution of mobile technologies.

Many of these issues and challenges addressed were closely related to an end-user perspective rather than technological development. In general, these include reasons for end-user adoption and the identification of the means to identify and overcome barriers to the acceptance of the technology. Further, Fang, et al. (2003) suggest that an understanding of user preferences and perceived values of task are essential for future development and improvement of the usability of m-commerce activities.

2.3 Adoption of m-commerce

Pederson & Ling (2003) point out that adoption research is part of the area of Information Systems (IS) research and it should include research from diverse disciplines. There has been very little research available to help the IS research community and practitioners to understand the adoption of m-commerce services. This may be due to its emerging nature as well as attributed to the complexity of the

service model and the convergence of technologies and services expected in m-commerce (Pedersen & Ling, 2003).

2.3.1 Research directions m-commerce adoptions

Pedersen & Ling (2003) believe researchers studying m-commerce adoption share a common interest in understanding how information technology and service is being adopted by end-users. Pedersen & Ling (2003) categorise four research directions for m-commerce adoption in a holistic manner (Figure 2.1):

- Diffusion research
- Adoption research
- Uses and gratifications research
- Domestication research

Diffusion research studies the aggregate diffusion or adoption of a technology (or service) and has a basis in market and economics studies. Adoption research primarily studies the adoption and use of traditional Information Communication Technology and in general has been a tradition of IS research. Use and gratification research studies the gratifications sought by adopters of different kinds of media that is based on media and communication theory. Domestication research concerns the adoption, use and domestication of technology in society with a particular focus on the societal consequences of technology from a sociological perspective (Pedersen & Ling 2003).

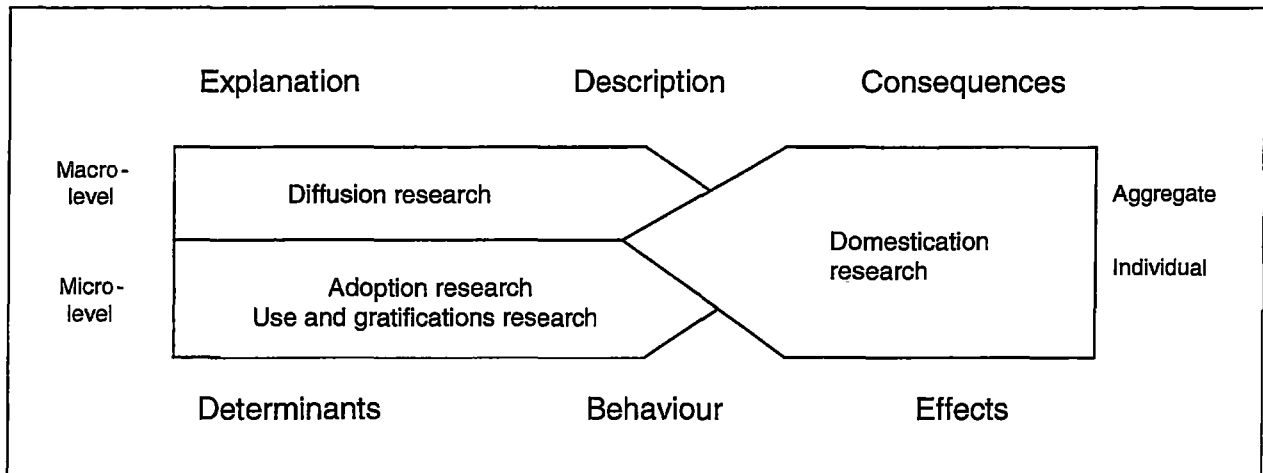


Figure 2.1 Research directions in mobile service adoption studies

Source: (Pederson & Ling 2003: p. 91)

Moreover, Pedersen, et al., (2002) have proposed a framework with three perspectives to help understand m-commerce end-user adoption (Figure 2.2). These three perspectives are:

- 1.) viewing the end-user as a network user
- 2.) viewing the end-user as a technology user
- 3.) viewing the end-user as a consumer (Pedersen et al., 2002).

Pedersen et al., (2002) believe that combining these perspectives may help to gain an understanding of end-users and their usage scenarios.

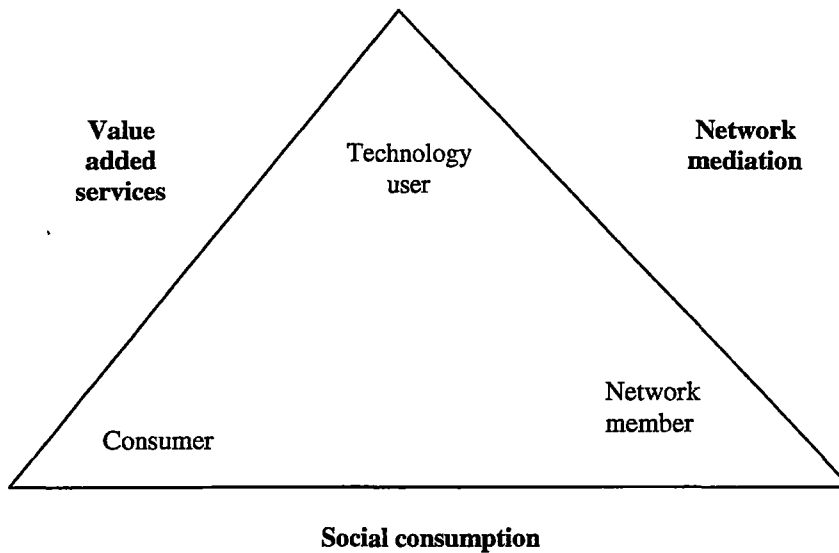


Figure 2.2 Suggested triangulation of perspectives in m-commerce end-user adoption

Source: (Pedersen, et al., 2002: p. 89)

2.3.2 Review of previous studies in m-commerce adoption

Pederson, et al., (2002) suggest that “end-user as network user” is focused on the diffusion side in the social context that includes aggregate diffusion theories. The importance of communication between network members and the social position of network members are taken into consideration. While in the view of end-users as technology users, a number of perspectives have been applied to understand technology adoption, as pointed out by Pederson et al., (2002). These perspectives include Technology Acceptance Model (TAM) of Davis (1989) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991). TAM is an IS theory that suggests perceived usefulness (PU) and perceived ease-of-use (EOU) influence the end-user decision to accept and use a technology. The Theory of Planned Behaviour (TPB) (Ajzen 1991) helps the researcher to understand the behaviour of people. The theory suggested three kinds of considerations 1.) Behavioural belief 2.) Normative beliefs and 3.) Control Beliefs. TPB is a theory, that predicts deliberate behaviour, because behaviour can be planned. In fact, a considerable body of research has been conducted based on the modification of TAM and TPB to investigate the adoption of m-commerce (Khalifa & Cheng, 2002; Lu, Liu, Yu & Yao, 2003; Fang, et al., 2003; Kleijnen, Wetzels & Ruyter, 2004; Wu & Wang, 2004).

Khalifa & Cheng (2002) investigated the effects of the exposure of an individual to m-commerce and intention to adopt it. The research was conducted based on TPB with extension of trial, observation and communication. They found that trial and communication were a strong source of exposure. In addition, exposure influences intention formation through perceived behavioural control. Thus exposure is likely to facilitate the adoption of m-commerce.

Lu, et al., (2003) applied TAM with extension of variables of trust, systems complexity, facilitating conditions and social influences to investigate the user intention to accept Wireless Internet via Mobile Technology (WIMT). As a result of this research, they concluded that the original variables of TAM, perceived usefulness and perceived ease of use and the additional four variables are in fact major factors influencing user acceptance of WIMT.

Fang, et al., (2003) studied the task characteristics and user intention to use a hand-held device for mobile commerce. They adopted the original TAM model with three additional factors: perceived playfulness, perceived task complexity and perceived security. They concluded that of the five factors only perceived usefulness, perceived security and perceived playfulness are in fact important to user intentions to use hand-held devices for m-commerce.

When Kleijnen, et al., (2004) studied consumer acceptance of financial wireless activity, they have adopted TAM as the point of departure with additional factors: perceived cost, system quality and social influence. In general the outcome of the research suggested that all these variables have a significant impact on user intention, with the exception of perceived cost. This was found to only have a minor impact on user intention.

Wu & Wang (2004) integrated TAM and the capability factor of Innovation Diffusion Theory with two additional factors: perceived risk and cost to investigate user acceptance of m-commerce. They found that capability is the most important factor on user behavioural intention to use m-commerce. In addition perceived risk and high

usage costs have a significant negative direct effect on behavioural intention to use m-commerce.

While much of the m-commerce adoption research has been conducted from the view of network users and technology users, Pederson, et al., (2002) point out that consumer perspective research is almost absent. Furthermore, they regard this as especially disturbing since many of the services introduced in 3G aims at providing a wide variety of services and capabilities. In addition to voice communication these include multimedia data transfer, video streaming, video telephony and full unabridged Internet access (Elliott & Phillips, 2004). These imply consumer-oriented services and value-added services supporting the consumption of physical goods and services (Pederson, et al., 2002). Moreover, Carlsson & Walden (2003) stress that without real substance for the potential customers the investments in the new mobile technology could still fail.

One of the research directions suggested is to investigate use of mobile Internet services from a perspective of end-users (Anckar & D’Incau, 2002; Anckar & Eriksson, 2003 & Pederson & Ling, 2003). These authors have emphasised the importance of “value” in relation to m-commerce. On the other hand, one criticism of m-commerce adoption research is that it lacks attention to the attributes of applications and services being adopted (Pederson & Ling, 2003).

McDougall & Levesque (2000) perceived value is the result or benefits received by a customer in relation to the total cost of the services. In other words value is the difference between perceived benefits and the cost created by m-commerce. Moreover, Landor (2003) has stressed the importance of the concept “value = benefit – cost”. For example, if two different supply chains are able to produce a product with identical capabilities, the chain that can achieve the required level of suitability for use at the lower total cost of ownership is the one with the greater value.

If m-commerce can provide benefits to end-users, that differ from e-commerce and traditional commerce at a relatively low cost in comparison other forms of commerce, the value of m-commerce will increase.

Hence, there is a vital need to identify the value of the m-commerce channel in its own right (Anckar & D’Incau, 2002) as the utilisation of the appropriate value

propositions will be fundamental to the success of m-commerce (Clarke, 2001). However little, if any, research has been conducted to address consumer attitude towards m-commerce and the value offered by the mobile channel (Clarke, 2001; Ankar & D’Incau, 2002; Ankar & Eriksson, 2003).

Perceived value is a difficult concept to define and measure (McDougall & Levesque 2000). Clarke (2001) suggested that the unique value of m-commerce can be specified according to four dimensions. These are ubiquity, convenience, localisation and personalisation and a consumer orientation that provides value-for-time functions to create a new value curve. As such m-commerce may achieve a competitive advantage over traditional e-commerce.

2.3.3 Measure of m-commerce value

Ankar & D’Incau (2002) proposed an analytical framework that can be used to theoretically evaluate the suitability of specific services for m-commerce (Figure 2.3). Within this framework the values can be divided into two types (1) wireless value (2) mobile value. The former refers to the value of wireless technologies in itself. The latter refers to value arising from the mobility of the medium. For example making use of an electronic service while on the move/road represents a service-dependent value phenomenon. Ankar & Eriksson (2003) applied this framework in research involving university students and the perceived value of m-commerce. The findings indicated that perceived mobile value of consumers was more important than wireless value in terms of driving m-commerce adoption. This outcome supports that the core value of m-commerce is service dependent.

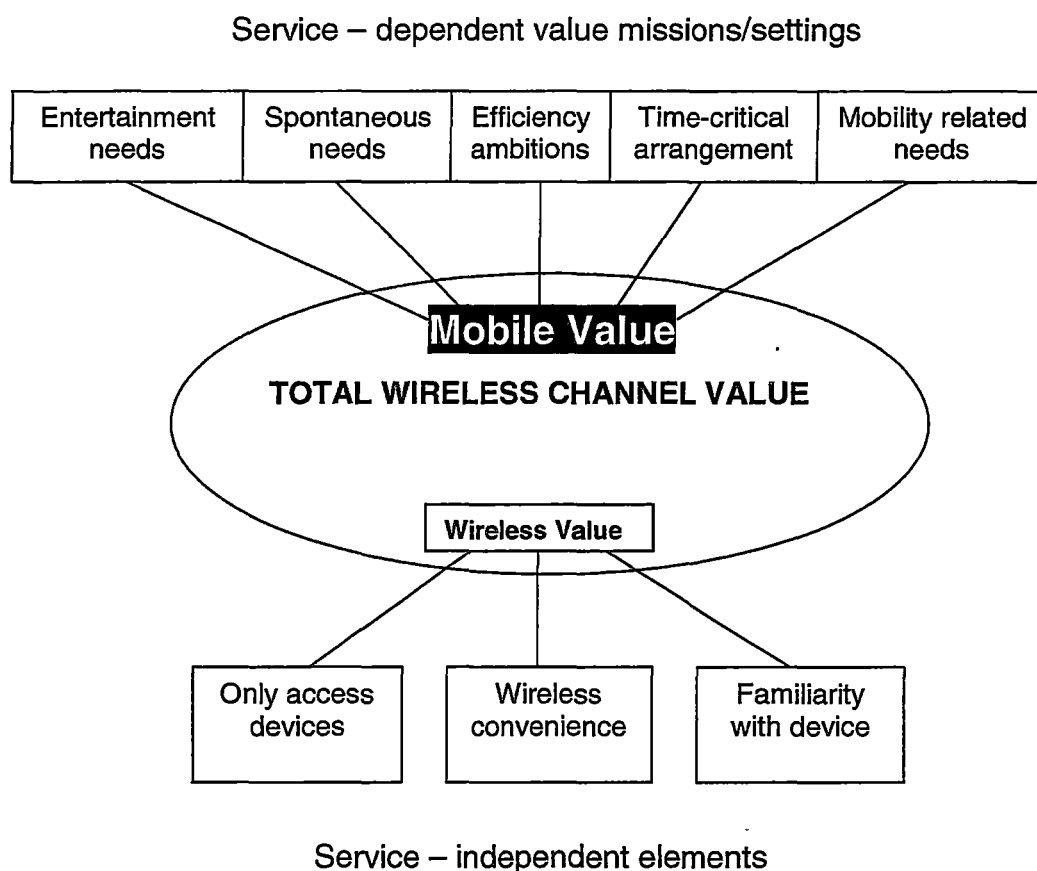


Figure 2.3 The analytical framework

Source: (Anckar & D’Incau 2002: p.48)

2.3.4 Mobile value dimensions

According to Anckar & D’Incau (2002) and Anckar & Eriksson (2003), there are five service – dependent mobile value dimensions. These include:

- Time-critical needs and arrangements = (TC)

Time-critical situations where immediacy is essential, or at least desirable, typically arising from external events.

- Spontaneous needs and decisions = (SP)

Spontaneous needs are internal. Decisions are straightforward, meaning that the if/when/where decisions do not require careful consideration.

