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FACTORS INFLUENCING THE SUCCESSFUL ADOPTION OF MOBILE COMMERCE SERVICES

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Abstract

Mobile Commerce (MC) can be defined as any transaction carried out over a wireless network, using a wireless device, such as a mobile phone, and that has monetary value (Wang and Liao, 2007). MC is a rapidly developing industry in terms of its technological capabilities. With these increasing developments, come greater forecasts of potential benefits to societies, economies, industries and individuals. However, the growth and development of the underlying MC technology, has not been met by the creation and adoption of the services meant to accompany MC. It is said that the success of MC will ultimately lie in its services. As MC Service Providers (MCSP) are responsible for delivering these MC Services (MCS), the success of MC can be said to rest on them.

In order for MCSs to be successfully adopted, both the initial use and continuous use thereof should be targeted. In other words those that have used MCSs (users) and those that have yet to use MCSs (non-users) should be targeted. It is thus pivotal that an understanding of the factors that generate MCS adoption be sought. This research purposed to uncover the factors that generate MCS adoption within the user and non-user group. In defining successful adoption of MCS's, two separate measures were used for each group. User satisfaction is a well accepted construct among researchers for measuring system success among users. User satisfaction is also accepted to be a determinant of service re-use and loyalty. Intention to use is a measure used for MC success among non-users and is accepted to be a determinant of actual use. Factors affecting both determinants, user satisfaction and intention to use, were investigated.

After a review of literature and current models, ten (10) factors were hypothesised to be significant factors in determining user satisfaction and intention to use namely: ease of use, cost, speed, personalisation, permission, privacy, security, convenience, relationship (with MCSP) and awareness. A questionnaire was developed to test the hypothesised factors. Not all factors were proven to have a significant impact on both user satisfactions and intention to use. One main recommendation is that both initial and continuous adoption should be the focus of MC strategy. Services that cater to specific user needs and offer convenience at a low cost should be offered.

MCSPs can use the factors proved to be significant to generate and evaluate their service offering, to users and non users, to increase the probability of successful adoption from initial to continuous use. The research concludes that MCSPs need to begin to offer MCSs that meet user needs and add value to their lives in order to realise the professed potential of MC.

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CHAPTER 1: INTRODUCTION

This chapter introduces the research. A brief summary of the research context as well as the problem statement, research methodology and summary of results are provided. The chapter concludes with the outline of the thesis structure.

1.1 Introduction

The purpose of this research is to investigate the factors that influence the adoption of Mobile Commerce Services (MCSs) with a core focus on the end-user needs and wants. Mobile Commerce (MC) can be defined as the use of wireless devices such as mobile phones, PDA's and laptops to carry out transactions over wireless networks (Wang and Liao, 2007). MCSs can thus be defined as any application that allows end users access to MC. Organisations providing MCSs to their end-users are known as MCS Providers (MCSPs). The desired product of this research is a list of success factors that MCSPs can instil in their services to increase the probability of successful adoption. Urbaczewski *et al.* (2003) state that "through careful empirical studies and rigorous development projects, market trends, product designs, and other critical success factors can be identified to limit the number of costly missteps in making MC a reality rather than just another technology fad that quickly goes by the wayside."

The research starts with an extensive literature survey of MC. Included in the literature survey, is research into current models explaining MC adoption. These models are evaluated in search of factors that MCSPs can implement in their service offerings. A proposed model of possible influencing factors for the adoption of MCSs is constructed and tested via an online questionnaire. The measures used for successful adoption are intention to use and user satisfaction. Based on the results of the questionnaire, a revised model is presented. The revised model is proposed as a guideline for MCSPs in offering MCSs to consumers. The revised model is intended to give MCSPs an understanding, in the form of a checklist, of the specific characteristics required in their service offering in order to positively affect intention to use the MCSs and user satisfaction so as to experience the greatest potential for success.

1.2 Research Context

April and Cradock (2000) suggest that the application of Information Technology (IT) in organisations has moved from being a source of competitive advantage to being a strategic necessity for survival. As a subset of IT, E-Commerce is considered one of these necessary resources. This is supported by Yeung *et al.* (2003) who assert that enterprises must utilize E-Commerce to some degree to remain competitive. E-Commerce encompasses the utilization of the Internet in order to provide an alternative means of interacting with a company (April and Cradock, 2000). Flippant, yet serious phrases like "dot com or dot dead" and "e or b e@ten", coined by IT professionals, further underscore the urgency with which organizations should investigate the application of E-Commerce resources (April and Cradock, 2000).

The overall success and necessity of E-Commerce along with the widespread use and adoption of mobile devices, particularly mobile phones, has led to the creation of a new avenue of E-Commerce known as MC. MC is also known as Mobile E-Commerce as it is considered to be an emergent subset of E-Commerce (Siau and Shen, 2003). This is supported by Jarvenpaa *et al.* (2003) who state that "E-Commerce brought the powers of a networked economy to the consumer and made the desktop computer a means of access to the web. With the addition of mobility, MC lets the Web come to the user".