-
- Entertainment needs = (EN)

The use of mobile services via a mobile medium for self-entertainment (for example, to kill time/have fun in situations when wired entertainment devices cannot be accessed).

- Efficiency needs and ambitions = (EF)

The use of m-commerce service enables increased productivity and efficiency to do simple everyday activities by providing the possibility to use the 'dead spots' in the day (for example, during daily commuting between home and work).

- Mobility-related needs =(MO)

Value through a mobile medium, as need for services predominantly arises when away from home and 'on the move' (Ankar & D'Incau 2002; Ankar & Eriksson, 2003).

Personalisation that was perceived as a mobile value by many authors (Clarke, 2001; May 2001; Siau & Shen 2003), was not included in this framework. Ankar & D'Incau (2002) and Ankar & Eriksson (2003) argued personalisation has long existed in the e-commerce era therefore it should not be considered as a unique mobile value, rather it should be viewed as a prerequisite of m-commerce.

Moreover, Chen and Nath (2003) cited in Frolick & Chen (2004) also support the view of Ankar & D'Incau (2002) by pointing the value of m-commerce is a function of the time sensitivity of the data or transaction and the mobility of the information user. The value of m-commerce rises with an increase in user mobility and time sensitivity of the required data or transaction.

2.3.5 Culture and value as influences of the adoption of m-commerce

As stressed by Varshney & Vetter (2002) worldwide the adoption factors of mobile devices can differ significantly on a country by country basis. Two major international studies have been conducted to examine usage patterns of the mobile Internet in a range of different countries to interpret any differences from a cross-cultural end-user perspective (Lee, Kim, Lee & Kim, 2002 and Kim, et al., 2004).

Kim, et al. (2003) found that (1) adoption patterns, (2) users' attitudes (3) willingness to pay for m-commerce, as well as (4) their preferred services differed between Hong Kong, Japan and Korea. Lee, et al. (2002) have suggested that cultural differences among the countries may be one of main causes for the dissimilar usage and adoption patterns of the mobile Internet. The results indicate that what users want in use of mobile Internet services should be identified on an individual country basis. This implies that localised strategies are needed to consider the unique cultural characteristics to increase the satisfaction levels of mobile Internet users in different countries.

Hence, the research on a m-commerce value dimension is not one size fits all, so it will need to be conducted with reference to national cultural differences. Investigations may be conducted in different countries in accordance with the analytical framework as proposed by Anckar & D'Incau (2002) and Anckar & Eriksson (2003).

2.4 Barriers for m-commerce Adoption

As previously mentioned, the rise of m-commerce has also brought up many issues and challenges. Other than understanding the value of m-commerce, another issue that is of common concern to the IS research community is addressing the barriers of m-commerce. A few researchers have attempted to identify the key barriers for m-commerce adoption (Lu, et al., 2003; Samtani, Leow, Lim & Goh, 2003; Fang, et al, 2003; Carlsson & Walden, 2003; Constantiou, Damsgaard, Knutsen, 2004; Sivanand, Geeta & Suleep, 2004; Wu & Wang, 2004). However, in this small body of knowledge that does exist the results are different from one another. Nevertheless, barriers to m-commerce can still be summarised as follows:

- Usability
- Trust, security and privacy
- Cost

2.4.1 Usability as an issue

Usability can be defined as the quality of a system with respect to ease of learning, ease of use, and user satisfaction (Rosson and Carroll, 2002 cited in Tarasewich, 2002). This section will present issues related to usability in the following sequence:

- Previous research on perceived barrier
- Lesson learned from WAP
- Usability problem for m-commerce

2.4.1.1 Previous research on perceived barrier

Usability research in m-commerce is a new area (Fang, et al., 2003). It has gained a lot of attention in the IS research community worldwide (Lu, et al., 2003; Samtani, et al., 2003; Fang, et al., 2003; Carlsson & Walden, 2003; Constantiou, et al., 2004; Sivanand, et al., 2004; Wu & Wang, 2004).

Lu, et al., (2003) reported that in China, perceived ease of use, is directly related to the acceptance of wireless Internet via mobile technology. In Singapore, researchers reported that difficulty in establishing a connection, slow loading speed and screen limitations were significant deterrents to the adoption of m-commerce (Samtani, et al., 2003). Research results indicate that perceived ease of use has a significant and positive correlation with user intention to perform a task on mobile communication devices (Fang, et al., 2003). In Scandinavia, slow data connection and/ or data transfer, small screen size of mobile device and complexity involved in using mobile services are seen as major barriers for adoption of m-commerce (Carlsson & Walden, 2003). Research conducted in Denmark reported that comfort of the device and an easy-to-use interface are important factors for the m-commerce adoption and diffusion but these are least important compared to “price” (Constantiou, et al., 2004). Moreover, the limitation in display size as well as the connection speed between the mobile device and the Internet is a hindrance to bank account holders in Malaysia in the adoption of mobile Internet banking services (Sivanand, et al., 2004). However, research conducted in Taiwan shows that perceived ease of use has no significant effect on behavioural intention to use (Wu & Wang, 2004).

The mobile communication device is really the entry point for most mobile commerce systems. Mobile communication devices are likely to affect the interoperability, implementability and scalability of m-commerce applications. Thus the capabilities or limitations of these devices will impact the type and frequency with which mobile commerce applications will be used (Varshney & Vetter, 2002). Tarasewich (2002) looked at how the usability of wireless devices affects the feasibility and success of m-commerce applications. Given the uniqueness of the wireless environment, usability becomes even harder to achieve for m-commerce applications (Tarasewich, 2002). The unique nature of the m-commerce environment requires a focus on usability that goes beyond the device itself. Mobile applications, by definition, can be used in various locations, meaning that the context of the application and the device must be taken into account when looking at usability (Tarasewich, 2002).

According to Fang, et al. (2003) a wireless telephony system has four socio-technical components: hardware, software, network, and bizware and each of these components can effect the usability experience. Researchers have suggested that interface developers need to consider the interaction between the design of user tasks, form factors, and application objectives (Chan, et al., 2002). Although much progress has been made in terms of technological innovation, many mobile Internet systems are difficult to use, lack flexibility and robustness. This has resulted in a poor experience of the technology by many users (Buchanan, Farrant, Jones & Timbleby, 2001).

Popular reaction to the most widely available mobile services, that are Wireless Application Protocol (WAP) based, has been negative (Buchanan, et al., 2001). WAP is one of the key enabling technologies of m-commerce as it allows mobile users to access the Internet from a mobile device. Consequently, the future consumer adoption of m-commerce relies heavily on how easy it is to use WAP to access and utilise these services (Condos, James, Every & Simpson 2002).

2.4.1.2 A lesson from Wireless Application Protocol (WAP)

The uptake by customers in many countries for new WAP phones has similarly been disappointing (Buchanan, et al., 2001). Condos, et al., (2002) studied the usability of WAP and reported that because WAP usability remains poor, it could have a negative effect on the future of WAP and m-commerce.

2.4.1.3 Usability problems for m-commerce

In term of devices, one of the significant differences between a desktop computer and a mobile device is the display. A small display device has a limited number of input facilities, processor power, memory and bandwidth (Buchanan, et al., 2001; Kukkonen & Kurkela, 2003; Qiu, Zhang & Huang, 2004). These device characteristics do not just alter how information should be presented but they also effect the style of user interaction. This implies user experience and the commercial viability of the systems (Buchanan, et al., 2001). Orientation and fluent navigation becomes even more important with mobile services than with desktop based web services, because of the small display size, usage situation and the cost of using the devices (Kukkonen & Kurkela, 2003). Users of mobile services have highly variable needs, and often tend to be impatient (Kukkonen & Kurkela, 2003). Although it is possible to do some less complex m-commerce transactions using a simple hand-held device, many sophisticated m-commerce applications require other capabilities, for example ability to:

- accept user input in many forms including voice,
- display rich and usable contents (Varshney & Vetter, 2002).

If user interfaces are difficult to deal with, due to the restrictions of mobile communication devices, such as a small display and limited input facilities, a user may not see significant value in mobile commerce applications (Kukkonen & Kurkela, 2003; Varshney & Vetter, 2002). In general, current usability problems for m-commerce can be summarised in the following:

- Output

-
- Input
 - Slow loading speed

Output

Output interaction concerns the ways in which users receive data, prompts or the results of a command (Tarasewich, 2002). Most mobile communication devices have monochrome screens, although more are being sold with colour screens, that can improve device usability. Reading text on small devices, especially the size found on many mobile phones, can be difficult (Varshney & Vetter, 2002; Tarasewich, 2002; Kukkonen & Kurkela, 2003)

The current limitations of the screens on wireless devices are their size, resolution and colour capabilities all of which are usually of lower quality than those found on desktop computers. These limitations make it difficult to display large amounts of text and graphic-based output such as maps, charts or Web pages on mobile devices (Tarasewich, 2002). However, this problem cannot be simply solved by increasing screen size, because it will also increase the size and weight of a device, thus reducing the mobility of the device (Tarasewich, 2002). In addition, Condos et al. (2002) have found that unreliability of the connection with poor interface design prevented users from completing the most basic and common tasks, such as reading a news article or checking the local weather forecast.

Input

Entering text data is difficult on most wireless hand-held devices (Chan, et al., 2002). Smaller mobile device usually rely on a more limited keypad for input. Most mobile phones use a standard 12-button numeric keypad, sometimes augmented by several special purpose keys (Tarasewich, 2002). This also involves multi-press input methods, where the user must hit the numeric key that also corresponds to the desired letter (Tarasewich, 2002).

Slow loading speed

With respect to the issues associated with input and output of mobile devices, currently mobile computing is still facing the problem of limited bandwidth. It is not feasible to exchange a large amount of information between a hand-held device and the base station. Limited bandwidth prevents a fast download of large amounts of information as well as restricts the loading speed.

Kukkonen & Kurkela (2003) believe that m-commerce may become the key driving force for developing mobile applications, just as e-commerce catalysed the development of Web applications. Condos, et al. (2002) suggest the effect that all the issues related to usability could have on the future development of WAP and the consumer adoption of m-commerce is quite significant. If the usability of a mobile handset is poor, it can have several consequences. The user may be incapable of completing some tasks or in using a service where he is just not satisfied with the product. Researcher and developers must determine and understand carefully what tasks users want to perform anytime from anywhere and decide how to ensure that the information and functionality to support those tasks are readily available and easily accessible. This will improve the overall user experiences as well as the effectiveness of the tools (Buchanan, et al., 2001; Tarasewich, 2002)

2.4.2 Trust, security and privacy

In this section of the paper the aim is to present a range of issues in terms of trust, security and privacy in relation to m-commerce.

According to May (2001) trust, security and privacy are interrelated issues. In the view of Consumer Affairs Victoria in the Department of Justice (2002) privacy issues have always been a key reason for potential online consumers to avoid e-commerce. End-user perceptions of security and privacy are two of the few important antecedents of trust in Internet shopping (Siau & Shen, 2003a). Lu, et al., (2003) have stated that while security has been a major concern in e-commerce, it becomes a more sensitive issue in mobile applications. This is considered to be due to doubts about the security and the inconsistent reliability of wireless connections.

Siau & Sheu (2003a) believe that the growth and success of mobile commerce is crucially depending on customer trust. Whether consumers are willing to adopt m-commerce is directly related to whether a secure system is provided, failing to provide a secure system of m-commerce will significantly dampen the consumer adoption rate (Ghosh and Swaminatha 2001). Security plays a crucial role in facilitating the level of trust users place on mobile devices and applications (Ding & Unnithan (2002). Most end-users and/or consumers are still not quite comfortable with the concept of Web-based businesses, and the electronic medium itself. Problems troubling e-commerce are now faced by m-commerce. M-commerce offers even more unique features than e-commerce (Siau & Sheu 2003b). This implies that new security and privacy risks peculiar to the wireless medium and devices abound in m-commerce. These make gaining end-user trust an even more daunting task (Siau & Sheu 2003a). Ghosh & Swaminatha (2001) have found that the convenience created by a mobile channel has also formed many of the security problems. In terms of m-commerce end-user and/or consumer fears regarding the safety of the information exchanged over a wireless network increases with the degree of interaction and the sensitivity of the information exchanged (Coursaris, et al., 2003).

Research into the risks posed by trust, security and privacy with respect to m-commerce has addressed the problem from a range of perspectives. Coyle, (2001) cited in Lu et al., (2003) has recommended that wireless security must be seen in the broader context of Internet-based e-commerce systems. This implies a need to include: confidentiality, authentication and message integrity.

In this regard an encryption algorithm has been used to determine whether hacking is possible. Coursaris, Hassanein & Head (2003) have pointed out that by comparison to wired encryption at 128 bits, where message hacking is feasible, the standard A5 algorithm with 54 bits encryption adopted by Global Systems for Mobile Communication (GSM) is still not sufficient to provide the desired level of security protection.

Worldwide there is a growing body of empirical research that has attempted to discover the perceptions of end-users on the security issues of wireless Internet access (Lu, et al., 2003; Samtani, et al., 2003; Fang, et al, 2003; Carlsson & Walden, 2003;

Constantiou, et al., 2004; Sivanand, et al., 2004; Wu & Wang, 2004). Research conducted in China reported a strong relationship between wireless trust environment and acceptance of wireless Internet via mobile technology (Lu, et al., 2003). In addition, research conducted by Fang, et al., (2003) concluded that higher perceived security results in greater user intent to use hand-held devices for m-commerce. In both Denmark and Finland security has emerged as one of the key factors affecting mobile services adoption and diffusion (Carlsson & Walden, 2003; Constantiou, et al. 2004). Carlsson & Walden (2003) also found that younger age users are not as concerned about privacy and security issues as are those in the older age group. In Malaysia researchers reported that bank account holders are generally unsatisfied with both the level of security of mobile devices and the level of security in conducting financial transactions in a mobile network environment (Sivanand, et al., 2004). Research in Taiwan has concluded that perceived risk has a significant and direct impact on the behavioural intention to the use of m-commerce (Wu & Wang, 2004). They suggest that privacy and security problems are less than satisfactory and must be overcome for m-commerce to become an accepted merchandising practice. In regard to privacy, cookies and locations-based service also of concern for m-commerce adoption.

2.4.2.1 Cookies

One of the greatest violations of privacy is through the use of cookies that collate and collect data on a user's Internet and mobile device activity. According to the Ohio State University (2004), a cookie is a small piece of information, that the user may be asked to accept when connecting to certain servers via a web browser. It is used throughout the session as a means of identifying the user. In the mobile Internet environment it can also be used to track user's preference and needs in the mobile domain.

2.4.2.2 Location-Based Service

Another privacy concern in relation to m-commerce is Location-Based Service (LBS). As previously mentioned, an advantage of m-commerce is the mobility, accessing mobile Internet anytime and anywhere to conduct various types of activities. LBS are services that exploit knowledge about where an information

device user is located (Gruteser & Grunwald 2003; Hong, Ng, Lederer & Landay 2004). Without safeguards, extensive deployment of such technologies could make end-users face greater risks in terms of location privacy as it exhibits significant potential for abuse (Gruteser & Grunwald, 2003). On the other hand, Barkhuus & Dey (2003) report that people are less concerned about their location being tracked, as long as they find the service useful. WAP gateway and the origin server can be used to track various personal characteristics of the users' habits, preferences and movement and this information can be used to support an extensive personalisation effort.

At an end-user level there must always be a balance between costs (giving up personal information such as location and driving speed) against benefits (such as navigation support). The private information that must be given up forms a potentially significant, though in m-commerce often hidden, cost (Ng, Swatman, Rebne & Hampe, 2003).

2.4.3 Cost of m-commerce

From the literature a number of studies conducted over the recent years have shown that cost is the key barrier against the adoption of m-commerce services (Aarnio, Enkenberg, Heikkilä & Hirvola, 2002; Carlsson & Walden, 2003). Aarnio, et al., (2002) studied the individual view on the adoption of M-commerce services and reported that the high-priced mobile services are generally used by people whose phone bill is paid for by their employer. Research in mainland Finland has shown that consumers perceive operation and initial costs as considerable barriers to the use of m-commerce products and services (Carlsson & Walden 2003).

In Asia, there was a similar finding in Singapore where high usage cost and high cost of Internet-enabled handsets are among numerous factors that consumers perceive as significant barriers to the adoption m-commerce (Samtani, et al., 2003). The same study also identified that low cost of Internet-enabled handsets and low billing costs are m-commerce critical success factors (Samtani, et al., 2003). In a most recent study Constantiou, et al., (2004) found that price is the most important factor influencing the attitudes of both mobile users and shoppers and they point out that high price constitutes one of the major obstacles towards mobile service diffusion. In

Malaysia, researchers have also reported the cost of mobile devices and the cost of subscriptions are the perceived barriers for the adoption of mobile banking (Sivanand, et al., 2004). In addition, Wu & Wang (2004) propose a Technology Acceptance Model (TAM) with extension of cost to examine the behavioural intention to use m-commerce. They found that from the customer perspective, cost is one of the most important predictors of m-commerce adoption intent, that can have a significant negative direct effect on behaviour intention to use the technology.

Moreover, a recent publication from Consumer Affairs Victoria (2004) points out that 3G technology is predicted to increase the availability of m-commerce services, and is likely to drive the development of a wider variety of m-commerce applications. However, the expense of 3G licences as well as the cost for the 3G network infrastructures will need to be passed on to consumers and so could impact on the acceptance of m-commerce (May, 2001).

Frolick & Chen (2004) stress that at the present time the costs for consumers to participate in m-commerce are still considerably high. Although current technology such as General Packet Radio Systems (GPRS) can reduce transmitting time in comparison to Circuit Switch Data (CSD), it is still costly even if is charged by the kilobyte of data transferred. To add to this problem, even if a user only transmits a partial kilobyte of data, most GPRS vendors round up to the next full kilobyte on a daily basis. This has the potential to add up significantly over a billing cycle (Parker, 2002 cited in Frolick & Chen (2004).

2.5 Chapter Summary

This chapter reviewed the difference between e-commerce and m-commerce, the unique set of problems associated with the future success of m-commerce. Research directions for m-commerce adoption have been addressed. The importance of understanding mobile value has also been outlined. From the literature it has been demonstrated that the mobile value dimension can vary from country to country. Furthermore, previous international research on barriers for m-commerce have showed issues such as usability, trust, security, privacy and cost are barriers limiting the adoption of m-commerce. Thus research should be conducted to investigate the

type of services and values and barriers perceived as important to the Tasmanian end-user.

3 Chapter 3 – Methodology

3.1 Introduction

The major purpose of this chapter is to describe in detail the process of data collection used in this research. Thus, this chapter will review issues such as:

- Philosophical Stance
- Ethical Compliance
- Research Method
- Data Coding and Analysis
- Chapter Summary

3.2 Philosophical Stance

There are many different research philosophies that a researcher can adopt in conducting research. For the purpose of this research, the researcher has adopted an objective ontology and a positive epistemology. This implies, the research will be conducted using a quantitative approach and the raw data will be analysed statistically. A mail survey was selected as the method for this research. The choice of a mail survey was determined for two reasons. First, a wide geographical area can be cost effectively covered and second, respondents can complete it at their own convenience in their homes, and at their own pace (Cavana, et al. 2001).

The primary objective of this research is to gain an overview of m-commerce from an end-user perspective. Therefore, other philosophical stances such as an subjective ontology and interpretive epistemology that may be based on interviews may be time consuming and the research may not be able to reach to the mass population of Tasmania.

3.3 Ethical Compliance

This research has been approved by the Human Research Ethics Committee (Tasmania Network) at the University of Tasmania. The researcher has received a Minimal Risk Application Approval, meaning that the Human Research Ethics

Committee requires the upholding of issues such as privacy, potential risk, confidentiality and anonymity.

3.4 Research Method

The purpose of this section is to provide a detailed description of the method used in this research. Within it, the following aspects of the methodology will be addressed:

- Sample Section
- Research Instrument
- Pilot Test
- Main Survey Administration

3.4.1 Sample selection

The primary objective of this research is to gain an overview of m-commerce in Tasmania. For this reason, the first step taken for this research is to determine the potential sample population based on the total population of Tasmania.

According to Australian Bureau of Statistics (2004) the population in Tasmania is approximately 471,795. Of this total, 231,854 people live in the greater Hobart-Southern area. This accounts for 49.14% of the Tasmanian total population. A further 133,115 people live in Launceston and North Eastern Tasmania representing 28.21% of the total population. The remaining population of 106,826 is located in the North West and West Coast (22.64%).

Due to the difference in population across the three areas, in order for the researcher to select the sample population, a random sampling technique was adopted in this research. In doing so the researcher could ensure the chance for every element in the population to be equally represented. For this reason, the potential sample population was identified using the three telephone directories used in this state. These directories represent different telephone area codes, Hobart and Southern Tasmania (03-62) Launceston and North Eastern Tasmania (03-63), the North West and West Coast (03-64). Telephone directories are updated on an annual basis, and new versions are due to be released in September 2004. The three directories used for this research are the most recently released versions at the time the research was

conducted. Since they represent a static resource many of the listings may now be out-of-date.

Due to the financial constraints within the masters research program at the School of Information Systems the maximum number of mail surveys that can be sent out is limited to three hundred.

The researcher used these directories to manually identify the potential sample population for this research and ensure that the potential sample population only included residential addresses and no commercial entries were included. This process was done according to the ratio within the three directories and translated to approximately one sample every 2.2 pages. Overall the directories contain a total of 685 pages. Of these 320 pages or 46.72% are listed in the telephone directory for Hobart & Southern Tasmania, thus 140 potential participants were chosen. A further 204 pages or 29.78% are in the Launceston & Northern Eastern Tasmania directory, thus a sample involving 89 residents in that area was selected. The North West & West Coast directory contains 161 or 23.5% and this was used to identify the final 71 potential questionnaire recipients.

After the identification of research sample, the researcher established a database using the label merge function in Microsoft Word software. Thereafter, the researcher manually entered each of the three hundred sample addresses into the database.

3.4.2 Research instrument

To the best of the knowledge of the researcher, this research is the first exploratory study attempted to gain an insight of m-commerce in a Tasmanian context. The research instrument used in this investigation was drawn from previous international research in the area of m-commerce from an end-user perspective (Ankar & D'Incau, 2002; Ankar & Eriksson, 2003; Pederson & Ling, 2003; Lu, et al., 2003; Samtani, et al., 2003; Fang, et al, 2003; Carlsson & Walden, 2003; Constantiou, et al., 2004; Sivanand, et al., 2004 & Wu & Wang, 2004).

The following section acknowledges the key contribution from previous IS literature for this research, as well as formulation of questions in the questionnaire.

The Mobile Internet experience questions, were constructed with reference to the Technology Acceptance Model (TAM) (Davis,1989). The aim of this section was to gain an understanding of respondent perceptions in terms of usefulness and ease of use towards accessing the Internet via a mobile communication device.

The questions related to the willingness for Mobile Commerce Service, mobile value perceptions, usage settings and end-user channel preferences sections, are drawn from May (2001), Anckar & D’Incau (2002) and Anckar & Eriksson (2003). In adopting these questions minor changes were made to suit the Australian context of the present research.

The questions focussed on the perceived barriers to the m-commerce usage were developed in accordance with previous studies in the area (Carlsson & Walden, 2003; Lu, et al., 2003; Samtani, et al., 2003; Fang, et al., 2003; Constantiou, et al., 2004; Sivanand, 2004).

3.4.3 Questionnaire structure and content

The instrument developed for the purposes of the research presented in this thesis consists of 9 sections with 18 questions and 122 items. These are listed below.

Demographic characteristics (3 items)

Internet usage (3 items)

Devices ownership (3 items)

Mobile Internet experience (9 items)

Willingness of mobile commerce services (24 items)

Value perceptions (23 items)

Usage setting (23 items)

Channel preferences (23 items)

Barriers identification (11 items)

Blank space for comment in relation to experiences with Mobile Commerce.

(Questionnaire can be found in Appendix A)

The questionnaire consists of eighteen questions in numerical order from 1 to 18.

- **Demographic questions**

Questions 1 to 3 were demographic questions. The aim of demographic section is to assist with the analysis and interpretation of the results. The demographic section consists of general questions such age, gender and telephone area code. For each of the questions participants were asked to tick one box to indicate their status.

- **Internet usage questions**

Questions 4 to 6 were Internet usage questions, with the aim of identifying participant's level of experience in terms of the use of the Internet. Respondents were asked to tick one box for each of the questions. Note, that if respondents reported that he/she is not an Internet user in Question 4, then the respondent was asked to skip question 5 and 6 and directed to respond to Question 7, Question 6 related to usage of the internet so were not applicable in the case of non-Internet users.

- **Device ownership questions**

Questions 7 to 9 related to device ownership. First respondents were asked whether or not he/she owns a mobile communication device. If respondents report that he/she did not own a mobile communication device, they are directed to answer Question 18 in the perceived barriers section. Respondents who own a mobile communication device were asked to tick one box to describe the primary mobile network service provider they currently use and the device they own. The aim of this question is to determine the mobile communication technology respondents have adopted.

- **Mobile Internet experience questions**

Questions 10 to 12 related to the mobile Internet experience. Only respondents who answered "Yes" to Question 10 "Have used mobile phone or Personal Digital Assistance (PDA) to access the Internet" are required to respond to question 11 and 12. Respondents, who reported that he/she did not have any previous experience using a mobile communication device to access the Internet, were directed to answer Question 13. Questions 11 and 12 attempted to identify user experiences towards the use of the Internet via mobile communication devices. For these questions a 5-point

Likert scale was used that ranged from 1 = strongly disagree and 5 = strongly agree. As pointed out by Argyrous (1996) when measuring attitude or satisfaction in opinion surveys, the use of ordinal scales is very common.

- **Willingness for mobile commerce service questions**

Question 13-14 aimed to identify mobile services that could gain the most popularity, as well as attempting to clarify user willingness in using m-commerce services. Question 13 consisted of twenty-three m-commerce services items. Question 14 was a statement that attempted to identify the respondents' interest level in terms of trying m-commerce services over the next six to eighteen months. Again a 5-point Likert scale was used to determine the likelihood of respondents using the service should it be available.

- **Value perception question**

Question 15 aimed to identify mobile value for each of the twenty-three proposed m-commerce services. The question consisted five types of mobile values as identified by Ankar & D'Incau (2002). For each of these items, respondents were asked to tick as many boxes to indicate the mobile value dimension each represents to them.

- **Usage identification in different environmental setting**

Question 16 aimed to identify the usage setting for each of the twenty-three proposed m-commerce services. Usage settings were constructed to find out what kind of environmental setting respondents is likely to use. Respondents were given choices of different environmental setting such as:

RE = Restaurants/ bars / Cafés

TR = in transportation

AB = abroad

ST = in the street

WE = at weekend/ holiday house

HO = at home

WO = at work/school

For each of these different environmental setting, respondents were asked to tick as many boxes to indicate the setting they would use for m-commerce services.

- **End-user preferred channels (PC vs. mobile device)**

Question 17 aimed to find out that if the proposed twenty-three m-commerce services are available for use in both Stationary PC and Mobile devices, what is the preferred channel for using the service. For each service respondents are required to tick one box to indicate the preferred channel.

- **Barriers**

Question 18 attempted to identify barriers for m-commerce adoption. From a list of perceived barriers participants were asked to indicate, using a 5-point Likert scale, the extent to which these represented barriers to their adoption of m-commerce.

3.4.4 Pilot test

The purpose of the pilot test is to refine the draft questionnaire to ensure its content is understandable and the level of language is appropriate. The pilot test has contributed to this research in two ways. By conducting the pilot test the researcher gained *face validity* and *content validity* for the research questionnaire. The former addresses concerns of whether the questionnaire appears to measure the concepts being investigated (Cavana, et al., 2001). The latter refers to the representativeness or sampling adequacy of the questionnaire regarding the content or the theoretical constructs to be measured (Cavana, et al., 2001). In this research two pilot rounds of tests were conducted.

3.4.4.1 Round 1

The first pilot round was conducted at the School of Information Systems within the University of Tasmania, Hobart campus. Ten people participated in the first round of piloting that included undergraduate students, honours and PhD students, student union staff and academic staff. Each participant completed the questionnaire then took part in a short interview with the researcher. During this follow up interview the researcher took the opportunity to ask questions regarding the questionnaire, thereby

gaining feedback to enable the refinement of the draft questionnaire. The first round of piloting gained valuable feedback. As a result minor modifications were made to improve the quality of the main questionnaire. Modifications included spelling, language and increasing the number of tick boxes in both the demographic and Internet usage sections.

3.4.4.2 Round 2

Following the first round of piloting a second round of piloting was distributed to 10 members of the Tasmanian population, again drawn from the telephone directories in this state. These were distributed by mail and involved questionnaires that had been refined on the initial round of piloting. From this second pilot distribution, one was returned as undeliverable by Australia Post and no other returns were received. One response was received after the second round piloting cut off date and therefore it was unusable.

3.4.5 Main survey administration

The researcher administrated the main questionnaire on the 20th of September 2004. Within this 300 questionnaires were sent via Australia Post to the potential sample population identified earlier from the White Pages telephone directories.

The questionnaire mail out included a letter of invitation to participate, an information sheet and a self-addressed pre-paid envelope for respondents to return the questionnaire back to the researcher (letter of invitation, information sheet can be found on Appendix B). In addition a complementary tea bag was included in the mail package. The aim of providing the tea bag was to encourage recipients to take time out and participate in the research.

The potential participant was encouraged to return the survey by the 1st of October 2004. This allowed participants ten days to reply. This turn around time frame was specifically established so as not to appear too demanding of immediate attention, or on the other hand, allowing a long period of time where the questionnaire could be overlooked.