MC brings with it numerous benefits and possibilities for organisations and individuals. From an organisational point of view Mobile Technology offers internal and external benefits. Internal benefits can be experienced in the creation of a wireless working environment where employees are not restricted to their desks in order to be productive (Srivasta, 2004). Thus employees, outside of the office, are able to connect to the organisational intranet and databases while on the move.

Externally, mobile technology is able to create new revenue streams for organisations, while allowing them to connect directly with existing and potential consumers (Srivastava, 2004). Their reach is also extended by the fact that mobile phone penetration is as high as it has ever been. It is reported that 30 countries have exceeded 100% mobile phone penetration rates at the end of the first quarter for 2006 and is estimated to grow to 40 countries by the end of 2006 (Wallace, 2006). South

Africa has a mobile phone penetration rate of 66% which exceeds fixed line penetration (Wireless World Forum, 2006). Eighty percent of the world has mobile phone coverage and this figure is expected to increase to 90% by 2010 (SAPA-AFP, 2006). Africa is noted to have the fastest growing mobile phone market with South Africa holding the biggest portion of this segment (Rice, 2006)

Despite the infancy of Mobile technology applications, numerous organizations worldwide are exploiting this technology. For example:

- Banks across South Africa (e.g. Standard Bank and FNB) are offering their clients mobile banking services;
- MasterCard offers their clients four ways to make payments and purchases using web-enabled mobile phones (MasterCard, 2004);
- organisations are experiencing major increases in productivity and convenience by utilising Wireless LANs (WLAN) to access data inside and outside the organisation (Thottam, 2003);
- hospitals equipped with WLANs are observing reductions in patient-check-in-times, quicker access to vital patient data and reduced time in processing medicinal and operational requests (AIRMAGNET, 2005);
- Content providers are providing location based services (context aware information) (Lembke, 2002).

The rate of MC initiatives, collaborations and research is increasing dramatically (Kuo and Chen, 2006). Companies like Microsoft, Nokia, Vodafone, 3 (a mobile technology and services provider in the United Kingdom), The GSM Association, HP, Orange, Samsung and Sun Micro are currently undertaking significant ventures to create the a standardised Mobile Internet across the European Union (EU) which is intended to assist in the adoption of MC (Nuttall and Pesola, 2004). Simpay, an organization founded by Orange, Telefonica, Moviles, T-Mobile and Vodafone was charged with a mandate to create a framework for a large-scale consolidated mobile phone payment system to enable the mobile phone to be used as a credit card (Darling, 2004). These examples serve as basic illustrations of the foundations being built for a MC future.

MC is, however, not without its problems:

- many of the promised benefits have not been realised (Urbaczewski *et al.*, 2003)
- mechanisms to best leverage the technology have yet to be determined (Weidmann, 2004)
- insufficient bandwidth (Urbaczewski *et al.*, 2003)
- complexity of both the devices and the MC applications (Tarasewich, 2003)
- few or no established "norms, rules and standards" (Lembke, 2002)

However, despite the interest in MC by organisations, South African consumers have yet to move from using their mobile phones for elementary commercial functionality, such as downloading ring tones, to more advanced applications such as mobile banking (World Wide Worx, 2005a).

It is thus important that organisations interested in utilising MC understand the factors behind MC adoption by end-users, from services to the technology (i.e mobile phones), so as to provide services that people want and will adopt successfully (Sarker and Wells, 2003).

"While old methods can be adapted and retooled to create applications and explain MC successes and failures, new methods, tools and ways of thinking must be developed and refined to take advantage of mobility and its potential". (Urbaczewski *et al.*, 2003)

1.3 Statement of the Problem

Even though there have been great advances in mobile technology such as increased bandwidth rates, camera and GPS phones, the adoption of advanced MCSs and applications are left behind. The purpose of this research is to identify the factors that influence the successful adoption of MCSs.

1.4 Research Methodology

The research methodology was as follows:

1. A literature study of MC was carried out to place the research into context
2. As part of the literature study, existing models describing the adoption of MC were reviewed
3. From the literature study, particularly the current model analysis, a list of success factors were proposed that were deemed pertinent to the provisions of successful MCSs
4. An empirical study utilising an online questionnaire was designed and tested against a select sample to validate the identified factors as well as the design of the questionnaire.
5. The results of the questionnaire were presented and statistically analysed using the Chi-Square statistic. The results of the analysis were used to instruct any necessary changes to the proposed factors.
6. A revised list of success factors were presented with recommendations for future research.

1.5 Summary of Results

Two proven measures were used to evaluate the success of MCSs namely intention to use MCSs (Hong *et al.*, 2006) and user satisfaction with MCSs (Wang and Liao, 2007). Intention to use MCSs is used as a measure of MCS success for people that have not used their mobile phone beyond basic phone calls, SMS and MMS functionality, this group of individuals are known as non-users. User satisfaction is used to measure the success of MCSs among people that have used MCSs beyond phone calls, SMS and MMS functionality. This group of individuals are known as users. Hong *et al.* (2006) argue that user satisfaction has an affect on a user's repurchase likelihood, which can also be termed intention to use or intention to re-use, making intention to use a valid measure in the user category.