3.4.6 Reminder questionnaire distribution

In order to increase the response rate, on the 4th of October 2004, the researcher administered a reminder. Due to the anonymity of the research, the researcher was unable to identify those who already responded to the first mailing, so on this basis the reminder mail out was distributed to the entire initial potential participants. The exceptions were 20 undeliverable mails returned from the first round mail out. This second mail-out contained the same documents as the first mail out package with the exception of a letter of invitation and tea bag. A reminder letter was included that provided an explanation for the second contact. It thanked those who had already responded and urged those who had not yet done so to participate. The return date for this reminder questionnaire was set as the 13th October 2004. (Reminder letter can be found in Appendix C)

3.5 Data Coding and Analysis

As soon as responses to the questionnaire were received, the researcher manually entered the data into Statistical Package for the Social Sciences (SPSS). This is a computer software operates on Microsoft Windows operating systems for statistical evaluation of data. It has been widely available and it has used in social science research for a numbers of years.

For the purpose of this research, questionnaires received on or before the 4th October 2004 were classified as early responses while those received post 4th October 2004 were classified as late responses.

3.6 Chapter Summary

This chapter has outlined the research method deployed for this research. Initially the philosophical stance of this research was established. The compliance of this research with ethical approval was then acknowledged. The research methodology was then provided in some detail. It included the process of the selection of a potential sample population. Within this the development of research instrument was also described. The two rounds of pilot testing were then explained. These enabled a refinement of the draft questionnaires, and also addressed issues of face and content validity. A refined version was developed after gaining the feedback from piloting test. The main survey was distributed to the potential sample population on the 20th September 2004. A reminder survey was mailed out that aimed to increase the overall response rate. Finally the process of data coding was described.

4 Results

4.1 Introduction

The aim of this chapter is to report the research results obtained from the mail survey that was distributed to a sample population of the Tasmanian general public. In this chapter the following issues will be addressed:

- Response Rate
- Representativeness of the Data
- Demographic Results
- Main Results
- Chapter Summary

4.2 Response Rate

From the original 300 mailed out questionnaires, 26 were returned as undeliverable by Australian Post. A further 7 potential participants reported by mail or by telephone to the researcher that they are unable to respond due to personal reasons. Three people reported that the recipients were deceased. A total of six responses were eliminated from the analysis as they were unusable. Thus, the total of potential participants is reduced to 258. Based on 88 usable responses this gives a response rate of 31%. According to Neuman (2003) the common response rate for mail survey is between 10% to 50%. Thus response rate achieved in this research is considered acceptable.

4.3 Representativeness of the Data

In the initial stage of analysis of the data, it is vital to test that the data are representative of the Tasmanian general public. Thus, there is a need to determine whether there is a difference between respondents and non-respondents. Due to the fact that there is no existing data from the non-respondents, received responses are therefore categorised into two groups, early and late responses.

A statistical test was used with the assumption that if there is no significance between two groups the responses are representative of general population in Tasmania.

Of the total 88 responses, 62% were classified as early responses, while 38% were classified as late responses (see Figure 4.1). For this research, questionnaires received on or before the 4th October 2004 were classified as early responses, those received this date were classified as late responses.

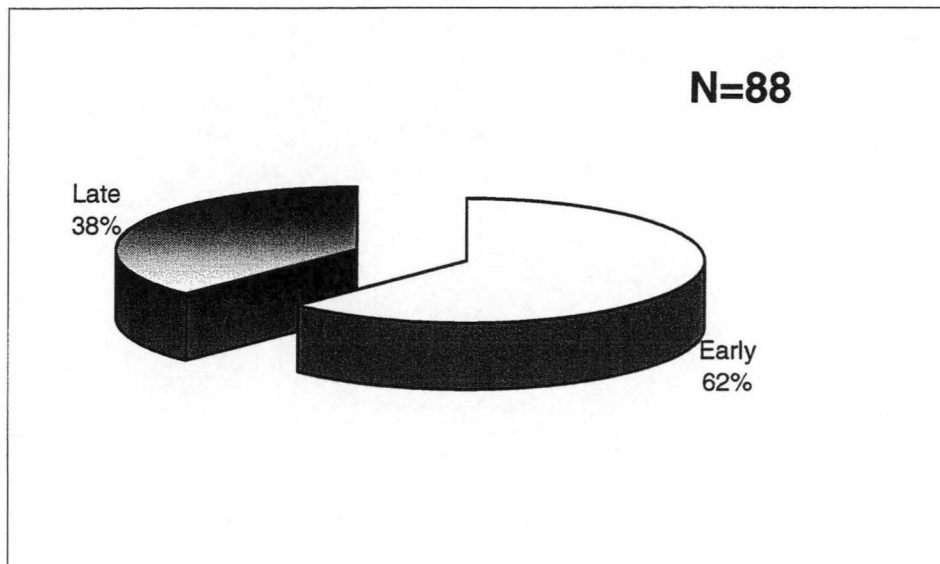


Figure 4.1 Time of response

For the purpose of testing the representativeness, a Chi-square test was used to determine whether there are significant differences between early and late responses based on three demographic results (age of respondents, gender of respondents and geographic location according to telephone area code). For each of the three perspectives no significant differences were found. The Chi-square test showed that for age of respondents (at 1df=.607, $p>.05$) for gender of respondents (at 1df=.533, $p>.05$) while for geographic location (at 2df=.767, $p>.05$). Thus, the responses within this research are shown to be representative of the Tasmanian general public.

4.4 Demographic Results

The aim of this section is to present the characteristics of those who participated in this research. The following result will be presented:

- Age of respondents
- Gender of the respondents
- Geographical Location (based on telephone area code)
- Internet experience
- Ownership of mobile communication devices

4.4.1 Age of respondents

Since only one person reported being in the 18-24 age category these data were merged into a new 18-31 age category.

The results for the age of respondents is presented in Table 4.1. From the 88 total respondents, 35% reported they are aged 59 years and above. A further 22% indicated they fall within the 39-45 years age group. From the remainder 19% reported their age as being from 46-52 years, 10% were aged between 53-59 years. The final 14% was equally divided between the 18-31 years age bracket and those 32-38 years of age.

Table 4.1 Age distributions of respondents

4.4.1.1 Age	%
Above 59	35
39-45	22
46-52	19
53-59	10
18-31	7
32-38	7
Total	100

N=88

4.4.2 Gender of respondents

As Figure 4.2 shows, 82 respondents provided gender details, 68% of whom were males and 32% of the respondents were females.

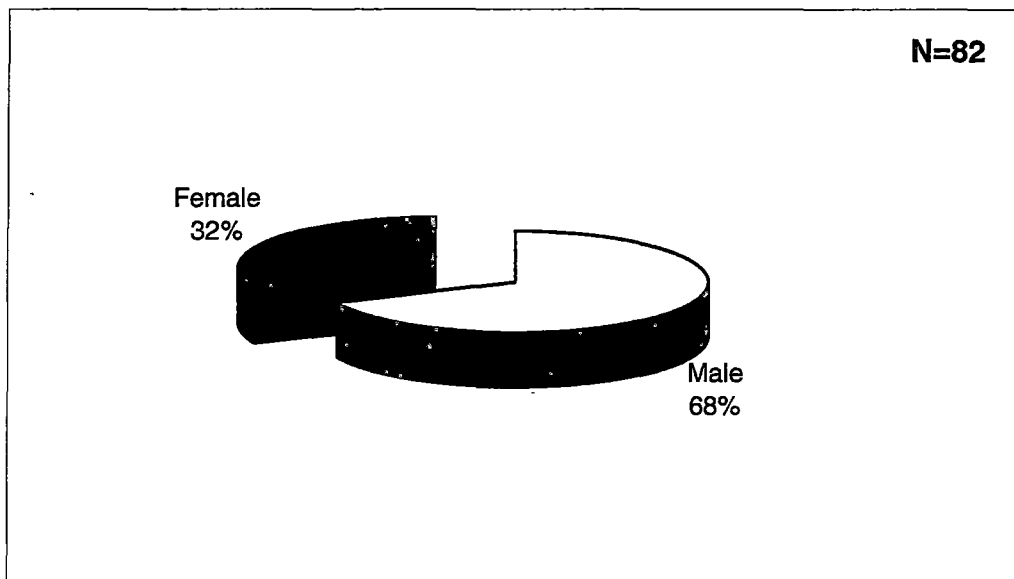


Figure 4.2 Gender distributions of respondents

4.4.3 Geographical location

As Table 4.2 indicates 85 respondents provided their telephone area code. Within these 42% are resident in Hobart & Southern Tasmania, 33% live in Launceston and the North East of Tasmania while 25% live on the North West & West Coast.

Table 4.2 Geographical location distributions of respondents

Geographic location	%
Area code 62 (Hobart & Southern Tasmania)	42
Area code 63 (Launceston and the North East)	33
Area code 64 (North West & West Coast)	25
Total	100

N=85

4.4.4 Internet adoption of respondents

As reported in Table 4.3, based on 86 responses, 64% of respondents reported they are Internet users while 36% indicated they are not.

Table 4.3 Internet adoption distributions of respondents

Internet usage	%
Internet user	64
Non Internet user	36
Total	100

N=86

4.4.4.1 Years of Internet experience of respondent have adopted Internet

As Table 4.4 shows, 54 out of the 55 respondents who reported they are Internet users, completed this section of the questionnaire. Within these 22% of respondents have 7-8 years Internet experience. A further 20% have used the Internet for 3-4 years. Internet users with 0-2 years and 5-6 years experience each accounted 19% of the responses. Of the remainder 13% reported having more than 10 years of experience while 7% of Internet users have used it for 9-10 years.

Table 4.4 Years of Internet experience

Year of experience	%
7-8 Years	22
3-4 Years	20
0-2 Years	19
5-6 Years	19
More than 10 Years	13
9-10 Years	7
Total	100

N=54

4.4.4.2 Experience in engaging e-commerce activities

Of total of 55 respondents who reported they were Internet users, 53 responded to a question whether or not they have engaged in e-commerce. As Figure 4.3 reports 77% of respondents have engaged in e-commerce activities such as purchasing, making payment or booking over the Internet. The remaining 23% have not engaged in any E-commerce activities.

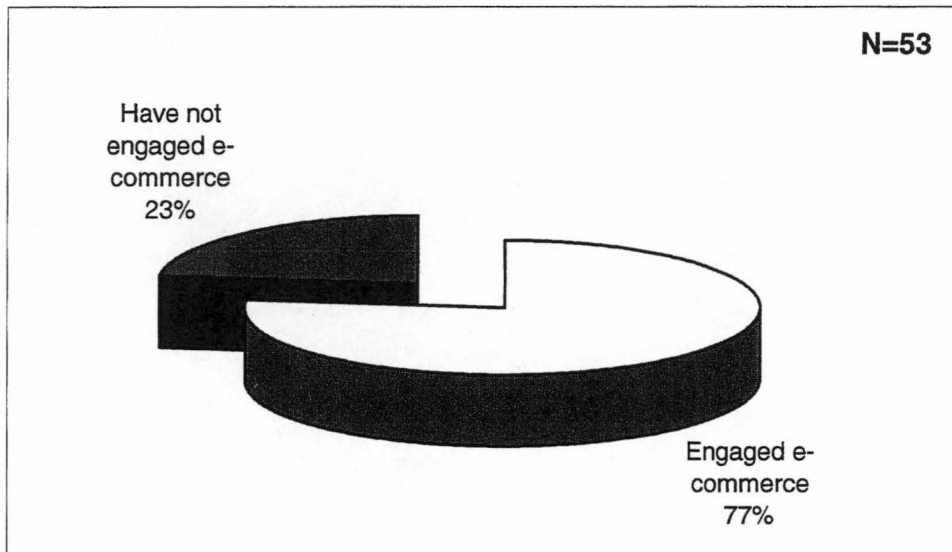


Figure 4.3 Engagement in e-commerce

4.4.5 Mobile communication device ownership of respondents

As Figure 4.4 shows, of the 87 total respondents, 69% reported they own a mobile communication device, while the remainder do not.

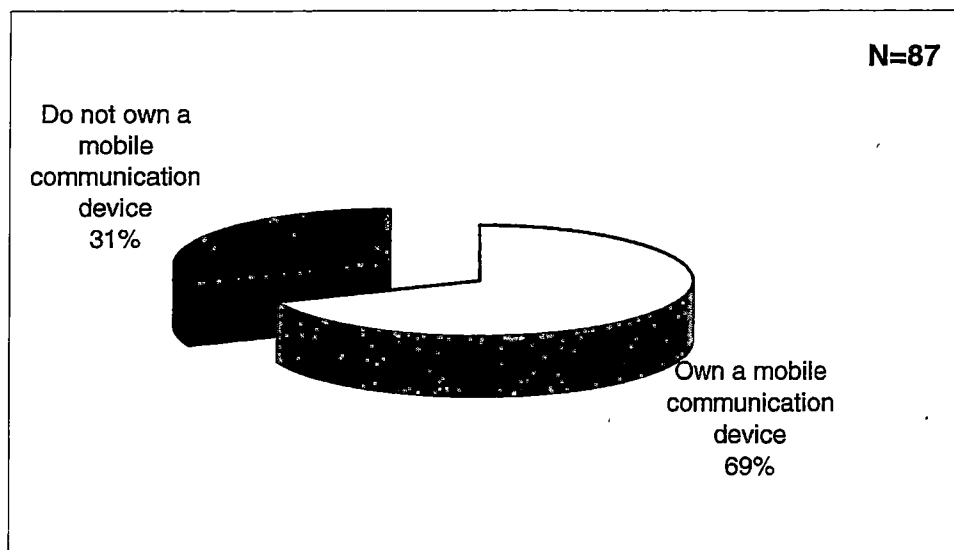


Figure 4.4 Mobile communication device ownership

4.4.5.1 The primary mobile network service provider chosen by respondents who own a mobile communication device

As shown in Table 4.5, of the 58 respondents who reported they own a mobile communication device, 72% reported Telstra GSM network as their primary mobile network provider. A further 21% reported Telstra CDMA as their service provider. Currently 7% indicated they use the Optus (GSM) network. No responses were forthcoming for Vodafone (GSM).

Table 4.5 Mobile network service provide

Primary mobile network service provider	%
Telstra(GSM)	72
Telstra(CDMA)	21
Optus(GSM)	7
Total	100

N=58

4.4.5.2 Type of mobile communication devices own by respondents

As shown in Table 4.6, of the 58 respondents who own a mobile communication device, 60% reported they own a GSM mobile phone without Internet accessibility, 12% reported they own a GSM mobile phone with Internet accessibility. Of the remainder 19% reported they own a CDMA mobile phone without Internet accessibility while 7% reported they own a CDMA mobile phone with Internet accessibility. No respondents own a PDA with wireless Internet accessibility while 2% indicated they were unsure of what type of device they own.

Table 4.6 Type of mobile communication devices ownership

Device type owned by respondents	%
GSM mobile phone without Internet accessibility	60
CDMA mobile phone without Internet accessibility	19
GSM mobile phone with Internet accessibility	12
CDMA mobile phone with Internet accessibility	7
Unsure	2
Total	100

N=58

4.4.6 Summary of the characteristics of the respondents

In short, a majority (35%) of respondents are older age people, the youngsters aged between 18-31 only accounted 7% of the total responses. Also, more males (68%) than females (32%) took part with this research. In terms of Internet adoption, 63% of Tasmanians are Internet users. Within these, 13% have had more than 10 years of Internet experience, while 77% have engaged in e-commerce activities. Moreover, 69% of respondents own a mobile communication device. Within the mobile communication device owners 72% used Telstra (GSM) and whereas 7% use Optus (GSM) as their primary mobile network service provider. On this basis it appears that the GSM network is the most popular mobile network for Tasmanians. In terms of ownership of types of mobile communication devices, 60% of respondent who own a mobile communication device reported that they own a GSM mobile phone without Internet access and 19% reported they own a CDMA mobile phone without Internet

access. This implies that a total of 79% of mobile owners do not own a mobile communication device that can access the Internet.

4.5 Main Results

The main results of this research will be addressed in this part of the chapter. This will include the following issues:

- Data Normality
- Reliability
- Willingness of use m-commerce services
- Value dimension
- Usage setting
- Channel preference
- Barriers for m-commerce adoption

4.5.1 Data normality

The collected data were tested to find out whether it was normally distributed. This was done by a review of the skewness and kurtosis output as well as the application of the Kolmogorov-Smirnov test. Skewness and Kurtosis is used to measure the symmetry and the peak distribution (Coakes & Steed, 2003). In addition, as the sample size is greater than fifty, the Kolmogorov-Smirnov statistic testing was applied. If the significance level is greater than .05 then normality is assumed (Coakes & Steed, 2003). The Kolmogorov-Smirnov test was applied to four aspects of the data: usefulness, ease of use, willingness and barriers. This test showed that for usefulness, $p = .2 > .05$, for ease of use, $p = .2 > .05$, willingness $p = .2 > .05$ and for barriers $p = .2 > .05$. On this basis the assumption of a normal distribution has been fulfilled in this dataset.

4.5.2 Reliability

The reliability of a measure indicates the stability and consistency with which the instrument measures the concept and helps to access the ‘goodness’ of a measure. (Cavana, et al., 2001).

Due to the small sample size (less than 100) in this research, it is not possible to perform a factor analysis (Coakes & Steed, 2003). Thus Cronbach’s alpha was used to test reliability. According to Cavana, et al., (2001) Cronbach’s alpha reliability coefficients are based on the average correlation of items within the test group.

The Cronbach’s alpha coefficient can hold a value of zero to 1. The closer the reliability coefficient gets to 1.0, the better (Cavana, et al., 2001). In general, a reliability of less than 0.60 is considered as poor, while above 0.70 is acceptable and a co-efficient of 0.80 is considered as good (Cavana, et al., 2001).

As indicated in the Table 4.7, the outcomes of Cronbach’s Alpha coefficients for this research were all above 0.80. Thus it can be assumed that all the items used for data collection in this research are reliable.

Table 4.7 Cronbach’s Alpha reliability coefficients

Variables	Number of items	Cronbach’s Alpha
Perceive Usefulness	5	0.9
Ease of Use	3	1
Willingness for M-commerce services	23	0.9
Barriers	11	0.9

4.5.3 Willingness to use m-commerce services

These questions of willingness to use m-commerce services were posed with reference to Ankar & D’Incau (2002) and Ankar & Eriksson (2003). In this section the results for this aspect of the research will be presented in the following sequence:

- Interest in trying out m-commerce services in the next 6-18 months
- Willingness to use proposed m-commerce services
- Willingness to use m-commerce on the basis of gender
- Willingness to use m-commerce on the basis of age
- Willingness to use m-commerce on the basis to geographic location

4.5.3.1 Interest in trying out m-commerce services in the next 6-18 months

Respondents were asked whether they are interested to try out m-commerce services over the Internet via mobile communication device in the next 6-18 months. As Table 4.8 shows, 22% of respondents indicated their willingness to try out m-commerce services over the next 6-18 months.

Table 4.8 Observed Interest in trying out m-commerce services in 6-18 months

	N	Interest (%) <i>a</i>	Mean
Interested to try M-commerce Services in 6-18 months	60	22	2.2

a = Percentage of respondents who responded agree (4) or strongly agree (5)

4.5.3.2 Willingness to use proposed m-commerce services

Respondents were asked if the m-commerce services that are subject of the investigation are available, whether or not they will be willing to use the service. As Table 4.9 shows, 48.3% of respondents are interested in using e-mail services. A further 43.3% of respondents are interested in using calendaring/alerting services. Slightly less respondents 41.7% are interested in using restaurant table reservation services.

On the other hand, respondents are least willing to use m-commerce services to engaged Internet auctions. Only 5% of respondents reported they will use this service, followed by access of live footage of Big Brother House with only 3.4% of respondents willing to use m-commerce for this service.

Table 4.9 Observed willingness to use m-commerce services

M-commerce services	N	Interest (%) <i>a</i>	Mean
Send/receive email	59	48.3	3.4
Calendaring/alerting services	59	43.3	3.0
Restaurant table reservations	60	41.7	3.1
Book travel tickets	60	40.0	2.9
Undertake routine banking services	60	38.3	2.9
Book cinema/theatre tickets	60	36.7	2.9
Remote activation of appliances	59	26.7	2.5
Read and receive news	60	26.7	2.7
Send insurance damage reports	59	26.7	2.2
Pay for parking meter	60	23.3	2.3
Advanced banking services	60	21.6	2.2
Listen to/download music	59	20.0	2.4
Buy products online	60	18.3	2.3
Payment in physical shops	59	13.4	2.3
Make purchase on vendor machine	59	13.3	2.0
Play online games	60	13.3	1.8
Stock trading	60	10.0	1.9
Receive personalised offers	60	8.4	1.7
Mobile betting/lotto services	60	8.4	1.5
Interactive voting	59	8.3	1.6
Online chat with strangers	60	6.6	1.4
Take part in Internet auctions	59	5.0	1.8
Access live footage from Big Brother House	60	3.4	1.3

a = Percentage of respondents who responded agree (4) or strongly agree (5)

4.5.3.3 Willingness to use m-commerce services on the basis of gender

Previous research has shown that willingness to use different m-commerce services may vary according to gender (Anckar & D’Incau, 2002). In Finland, research has found that woman were more eager to use m-commerce services such as reserve cinema/theatre tickets, while men are much more willing to use m-commerce services for stock trading, remote control of home appliances, playing online games, and taking part in Internet auctions (Anckar & D’Incau, 2002).

Table 4.10 reports the results obtained in the present research. These were tested using independent sample t-tests to determine whether there were any statistical significances on the basis of gender. These tests revealed that this proved to be true in only one m-commerce service, listen to/download music ($p = .018, < .05$).

Table 4.10 Observed willingness to use m-commerce services between males and females

M-commerce services	All Respondents		Gender	
	N	Mean for M	Mean for F	2 tailed Sig.
Send/receive email	59	3.2	3.8	0.15
Calendaring/alerting services	59	2.9	3.5	0.22
Restaurant table reservations	60	3.0	3.4	0.40
Book travel tickets	60	3.0	2.9	0.77
Undertake routine banking services	60	2.9	3.0	0.80
Book cinema/theatre tickets	60	2.8	3.1	0.48
Remote activation of appliances	59	2.6	2.4	0.69
Read and receive news	60	2.6	2.9	0.53
Send insurance damage reports	59	2.3	2.3	0.93
Pay for parking meter	60	2.3	2.4	0.93
Advanced banking services	60	2.2	2.2	0.92
Listen to/download music	59	2.1	3.1	0.02*
Buy products online	60	2.2	2.5	0.47
Payment in physical shops	59	2.4	2.1	0.52
Make purchase on vendor machine	59	2.0	2.1	0.90
Play online games	60	1.7	2.3	0.10
Stock trading	60	1.9	1.8	0.78
Receive personalised offers	60	1.7	1.8	0.72
Mobile betting/lotto services	60	1.5	1.5	0.98
Interactive voting	59	1.5	1.9	0.29
Online chat with strangers	60	1.5	1.2	0.15
Take part in Internet auctions	59	1.8	1.9	0.66
Access live footage from Big Brother House	60	1.3	1.3	0.10

* Significant at the 0.05 probability level

4.5.3.4 Willingness to use m-commerce services based on age group

According to Anckar & D’Incau (2002) there is a possible linkage between age and the willingness to use m-commerce services. In Finland, those in the younger age group are much more likely to use m-commerce service compared to older people. Thus it would be interesting to see whether the same phenomenon occurs in Tasmania.

Table 4.11 provides the mean results based on the six age classifications and willingness to use proposed m-commerce services. It also reports the outcome of One-Way ANOVA test used to determine any significant differences between the various age groups.

The ANOVA tests revealed significant differences on the basis of age group with respect to the following m-commerce services:

Send/receive E-mail ($F(5,53) = 2.44, p = 0.046, < .05$)

Calendaring/alerting services ($F(5,53) = 2.95, p = 0.020, < .05$)

Send insurance damage reports ($F(5,53) = 3.93, p = 0.004, < .05$)

Listen/download music ($F(5,53) = 3.54, p = 0.008, < .05$)

Take part in Internet auctions ($F(5,53) = 4.03, p = 0.004, < .05$)

To determine where these differences are post-hoc pairwise comparison tests were used. For send/receive E-mail, calendaring/alerting services, listen/download music because Levene’s assumption of equality variance was fulfilled Tukey post-hoc tests were used. These showed that for:

For send/receive E-mail, the age groups 18-31 and 59 and above there was a significant mean difference (2.28) .03 $p < .05$.

For calendaring/alerting services, the Tukey post-hoc test was unable to detect any significant differences between the Pairwise comparisons. Potentially this outcome can be explained due to the small sample size when the data were divided on the basis of age categories.

Significant mean differences were found on listen/download music for the age groups 18-31 and the age group 39-45 (1.81) .04 $p < .05$), the age group 46-52 (2.17) .01 $p < .05$), 53-59 (2.31) .02 $p < .05$) and 59 and above (2.39) .01 $p < .05$).

The remaining two mobile services, send insurance damage report and take part in Internet auctions, while significant, failed to meet the equality of variance, so Dunnett T3 post-hoc tests were used. These showed:

Send insurance damage reports, the age groups 39-45 and 46-52 there was a significant difference ((1.84) .00 $p < .05$) and age groups 53-59 ((1.88) 0.02 $p < .05$).

Take part in Internet auctions, the age groups 18-31 and 46-52 there was a significant difference ((1.5) .00 $p < .05$) and age groups 53-59 ((1.5) .00 $p < .05$).

Table 4.11 Willingness to use m-commerce services between different age groups

M-commerce services	Age group						Sig.
	18-31	32-38	39-45	46-52	53-59	59+	
Send/receive email	4.8	4.0	3.4	3.2	2.9	2.6	0.046*
Calendaring/alerting services	4.3	3.8	3.6	2.6	2.1	2.1	0.020*
Restaurant table reservations	3.5	3.4	3.5	2.9	2.7	2.5	0.441
Book travel tickets	3.0	2.6	3.4	2.6	2.9	2.6	0.620
Undertake routine banking services	3.5	3.4	3.5	2.3	2.3	2.5	0.757
Book cinema/theatre tickets	3.2	3.4	3.0	2.7	2.9	2.5	0.857
Read and receive news	3.2	2.4	2.7	2.5	2.7	2.8	0.928
Remote activation of appliances	2.7	2.8	2.6	2.3	2.1	2.4	0.068
Send insurance damage reports	2.7	2.8	3.2	1.4	1.4	1.9	0.004*
Pay for parking meter	2.8	2.6	2.6	2.1	2.0	2.1	0.789
Advanced banking services	2.5	2.2	2.9	1.9	1.6	1.5	0.105
Listen to/download music	4.2	3.0	2.4	2.0	1.9	1.8	0.008*
Buy products online	2.7	2.6	2.9	2.0	1.9	1.6	0.104
Payment in physical shops	2.8	2.0	2.7	1.9	2.4	1.7	0.167
Make purchase on vendor machine	2.3	2.4	2.5	1.7	1.6	1.7	0.408
Play online games	3.0	2.4	1.9	1.5	1.3	1.4	0.113
Stock trading	2.0	2.4	2.1	1.5	1.3	2.0	0.491
Receive personalised offers	2.0	1.4	1.9	1.5	1.6	1.8	0.799
Mobile betting/lotto services	1.8	2.0	1.5	1.3	1.0	1.5	0.595
Interactive voting	2.3	2.2	1.8	1.3	1.1	1.6	0.312
Online chat with strangers	1.5	1.4	1.7	1.3	1.0	1.0	0.431
Take part in Internet auctions	2.8	2.0	2.4	1.3	1.3	1.3	0.004*
Access live footage from Big Brother House	1.9	1.6	1.3	1.3	1.0	1.1	0.406

* Significant at the 0.05 probability level

4.5.3.5 A Comparison of willingness to use m-commerce services between geographic locations

The aim of this portion of the results is to investigate whether there are differences in the willingness to use m-commerce services on the basis of geographic location.

Table 4.12 provides the mean results for each region used in this research as well as the outcome from one-way ANOVA tests. It shows that the only significant difference related to receive personalised messages and take part in Internet auctions.

For receive personalised messages ($F(2,56)$, $p = 0.043$ while for auctions ($F(2,55)$, $p = .029$).

Because both results fails to fulfil an assumption of equality of variance Dunnett T3 post hoc tests was used to locate where the difference were between the three regions.

The application of this test failed to locate any significant difference between the three regions on both willingness to receive personalised message and take part of Internet auctions. Potentially this outcome can be explained due to the small sample size when the data were divided on the basis of geographic region.

Table 4.12 Observed willingness to use m-commerce services between geographic locations

M-commerce services	Location			Sig.
	62	63	64	
Send/receive email	3.3	3.6	3.2	0.696
Calendaring/alerting services	2.8	3.6	2.8	0.309
Restaurant table reservations	3.2	3.3	2.8	0.667
Book travel tickets	3.1	2.9	2.7	0.689
Undertake routine banking services	3.0	2.4	3.1	0.441
Book cinema/theatre tickets	3.0	3.0	2.6	0.531
Read and receive news	2.6	2.9	2.6	0.673
Remote activation of appliances	2.7	2.2	2.5	0.519
Send insurance damage reports	2.1	2.1	2.8	0.313
Pay for parking meter	2.3	1.9	2.7	0.357
Advanced banking services	2.0	2.3	2.5	0.508
Listen to/download music	2.1	2.7	2.5	0.339
Buy products online	2.2	2.5	2.3	0.765
Payment in physical shops	2.4	1.9	2.4	0.473
Make purchase on vendor machine	2.0	1.8	2.3	0.465
Play online games	1.4	2.0	2.3	0.096
Stock trading	1.8	1.6	2.4	0.148
Receive personalised offers	1.6	1.4	2.3	0.043*
Mobile betting/lotto services	1.3	1.5	1.6	0.693
Interactive voting	1.5	1.8	1.7	0.692
Online chat with strangers	1.3	1.1	1.8	0.082
Take part in Internet auctions	1.6	1.6	2.4	0.029*
Access live footage from Big Brother House	1.2	1.3	1.5	0.445

** Significant at the 0.05 probability level*

4.5.4 Observed value dimension

As suggested by McDougall & Levesque (2000); Clarke, (2001); Ankar & D’Incau, (2002); Ankar & Eriksson, (2003); & Pederson & Ling, (2003) on the demand side of m-commerce is to determine the value that m-services can offer to end users. Thus these questions was posed with reference to the analytical framework proposed by Ankar & D’Incau (2002). According to this framework there are five types of value listed in the following:

- Time-critical needs and arrangements = (TC)

Time-critical situations where immediacy is essential, or at least desirable, typically arising from external events.

- Spontaneous needs and decisions = (SP)

Spontaneous needs are internal. Decisions are straightforward, meaning that the if/when/where decisions do not require careful consideration.

- Entertainment needs = (EN)

The use of mobile services via a mobile medium for self-entertainment (for example, to kill time/have fun in situations when wired entertainment appliances cannot be accessed).

- Efficiency needs and ambitions = (EF)

The use of m-commerce service enabling you to increase your productivity and efficiency to do simple everyday activities by providing you with the possibility to use the 'dead spots' in the day. (for example, during daily commuting between home and work).

- Mobility-related needs =(MO)

Value through a mobile medium, as need for services predominantly arises when away from home and 'on the move'.

As Table 4.13 shows, the proposed m-commerce services that are likely to be used by respondents are those services that offer multiple values. The top three m-commerce services are perceived as offering four value dimensions. For send/receive E-mail these are efficiency needs/ambitions (>40%), mobility related needs (>40%), time-critical needs (30%-40%) and spontaneous needs/decisions (20-29.9%).

Restaurant table reservations service offers spontaneous need/decisions (>40%), entertainment needs, efficiency needs/ambitions and mobility needs (20-29.9%).

Travel ticket booking service offers efficiency needs/ambitions (30-40%) time-critical needs, spontaneous needs/decisions and mobility related need (20-29.9%).

Table 4.13 Observed importance of different value dimensions for m-commerce services

M-commerce Services	TC	SP	EN	EF	MO
Send/receive email	⊙	○		●	●
Restaurant table reservations		●	○	○	○
Book travel tickets	○	○		⊙	○
Undertake routine banking services	○			●	⊙
Calendaring/alerting services	⊙			●	⊙
Book cinema/theatre tickets		⊙	⊙		○
Read and receive news			○	○	○
Remote activation of appliances	○			○	○
Send insurance damage reports	●			○	○
Pay for parking meter	●	○		○	
Advanced banking services	⊙			○	○
Listen to/download music			●		
Buy products online		●		○	
Payment in physical shops	○	⊙		○	○
Make purchase on vendor machine		●			○
Play online games			●		
Stock trading	○			○	○
Receive personalised offers			○		
Mobile betting/lotto services			⊙		
Interactive voting			●		
Online chat with strangers			⊙		
Take part in Internet auctions		○			
Access live footage from Big Brother House			●		

N=47

TC = time-critical needs

SP = spontaneous needs/decisions

EN = entertainment needs

EF = efficiency needs/ambitions

MO = mobility-related needs

The buttons represents the observed importance of a specific value dimension for a specific service:

● > 40%

⊙ 30-40%

○ 20-29.9%

Blank < 20%

4.5.5 Channel preference

If it is possible to perform a same task in both stationary Personal Computers (PC) and mobile device, it would be interesting to find out which channel is likely to be used by respondents.

Table 4.14 shows the result of the statistic, there was 77% of respondent would prefer to send/received E-mail on a stationary PC, while 23% of respondents would prefer to do so via a mobile device.

In addition, with the proposed m-commerce services, generally overall there are higher percentages for stationary PC as the preferred channel. There are however some exceptions. For services such as remote activation of appliances 75% of respondents would prefer to engage in this service via a mobile device. For calendaring/alerting service 60% of respondents reported the preferred channel as a mobile device. In addition, mobile devices were preferred mediums for restaurant table reservations, paying for parking meter, making purchase on vendor machines and interactive voting.

On the other hand, 98% of respondents would prefer to buy products online via a stationary PC and 93% of respondents would prefer to engage in stock market trading using a stationary PC.

Table 4.14 Observed channel preference by respondents

M-commerce services	N	Stationary PC	Mobile device
		%	%
Send/receive email	47	77	23
Calendaring/alerting services	40	40	60
Restaurant table reservations	43	47	53
Book travel tickets	46	85	15
Undertake routine banking services	46	78	22
Book cinema/theatre tickets	43	63	37
Read and receive news	43	81	19
Remote activation of appliances	40	25	75
Send insurance damage reports	35	80	20
Pay for parking meter	39	46	54
Advanced banking services	37	86	14
Listen to/download music	39	77	23
Buy products online	40	98	3
Payment in physical shops	35	51	49
Make purchase on vendor machine	33	45	55
Play online games	33	88	12
Stock trading	29	93	7
Receive personalised offers	29	79	21
Mobile betting/lotto services	24	54	46
Interactive voting	27	44	56
Online chat with strangers	27	85	15
Take part in Internet auctions	30	90	10
Access live footage from Big Brother House	25	52	48

4.5.6 The usage setting of using m-commerce services

According to Anckar & Eriksson (2003) the key notion of m-commerce is mobility. Thus it would be interesting to find out whether end-users will be inclined to use a m-commerce services in a mobile situation, where fixed Internet access is absent.

For this research a fixed setting refers to the use of m-commerce services at work or at home, while a mobile setting refers to a situation where access via the wired device is absent. As shown in the Table 4.15, the top three m-commerce services that are likely to be used by respondents are services that can be used by respondents in both a fixed or a mobile setting. In terms of the top three m-commerce services, between 50-60% of respondents would use send/receive e-mail service from home and at work (50-60%), for calendaring/alerting services at home (40-49.9%) and at work (50-60%) and travel ticket booking services at home (60%) and at work (39.9-30%).

On the other hand, respondents would also use these services in a mobile setting, to send/receive E-mail service in transportation (40-49.9%), while aboard (39.9-30%) and at the weekend/holiday house (40-49.9%), for calendaring/alerting services in transportation (39.9-30%), aboard (39.9-30%) and at the weekend/holiday house (39.9-30%) and travel ticket booking services aboard (39.9-30%) and at the weekend/holiday house (39.9-30%).

In general, Tasmanian respondents are more likely to use most of the proposed m-commerce services at a fixed environment such as home or office rather than in a mobile environment.

Table 4.15 Observed interest in using m-commerce services in different settings

M-commerce Services	Mobile settings					Fixed settings	
	RE	TR	AB	ST	WE	HO	WO
Send/receive email		⊙	○		⊙	●	○
Calendaring/alerting services		○	○		○	⊙	●
Book travel tickets			○		○	●	○
Restaurant table reservations					○	●	○
Undertake routine banking services			⊙			●	○
Book cinema/theatre tickets						●	
Read and receive news						⊙	
Remote activation of appliances		○					⊙
Send insurance damage reports						⊙	○
Pay for parking meter				⊙			
Advanced banking services						●	
Listen to/download music						⊙	
Buy products online						●	
Payment in physical shops							
Make purchase on vendor machine							
Play online games						○	
Stock trading						⊙	
Receive personalised offers						○	
Mobile betting/lotto services						○	
Interactive voting						○	
Online chat with strangers						○	
Take part in Internet auctions						⊙	
Access live footage from Big Brother House						○	

N = 49

RE = in restaurants/bars/café's

TR = in transportation

AB = abroad

ST = in the street WE = at weekend/ holiday house

HO = at home

WO = at work/school

The buttons in the table represents the observed importance of a specific setting for specific service:

● > 60%

⊙ 50-60%

○ 40-49.9%

○ 39.9-30%

Blank < 30 %

4.5.7 Overall barriers to m-commerce adoption

Previous research has addressed a number of potential barriers to adopt m-commerce (Lu, et al., 2003; Samtani, et al., 2003; Fang, et al, 2003; Carlsson & Walden, 2003; Constantiou, et al., 2004; Sivanand, et al., 2004; Wu & Wang, 2004). The aim of this section is to follow through on existing research with a focus on perceived barriers from a Tasmanian end-user perspective.

As Table 4.16 shows, 70% of respondents perceived difficulty inputting data using a number pad as a key barrier to the adoption of m-commerce. Further 69% of respondents perceived high usage cost as a barrier. On the other hand, lack of content (40%) and limited proficiency (48%) are the least perceived barriers to adoption m-commerce by respondents.

Table 4.16 Observed barrier for using M-commerce services by all respondents

Barrier Items	N	Barrier a	Mean
		%	
Difficulty inputting data	84	70	3.95
High usage costs	84	69	4.01
Concern about security	83	66	3.99
Concern about privacy	83	64	3.92
Lack of exposure (communication)	83	63	3.76
Lack of exposure (trial)	85	62	3.82
Screen limitation	83	60	3.89
High cost of Internet enabled handsets	84	58	3.89
Slow loading speed	81	52	3.67
Limited proficiency	84	48	3.45
Lack of content	82	40	3.5

a = Percentage of respondents who responded agree (4) or strongly agree (5)

4.5.7.1 Comparison barriers to m-commerce based on e-commerce users and non e-commerce users

Since e-commerce does have some similarity with m-commerce, it would be interesting to find out whether there is any difference in terms of perceived barriers between e-commerce users and non e-commerce users. A t-test will be used to determine whether this is so.

As shown in the Table 4.17, on the basis of experience with e-commerce no significant differences were found between the ten of the eleven barriers proposed in this research. The exception to relates to high usage costs ($p = .049, < .05$). These results indicates that respondents who have engaged in e-commerce perceive high usage cost as a major barrier precluding the adoption of m-commerce than those who have not engaged in e-commerce.

Table 4.17 Perceived barriers for using m-commerce services between respondents who have engaged e-commerce and those who have not

Barrier Items	Barrier <i>a</i>	EC user	Non EC	2 tailed Sig.
	(%)	Mean	Mean	
Difficulty inputting data	70	4.2	4.2	1.00
High usage costs	69	4.27	3.1	0.049*
Concern about security	66	4.05	4.4	0.297
Concern about privacy	64	3.93	4.3	0.362
Lack of exposure (communication)	63	3.93	4.2	0.468
Lack of exposure (trail)	62	3.9	4.2	0.413
Screen limitation	60	4.07	4.6	0.074
High cost of Internet enabled handsets	58	3.98	3.9	0.839
Slow loading speed	52	3.93	3.9	0.94
Limited proficiency	48	3.51	3.6	0.824
Lack of content	40	3.61	3.8	0.586

** Significant at the 0.05 probability level*

a = Percentage of respondents who responded agree (4) or strongly agree (5)

4.5.7.2 A comparison of perceived barriers to m-commerce based on years of Internet experiences

It would be interesting to find out whether people with longer experience of the Internet see adoption barriers differently than those who have less Internet experience. An ANOVA was used to determine whether there were any significant differences on perceived barriers on the basis of Internet experience.

As Table 4.18 shows, the only significant different is related to limited proficiency ($F(5,46) = 2.46, p = .047$). To determine where the differences are, the Tukey post-hoc pairwise comparison test was used, because the Levene's assumption of equality variance was fulfilled. This revealed that for limited proficiency, differences can be found between groups with 0-2 years of Internet experience and the group with more than 10 years of Internet experience ($1.53, .43, p < .05$).

Table 4.18 comparison of barriers between years of Internet experiences

Barrier Items	0-2 mean	3-4 mean	5-6 mean	7-8 mean	9-10 mean	10+ mean	Sig.
Difficulty inputting data	4.3	4.6	4.3	3.8	4.3	3.86	0.49
High usage costs	4.0	3.3	4.3	4.7	5.0	3.86	0.19
Concern about security	4.5	4.0	4.0	3.9	4.3	4.14	0.90
Concern about privacy	4.4	4.0	4.0	3.8	4.3	3.71	0.80
Lack of exposure (communication)	4.2	4.5	3.9	3.8	4.0	3.29	0.26
Lack of exposure (trial)	4.2	4.4	3.7	3.9	3.8	3.43	0.40
Screen limitation	4.4	4.7	3.9	3.8	4.0	4	0.41
High cost of Internet enabled handsets	3.9	4.0	4.1	3.7	4.0	4.14	0.93
Slow loading speed	4.0	3.8	3.8	4.0	4.3	3.71	0.95
Limited proficiency	4.1	3.8	3.6	3.6	2.8	2.57	0.047*
Lack of content	3.8	3.8	4.0	3.6	3.5	2.86	0.27

* Significant at the 0.05 probability level

4.6 Chapter Summary

This chapter presented the overall results of this research. Initially the response achieved in this research was established, and the data were then tested to ensure the data are representative of the Tasmanian general public. Subsequently, the demographic results of this research were reported. Furthermore, the normality of data distribution was confirmed by application of the Kolmogorov-Smirnov test. A reliability test was conducted using Cronbach's Alpha.

An overview of the main results was then provided; it included the willingness of using m-commerce services, value dimensions of m-commerce services, usage settings, channel preferences and barriers for m-commerce adoption.

5 Discussion and Conclusions

5.1 Introduction

The aim of this chapter is to discuss the findings of this research based on the results presented in the previous chapter. This chapter will be presented in the following sequence:

- Discussion
- Conclusions
- Limitations
- Contributions
- Potential areas for further research

5.2 Discussion

The adoption of m-commerce from an end-user perspective is a new topic of interest to the IS research community. The objective of the research presented in this thesis is to gain a better understanding of the overview of m-commerce from the Tasmanian end-user perspective. It is proposed that this research has achieved its objective and gained a better understanding in terms of mobile value and the barriers perceived by end-users. However, in addition some new issues and questions have emerged as a consequence of this research.

In general, from the results of this research, have shown that Tasmanian end-users are not really willing to use m-commerce services in the next 6-18 months. The most appealing m-commerce services for Tasmanians are *send/receive E-mail, calendaring/alerting services, restaurant table reservations, book travel tickets and undertake routine banking services*.

From the literature review this research identified a range of perspectives that to date have formed the focus of m-commerce research. On this basis the need for research was identified as a gap in the body of knowledge in relation to the uptake of m-commerce. This subsequently established the objective for the research presented in this thesis.

At first, an analytical framework drawn from Anckar & D’Incau (2002) was adopted for the purpose of identifying the potential value that m-commerce can offer to the Tasmanian end-users. In addition, a number of m-commerce services were proposed to determine the extent to which end-users might be willing to use them.

Even with the most popular m-commerce service (send/receive E-mails) only half of respondents indicated their willingness to use it. Generally, respondents are not particularly interested in the m-commerce services proposed in this research. There are a few possibilities that could explain this outcome. It could be that the concept of m-commerce is a relatively new technology and respondents are not aware of the services it can provide. In addition, the services proposed in this research were drawn from research conducted in more technologically-advanced countries compared to the sample of development of m-commerce in the state of Tasmania.

A phenomenon found in both Finland and Tasmania is that younger people appear more willing to try out m-commerce services (cf. Anckar & D’Incau 2002). The willingness in terms of age is particularly obvious when services such as use send/receive E-mail service and listen/download music are considered. It could be that the concept of E-mail and MP3 music files via the Internet have only existed for a limited number of years. As a result the younger Internet generation is more familiar with this concept and therefore more likely to try and use it via a mobile channel.

In terms of willingness to use m-commerce services there are both similarities and differences between end-users in Finland and Tasmania. The major similarity is that send/receive E-mail is the service that both Tasmanian and Finnish consumers are most willing to use. However, differences can be found on the basis of gender. Finnish females are much more willing to use an m-commerce service to reserve cinema/theatre tickets while Tasmanian females are more inclined to use m-commerce services to listen/download music. These differences may be explained by cultural differences, as suggested by Lee, et al (2002). They hold the view that cultural differences may be one of the main causes for the dissimilar usage and adoption patterns of the mobile Internet.

5.2.1 Discussion of mobile value results

As pointed out by Carlsson & Walden (2003) without real substance for potential customer investment in the new mobile technology it could fail. Thus it is important to determine what value m-commerce can offer to Tasmanian end-users.

As noted earlier the framework used for assessing mobile value was drawn from Anckar & D’Incau (2002). It was initially used for analysing mobile value from a Finnish consumer perspective.

M-commerce services determined to have a higher end-user willingness for adoption were also identified as those that offer multiple values. Thus, it can be assumed that Tasmanian end-users are much more likely to adopt m-commerce services that offer multiple values than those services that offer only a single value. Moreover, when looking at the top five m-commerce services, achieving efficiency needs/ambitions and mobility related needs seemed to be the key values m-commerce could offer to its potential end-users. Hence, m-commerce services that offer multiple values and are able to fulfil efficiency needs/ambitions and mobility related needs are the ones that are more likely to be adopted by Tasmanian end-users.

When comparing the findings of this research to those from the research conducted in Finland, one major difference is that the value dimensions perceived as important differ between the two places. Finnish end-users/consumers regard spontaneous needs and time-critical needs as important mobile value dimensions while Tasmanians regard efficiency need/ambition and mobility need as important mobile values (cf. Anckar & D’Incau 2002).

5.2.2 Discussion of m-commerce service settings and channel preferences

According to the results of the research, respondents are more interested in using proposed m-commerce services at home and at work in a fixed setting environment. Moreover, services that are more likely to be used by the respondent are those services that respondents are inclined to use in both a mobile setting as well as a fixed setting. In comparison to the Finnish research findings, Tasmanians appear less

inclined to use proposed services in a mobile setting than their Finnish counterparts (cf. Anckar & Eriksson, 2003). This difference may be explained based on the different sample populations. The Finnish study was conducted using university students, while this study was based on the general Tasmanian population. There is a possibility that if future research is conducted based on university students in Tasmania the results might be more similar to the Finnish study.

Furthermore, according to the results from channel preferences end-users prefer to use a stationary PC than mobile devices if both channels are available for the proposed m-commerce services. While end-users indicated they are willing to try out send/receive E-mail services, the preferred channel is mainly a stationary PC. Of the remaining five m-commerce services that respondents were willing to try out, for only performing calendaring/alerting services and restaurant table reservations services the preferred channel was via a mobile device.

5.2.3 Discussion of Barriers to m-commerce adoption

One aim of this research was to identify the key barriers to the adoption of m-commerce for Tasmanian end-users. The finding showed that inputting data using a number pad and high usage costs were perceived as the key barriers.

Furthermore, significant differences were found on the perceived high usage cost as a barrier for the adoption of m-commerce between end-users who have already engaged in e-commerce and those who have not. End-users who have engaged in e-commerce perceive high usage cost as a greater barrier than those who have not engaged in e-commerce. As stressed by Anckar & D'Incau (2002) the potential early adopters of m-commerce could start by looking at the characteristics of end-users who have been early adopters of e-commerce, since this group of end-users has already been exposed to the e-commerce environment. Also, according to the results of research presented in this thesis there is a significant difference on perceived limited proficiency as a barrier to m-commerce adoption between respondents based on years of the Internet experience. The longer respondents have used the Internet, the less they perceive limited proficiency as a barrier.

5.2.4 Discussion Summary

M-commerce services that offer multiple values with the ability to fulfil end-users in terms of efficiency needs/ambitions and mobility-related needs are more likely to be adopted by end-users. However with these proposed m-commerce services, end-users would prefer to use them in a fixed setting. Also, when comparing preference or channels for most of the m-commerce services, end-users would much prefer to use them via a stationary PC. Thus, it can be said that while there are values created by m-commerce and these are recognised by the Tasmanian end-users, people are more willing to conduct these proposed services with a stationary PC. It would be interesting to know, when 3G services becomes available in Tasmania in the near future, whether end-users will adopt it. While m-commerce can fulfil their efficiency needs/ambitions and mobility-related needs, are end-users more likely to conduct commerce related activities with Internet via a stationary PC? If so, then the future of 3G services in Tasmanian could face a high risk of failure.

Nevertheless, future investigations into m-commerce from an end-user perspective is necessary to broaden our knowledge in this area. As pointed out by Carlsson & Walden (2003) without real substance for the potential of customer investment in the new mobile technology, it could fail. However, value itself may not be the only substance or explanation for potential end-user adoption; rather it seems to be a prerequisite for the adoption of m-commerce by end-users. In addition, other issues such as how end-users are going to use the actual services and the functionality of wireless channels need to be taken into consideration when attempting to gain understanding for m-commerce adoption from a consumer perspective in the future.

As mentioned by McDougall & Levesque (2000), perceived value is the result of benefits received by a customer in relation to the total cost of the services. Moreover, the difficulty of inputting data using a key pad on a mobile device and high usage cost are the key barriers to the adoption of m-commerce. This means that although a mobile value exists, end-users have difficulty in accessing these values. Thus these barriers could be viewed as a reduction of the total value of m-commerce. It is important to recognise that cost is a key barrier for end-user adoption of m-commerce.

Hence, if value is the driver for m-commerce adoption then end-users need to be willing to pay to fulfil their efficiencies ambition and mobility-related needs.

5.3 Conclusions

In conclusions, this chapter has reviewed the m-commerce adoption from a Tasmanian end user perspective. When compared with previous research in Finland a number of differences can be found on willingness in terms of trying out m-commerce services and perceived mobile value. It is proposed that cultural differences could be the explanation for the differences in these results. Moreover, differences were also found when comparing usage setting, that might be due to the difference in target populations for the research. A key barrier for m-commerce adoption such cost can be seen as a reduction of total value. Further research will be necessary to broaden out knowledge in m-commerce from an end-user perspective.

5.4 Limitations

One of limitation of this research is that the sample selection was based on the three residential telephone directories published in year 2003. This precluded the opportunity to identify a potential research population based on up-to-date information. As a result number of questionnaires were returned due to the relocation of potential respondents.

Land-line based probability of selecting young people in the random sampling process was relatively low.

Moreover, as research was conducted as part of the Masters of Information Systems degree in the School of Information Systems at the University of Tasmania, budget and time were the constraints. As a result, only 300 questionnaires were mailed out, that limited the possibility of reaching a greater number of potential respondents.

The proposed m-commerce services used in this research were drawn from previous literature and are not yet available in Tasmania. Therefore potential respondents might not be familiar with the concept of using mobile Internet to engage these services. Thus, this might minimise the validity of the outcome of this research.

5.5 Contributions

This research has contributed to knowledge from both a theoretical and a practical perspective in areas of m-commerce.

This research has been the first exploratory study in m-commerce adoption from a Tasmanian end-user perspective. Thus it has contributed to the body of knowledge in m-commerce research with respect to its adoption and the barriers perceived by end-users. It has also provided a point of departure for future research not only for Tasmania, but the other Australian states and territories or countries as well.

In terms of a practical contribution, this research has provided managers of telecommunication industries, m-commerce investors, CIOs, application developers and commercial researchers some understanding for the values that can drive end-user adoption of m-commerce. In addition, this research has highlighted the barriers that need to be overcome in the near future for the successful adoption of m-commerce. This research may also have provided an entry point to understand 3G adoption as well as assisted in improving m-commerce services to end-users.

5.6 Potential area for Further Research

As a result of conducting this research a number of areas worthy of further research have been identified. The scope of this research was based on the Tasmanian population, thus the outcome is only applicable to this state. Accordingly it is proposed that further research could be conducted in the other states and territory of Australia, as well as other parts of the world.

Further research may also be conducted to identify m-commerce services that provide both efficiency needs/ambitions and mobility-related needs, as these value dimensions appear to be driving the adoption of m-commerce.

Research could also be conducted to look at human activities to find out when and where people need efficiency and mobility for access to the mobile Internet. This could be beneficial in identifying successful m-commerce services.

Research also needs to be conducted, that attempts to understand the costs associated with m-commerce and make comparisons of the costs associated with e-commerce. The aim will be to determine if there is significant variation in costs between the two channels in terms of usage cost or it is simply perceived as a barrier by the public.

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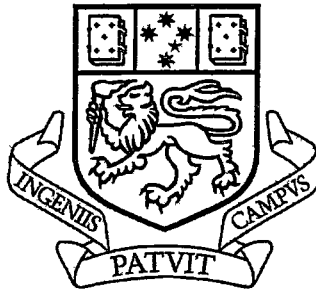
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Appendix A

(Questionnaire)



UNIVERSITY OF TASMANIA

School of Information Systems

Mail Survey

An Overview of Mobile Commerce in Tasmania
--

Dr Judy Young
School of Information Systems,
University of Tasmania

Phone: 03 6226 6266
E-mail: judy.young@infosys.utas.edu.au

Ryan Yick Lam Wong
Master of Information Systems candidate,
School of Information Systems,
University of Tasmania
Phone: 03 6226 6219
E-mail: yicklamw@utas.edu.au

For the purpose of this research the following definition of Mobile Commerce (M-commerce) will be used.

“The ability to use mobile wireless devices as a secure method to purchase goods, services or digital content.”

(Telstra cited in the Australian Communications Authority, Mobile Commerce, Regulatory and Policy Outlook discussion paper, 2003)

Demographic questions

Q 1. Age (years) (Tick one box)

Under 18 ☐ 18-24 ☐ 25-31 ☐ 32-38 ☐
39-45 ☐ 46-52 ☐ 53-59 ☐ 59 above ☐

Q 2. What is your gender? (Tick one box)

Male ☐ Female ☐

Q 3. What is your telephone area code? (Tick one box)

62 ☐ 63 ☐ 64 ☐

Internet usage questions

Q 4. Are you an Internet user? (Tick one box)

Yes ☐ No ☐ (Please go to Question 7)

Q 5. How many years of experience do you have with the Internet?
(Tick one box)

0-2 Years ☐ 3-4 Years ☐ 5-6 Years ☐
7-8 Years ☐ 9-10 Years ☐ More than 10 Years ☐

Q 6. Have you ever engaged in any activities (e.g. purchasing, make payment, booking etc.) over the Internet? (Tick one box)

Yes ☐ No ☐

Devices ownership questions

Q 7. Do you own a mobile communication device? (e.g. mobile phone, PDA etc.) (Tick one box)

Yes ☐ No ☐ (Please go to Question 18)

Q.8 Who is your primary mobile network service provider?

In a Tasmanian context, a GSM mobile phone is one where a SIM card can be inserted, whereas a CDMA mobile phone is one that does not have a SIM card. (Tick as many boxes as appropriate)

Telstra(GSM) ☐ Telstra(CDMA) ☐ Optus(GSM) ☐
Vodafone(GSM) ☐

Q 9. Which of the following mobile communication devices do you own?
(Tick as many boxes as appropriate)

GSM mobile phone without Internet accessibility ☐
GSM mobile phone with Internet accessibility (WAP & GRPS enabled) ☐
CDMA mobile phone without Internet accessibility ☐
CDMA mobile phone with Internet accessibility (via WAP) ☐
PDA with wireless Internet accessibility of any kind ☐
Unsure, but I know the model number (Please specify) _____

Mobile Internet experience questions

Q 10. Have you ever used a mobile phone or Personal Digital Assistance (PDA) to access the Internet? (Tick one box)

Yes ☐
No ☐ (please go to Question 13)

Q 11. Perceived Usefulness

Please circle the appropriate number to indicate the extent to which you agree or disagree with the following statements (Where 1=strongly disagree and 5=strongly agree)

Use of the Internet via a mobile communication device increases my quality of life.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Use of the Internet via a mobile communication device supports my lifestyle.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Use of the Internet via a mobile communication device increases my life performance.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Use of the Internet via a mobile communication device increases my mobility (eg. Available 24*7).

Strongly Disagree 1 2 3 4 5 Strongly Agree

Use of the Internet via a mobile communication device allows me to access information instantaneously.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Q 12. Ease of Use

Please circle the appropriate number to indicate the extent to which you agree or disagree with the following statements (Where 1=strongly disagree and 5=strongly agree)

Use of the Internet via a mobile communication device is easy

Strongly Disagree 1 2 3 4 5 Strongly Agree

It does not require extra time and effort to learn how to use mobile device to access the Internet.

Strongly Disagree 1 2 3 4 5 Strongly Agree

The interaction with a mobile communication device to access the Internet is clear and understandable.

Strongly Disagree 1 2 3 4 5 Strongly Agree

Willingness for Mobile Commerce Service questions
--

Q 13. Willingness of use

Assuming that the following Mobile Commerce Services are available, please circle the appropriate number to indicate the extent to which you agree that you would use a mobile communication device for each service (Where 1= strongly disagree and 5= strongly agree).

Pay for parking meter

Strongly Disagree 1 2 3 4 5 Strongly Agree

Make purchase on vendor machine

Strongly Disagree 1 2 3 4 5 Strongly Agree

Send/receive email

Strongly Disagree 1 2 3 4 5 Strongly Agree

Undertake routine banking services

Strongly Disagree 1 2 3 4 5 Strongly Agree

Book cinema/theatre tickets

Strongly Disagree 1 2 3 4 5 Strongly Agree

Remote activation of appliances

Strongly Disagree 1 2 3 4 5 Strongly Agree

Restaurant table reservations

Strongly Disagree 1 2 3 4 5 Strongly Agree

Calendaring/alerting services

Strongly Disagree 1 2 3 4 5 Strongly Agree

Buy products online

Strongly Disagree 1 2 3 4 5 Strongly Agree

Payment in physical shops

Strongly Disagree 1 2 3 4 5 Strongly Agree

Read and receive news

Strongly Disagree 1 2 3 4 5 Strongly Agree

Receive personalised offers

Strongly Disagree 1 2 3 4 5 Strongly Agree

Book travel tickets

Strongly Disagree 1 2 3 4 5 Strongly Agree

Listen to/download music

Strongly Disagree 1 2 3 4 5 Strongly Agree

Play online games

Strongly Disagree 1 2 3 4 5 Strongly Agree

Send insurance damage reports						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Online chat with strangers						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Stock trading						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Take part in Internet auctions						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Advanced banking services						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Mobile betting/lotto services						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Interactive voting (eg. Australian Idol)						
Strongly Disagree	1	2	3	4	5	Strongly Agree
Access up to the minute live footage from the Big Brother House						
Strongly Disagree	1	2	3	4	5	Strongly Agree

Q 14. Please circle the appropriate number to indicate the extent to which you agree or disagree the following statement.

"I will be interested in trying out a Mobile Commerce Service over the Internet via mobile communication device in the next 6-18 months."

Strongly Disagree	1	2	3	4	5	Strongly Agree
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Value perception questions

Q 15. Mobile Value dimension

To assist you to complete this section of the questionnaire, the following definitions are provided

Time-critical needs and arrangements = (TC)

Time-critical situations where immediacy is essential, or at least desirable, typically arising from external events.

Spontaneous needs and decisions = (SP)

Spontaneous needs are internal. Decisions are straightforward, meaning that the if/when/where decisions do not require careful consideration.

Entertainment needs = (EN)

The use of mobile services via a mobile medium for self-entertainment (e.g. to kill time/have fun in situations when wired entertainment appliances cannot be accessed).

Efficiency needs and ambitions = (EF)

The use of mobile commerce service enabling you to increase your productivity and efficiency to do simple everyday activities by providing you with the possibility to use the 'dead spots' in the day. (e.g. during daily commuting between home and work).

Mobility-related needs = (MO)

Value through a mobile medium, as need for services predominantly arises when away from home and 'on the move'.

For each of the following Mobile Commerce Services. Please tick as many boxes to indicate the mobile value dimension they represent to you.

Mobile Commerce Service		M-value dimension				
		TC	SP	EN	EF	MO
1	Pay for parking meter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Make purchase on vendor machine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Send/received email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Undertake routine banking services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Book cinema/theatre tickets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Remote activation of appliances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Restaurant table reservations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Calendaring/alerting services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Buy products online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Payment in physical shops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Read and receive news	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Receive personalised offers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Book travel tickets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Listen to/download music	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Play online games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Send insurance damage reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Online chat with strangers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Stock trading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Take part in internet auctions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Advanced banking services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Mobile betting/lotto services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Interactive voting (eg. Australian Idol)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Access up to the minute live footage from the Big Brother House	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Usage identification in different environmental setting

Q 16. Usage settings

For each of the following Mobile Commerce Services. Please tick as many boxes to indicate in which environmental setting you would be inclined to use the service.

RE = in restaurants / bars / cafés

TR = in transportation

AB = abroad

ST = in the street

WE = at weekend / holiday house

HO = at home

WO = at work/school

Mobile Commerce Service		Mobile settings					Fixed settings	
		RE	TR	AB	ST	WE	HO	WO
1	Pay for parking meter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Make purchase on vendor machine	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Send/received email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Undertake routine banking services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Book cinema/theatre tickets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Remote activation of appliances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Restaurant table reservations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Calendaring/alerting services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Buy products online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Payment in physical shops	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	Read and receive news	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	Receive personalised offers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	Book travel tickets	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	Listen to/download music	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	Play online games	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16	Send insurance damage reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	Online chat with strangers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	Stock trading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	Take part in internet auctions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	Advanced banking services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21	Mobile betting/lotto services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22	Interactive voting (eg. Australian Idol)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23	Access up to the minute live footage from the Big Brother House	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

End-users preferred channel (PC vs. Mobile device)

Q. 17.Channel Preferences

For each of the following Mobile Commerce Services. Please tick ONE box to indicate your preferred channel.

Mobile Commerce Service		Stationary PC	Mobile device
1	Pay for parking meter	<input type="checkbox"/>	<input type="checkbox"/>
2	Make purchase on vendor machine	<input type="checkbox"/>	<input type="checkbox"/>
3	Send/received email	<input type="checkbox"/>	<input type="checkbox"/>
4	Undertake routine banking services	<input type="checkbox"/>	<input type="checkbox"/>
5	Book cinema/theatre tickets	<input type="checkbox"/>	<input type="checkbox"/>
6	Remote activation of appliances	<input type="checkbox"/>	<input type="checkbox"/>
7	Restaurant table reservations	<input type="checkbox"/>	<input type="checkbox"/>
8	Calendaring/alerting services	<input type="checkbox"/>	<input type="checkbox"/>
9	Buy products online	<input type="checkbox"/>	<input type="checkbox"/>
10	Payment in physical shops	<input type="checkbox"/>	<input type="checkbox"/>
11	Read and receive news	<input type="checkbox"/>	<input type="checkbox"/>
12	Receive personalised offers	<input type="checkbox"/>	<input type="checkbox"/>
13	Book travel tickets	<input type="checkbox"/>	<input type="checkbox"/>
14	Listen to/download music	<input type="checkbox"/>	<input type="checkbox"/>
15	Play online games	<input type="checkbox"/>	<input type="checkbox"/>
16	Send insurance damage reports	<input type="checkbox"/>	<input type="checkbox"/>
17	Online chat with strangers	<input type="checkbox"/>	<input type="checkbox"/>
18	Stock trading	<input type="checkbox"/>	<input type="checkbox"/>
19	Take part in internet auctions	<input type="checkbox"/>	<input type="checkbox"/>
20	Advanced banking services	<input type="checkbox"/>	<input type="checkbox"/>
21	Mobile betting/lotto services	<input type="checkbox"/>	<input type="checkbox"/>
22	Interactive voting (eg. Australian Idol)	<input type="checkbox"/>	<input type="checkbox"/>
23	Access up to the minute live footage from the Big Brother House	<input type="checkbox"/>	<input type="checkbox"/>

Barriers Identification

Q 18. Perceived barriers

For each of the following statements, please circle the appropriate number to indicate the extent to which you agree or disagree are the barriers to adopting Mobile Commerce Service? (where 1=strongly disagree and 5=strongly agree)

High costs of internet-enabled handsets

Strongly Disagree 1 2 3 4 5 Strongly Agree

High usage costs

Strongly Disagree 1 2 3 4 5 Strongly Agree

Limited proficiency

Strongly Disagree 1 2 3 4 5 Strongly Agree

Lack of exposure (Lack of trial)

Strongly Disagree 1 2 3 4 5 Strongly Agree

Lack of exposure (Lack of communication with others regarding M-commerce)

Strongly Disagree 1 2 3 4 5 Strongly Agree

Screen limitation (e.g. small screen, poor resolution)

Strongly Disagree 1 2 3 4 5 Strongly Agree

Slow loading speed

Strongly Disagree 1 2 3 4 5 Strongly Agree

Difficulty inputting data (e.g. keying words using a number pad)

Strongly Disagree 1 2 3 4 5 Strongly Agree

Concern about privacy

Strongly Disagree 1 2 3 4 5 Strongly Agree

Concern about security

Strongly Disagree 1 2 3 4 5 Strongly Agree

Lack of content

Strongly Disagree 1 2 3 4 5 Strongly Agree

The following space has been left blank to allow you to offer any comments you may wish to make in relation to your experiences with Mobile Commerce and/or accessing the Internet via mobile communication device(s).

Thank you for your valuable participation in this survey. Your contribution is greatly appreciated and will make a valuable contribution to this research. Please return your completed questionnaire in the self-address envelope provided. If you have queries, please contact the researcher (Ryan Wong, yicklamw@utas.edu.au) for further clarification.

(Letter of Invitation
&
Information Sheet)



UNIVERSITY
OF TASMANIA

School of Information Systems

20th September 2004

Dear Sir/Madam,

I wish to invite you to take part in research being conducted by Ryan Yick Lam Wong as a component of his Master of Information Systems degree within the School of Information Systems. You are one of 300 Tasmanians from the total population of the state that has been selected to take part in this research. As such your participation is critical to the success of the research.

The aim of this research is to gain an understanding of the acceptance and usage of mobile commerce within Tasmania. I have included an information sheet that provides more details about the research. Within this you will see that the research is being conducted within the requirements of the Human Research Ethics Committee (Tasmania) Network so the anonymity of participants is guaranteed. In addition no questions are asked that might be of a sensitive nature.

A pilot round of the questionnaire has shown that to participate will involve no more than fifteen minutes of your valuable time. To take part in the research all you need to do is to complete the questionnaire.

In anticipation that you are willing to help Ryan in his research endeavours I have included the questionnaire and a reply paid envelope. It will be greatly appreciated if you can return the questionnaire by *Friday 1st October*.

Yours faithfully,

Dr Judy Young

Private Bag 87 Hobart
Tasmania Australia 7001
Telephone (03) 6226 6200
Facsimile (03) 6226 6211
Web www.utas.edu.au/infosys



UNIVERSITY OF TASMANIA

School of Information Systems

Information Sheet

Title : An Overview of Mobile Commerce in Tasmania.

Chief Investigator

Dr Judy Young, School of Information Systems, University of Tasmania.

Primary Researcher

Ryan Yick Lam Wong, Masters candidate, School of Information Systems, University of Tasmania.

Purpose of this study

The purpose the research is the partial fulfilment of the requirements for a Master of Information Systems degree at the University of Tasmania. Mobile commerce is generally regarded as a growth area. It has become a major topic of interest for the IS community and a priority for many business organisations as it becomes increasingly evident that PC (personal computer) based e-commerce has not lived up to its expectations. Countries such as Australia that have high PC ownership, internet access and mobile phone penetration rates are well positioned for mobile commerce development. The present research aims to obtain an overview of the uptake of mobile commerce in Tasmania.

Benefits of this study

It is anticipated that this research will provide useful feedback about the willingness of Tasmanians to engage in the use of leading edge technology. While it is limited to a single state, it does have the potential to establish the basis for future work focussed on the other remaining Australian states or territories.

Study procedures

You have been selected to take part in the research based on the random sampling of the three Tasmanian Telstra area code telephone directories. Participation in this survey is entirely voluntary. If you are willing to participate, please complete the enclosed questionnaire. From a pilot study, it has been determined that this should take no longer than 20 minutes. The questionnaire does not contain any questions that are private or commercially sensitive in nature. The questionnaire is anonymous. You are not asked to provide any personal details that could reveal your identity. Hence, you will not be identifiable in any research output. For your convenience a reply paid, self addressed envelope is provided for the return of the questionnaire.

Confidentiality and anonymity

Any information you provide will be treated in the strictest confidence. The only people who will have access to this information will be the Chief Investigator and the Primary Researcher. The electronic form of the data will be stored on a secured computer server within the School of Information Systems. These files will be password protected to prevent unauthorised access. The completed questionnaires will be secured in locked storage accessible only by the Chief Investigator and the Primary Researcher. The data will be kept for the mandatory five year period, after which it will be destroyed under appropriate supervision.

Contact persons

The contact persons for questions relating to this study are:

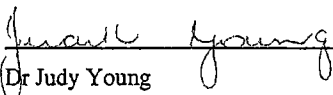
Judy Young	03 6226 6266	judy.young@infosys.utas.edu.au
Ryan Yick Lam Wong	03 6226 6219	yicklamw@postoffice.utas.edu.au

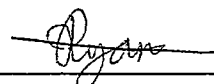
Approval

The research has received ethical approval from the Human Research Ethics Committee (Tasmania) Network. If you have any concerns of an ethical nature about this research you can contact the Executive Officer of the Human Research Ethics Committee (Tasmania) Network, Amanda McAully (Ph 03 62262763).

Results of this investigation

The overall results of the study will be compiled as part of the Masters Project to be delivered in December 2004. Shortly after this date an electronic copy of the thesis will be available on the School of Information Systems web page (<http://www.infosys.utas.edu.au/publications/index.html>). Given that the questionnaire responses are anonymous, it follows that the organisations or individuals who have participated in the research will not be identifiable in any subsequent academic publications.


Dr Judy Young


Ryan Yick Lam Wong

Private Bag 87 Hobart
Tasmania Australia 7001
Telephone (03) 6226 6200
Facsimile (03) 6226 6211
Web www.utas.edu.au/infosys

(Letter of Reminder)

1st October 2004

Dear Sir/Madam,

In September I sent you a letter inviting you to take part in research being conducted by Ryan Yick Lam Wong as a component of his Master of Information Systems degree within the School of Information Systems. The aim of this research is to gain an understanding of the acceptance and usage of mobile commerce within Tasmania. You are one of 300 Tasmanians from the total population of the state that has been selected to take part in this research. As such your participation is critical to the success of the research.

Because we are upholding anonymity, we have no way of identifying those who have participated to date. If you have completed and returned the questionnaire, thank you for your valuable contribution. We apologise for sending you a reminder. If you have not yet completed the questionnaire you still have time to take part in this research.

In case you have misplaced the original research package, I am providing a duplicate package. This includes the questionnaire, an information sheet and a self-addressed, reply paid envelope. It will be greatly appreciated if you can return the questionnaire by *Wednesday 13th October*.

In anticipation, thank you for your support.

Yours faithfully,

Dr Judy Young

Appendix D

(Ethic Approval)

HUMAN RESEARCH ETHICS COMMITTEE (TASMANIA) NETWORK

MINIMAL RISK APPLICATION APPROVAL

20 September 2004

Dr Judith Young
Information Systems
Private Bag 87
Hobart

H0008050: An overview of mobile commerce in Tasmania.

Dear Dr Young

Acting on a mandate from the Southern Tasmania Social Sciences, the Chair of the committee considered and approved the above project on 31 August 2004.

All committees operating under the Human Research Ethics Committee (Tasmania) Network are registered and required to comply with the *National Statement on the Ethical Conduct in Research Involving Humans* 1999 (NHMRC guidelines).

Therefore, the Chief Investigator's responsibility is to ensure that:

- 1) All researchers listed on the application comply with HREC approved application.
- 2) Modifications to the application do not proceed until approval is obtained in writing from the HREC.
- 3) The confidentiality and anonymity of all research subjects is maintained at all times, except as required by law.
- 4) Clause 2.37 of the National Statement states:
An HREC shall, as a condition of approval of each protocol, require that researchers immediately report anything which might warrant review of ethical approval of the protocol, including:
 - a) *Serious or unexpected adverse effects on participants;*
 - b) *Proposed changes in the application; and*
 - c) *Unforeseen events that might affect continued ethical acceptability of the project.*

The report must be lodged within 24 hours of the event to the Ethics Executive Officer who will report to the Chairs.

- 5) All participants must be provided with the current Information Sheet and Consent form as approved by the Ethics Committee.
- 6) The Committee is notified if any investigators are added to, or cease involvement with, the project.

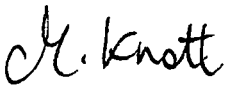
- 7) This study has approval for four years contingent upon annual review. An *Annual Report* is to be provided on the anniversary date of your approval. Your first report is due . You will be sent a courtesy reminder by email closer to this due date.

Clause 2.35 of the National Statement states:

As a minimum an HREC must require at regular periods, at least annually, reports from principal researchers on matters including:

- a) Progress to date or outcome in case of completed research;*
 - b) Maintenance and security of records;*
 - c) Compliance with the approved protocol, and*
 - d) Compliance with any conditions of approval.*
- 8) A *Final Report* and a copy of the published material, either in full or abstract, must be provided at the end of project.

Yours sincerely



Amanda McAully
(Executive Officer)