From the research conducted and the analysis performed the following conclusions were drawn:

For existing users of MCSs the following factors were proven to affect user satisfaction and thus intention to re-use:

- Ease of use
- Personalisation
- Cost
- Relationship
- Privacy
- Permission
- Convenience
- Speed

Therefore in order to keep current users satisfied and loyal a MCSP should ensure that these factors are considered in the MCSs they provide.

For non-users of MCS the following factors were proven to affect intention to use: Intention to Use

- Ease of use
- Personalisation
- Relationship
- Privacy
- Convenience
- Security
- Awareness

Therefore to attract non-users to using MCSs, MCSPs should ensure that these factors are considered in the MCSs they provide.

The differentiating anomalies between the two sets of success factors are cost, speed, security, permission and awareness. Cost, permission and speed were deemed important determinants of user satisfaction but were not important to non-user's intention to use MCSs. Security and awareness are important determinants of non-user's intention to use but not important to user satisfaction.

Brief descriptions of these factors are:

- Ease of Use - the ease with which a MCS is accessed and used

- Cost – the cost associated with using a MCS
- Privacy – the privacy offered when using a MCS
- Convenience – the convenience a MCS offers
- Security – the ability to make secure financial transaction using a MCS
- Personalisation – the personal value a MCS offers
- Relationship – the extent of the relationship between a user or non-user and the MCSP
- Speed – the speed with which a MCS can be access and used
- Permission – whether a MCS is permission based or not
- Awareness – the awareness of users and non-users about MCSs

1.6 Thesis Organisation

This thesis is organised into several chapters:

- **Chapter 1: Introduction**

The research area and the specific problem under investigation are introduced in Chapter 1. Contextual background information and the rationale for the research are provided. The summary of results and a discussion of the thesis organisation are also contained within this chapter.

- **Chapter 2: MC**

Chapter 2 reviews the progression from Information Technology (IT) to E-Commerce to MC along with the advantages and disadvantages of MC. This chapter provides motivation for the move and drive towards MC as well as the importance of organisations utilising this technology not only for competitive purposes but also for survival. The social affect of mobile technology and its adoption are discussed followed by some examples of the current utilisation of MC technology in South Africa.

- **Chapter 3: Current Models**

Chapter 3 reviews several models that give an understanding of the factors that influence the adoption of MC.

- **Chapter 4: Proposed Model**

Based on the research performed in Chapter 2 and 3, Chapter 4 produces a list of the factors that are proposed to influence the successful adoption of MCSs.

- **Chapter 5: Research Methodology**

Chapter 5 describes the questionnaire development and distribution. This is the research instrument used to test the validity of the proposed model. This chapter concludes by presenting the results of the questionnaire.

- **Chapter 6: Analysis of Results**

Chapter 6 provides an interpretation of the results with special focus on validating the factors identified in Chapter 4.

- **Chapter 7: Conclusions and Future Research**

This chapter concluded the research by providing a summary of the main contributions and future research possibilities.

CHAPTER 2: MOBILE COMMERCE

Chapter 2 provides an extensive literature survey of Mobile Commerce. The research follows the progression of IT through to E-Commerce and onto MC. MC is then discussed in terms of adoption, technical infrastructure, key players, advantages and disadvantages. Chapter 2 concludes with a discussion of MC applications and some examples of current initiatives in South Africa.

2.1 Introduction

The 1980s have been classified as the decade of the personal computer and the 1990s the age of the Internet and E-Commerce. Many experts suggest the first decade of the 21st century is the decade of MC (Urbaczewski *et al.*, 2003). MC has evolved rapidly with the introduction of new enabling technologies such 3G networks and GPS-mobile-camera-phones. In 2005, Goldstuck, Head of World Wide Worx, South Africa's leading technology research organisation, argued that MC would reach market maturity within the next three years (World Wide Worx, 2005a).

This chapter begins by describing the historical development of IT and its evolutionary nature. An introduction to E-Commerce is provided as a result of IT's evolution. The discussion progresses onto MC, as a subset and evolution of E-Commerce, which is described along with the reasons for its dramatic progression and adoption with specific reference to its unique advantages and drivers.

2.2 M-Commerce History

2.2.1 Information Technology

In the 1980s, IT was used primarily as a source of competitive advantage over competitors by increasing organisational efficiency (April and Cradock, 2000). Ayres and Williams (2004) agree that IT was used to improve business processes and make organisations more effective and efficient. It was, however, noted that as IT became more readily available that the initial advantage was not easily maintained. April and Cradock (2000) explain that in order to create a more sustainable advantage, IT had to

be combined with the organisational strategy and organisational restructuring (April and Cradock, 2000). IT became a strategic resource. McNurlin and Sprague (2006) defined a strategic resource as something that had "a significant, long-term impact on a firm's growth rate, industry and revenue". In this relentless pursuit of maintaining a competitive advantage, organisations had to continuously invest in new IT resources and innovations in addition to finding new ways to utilise currently employed technologies and systems to stay competitive (Ayres and Williams, 2004).

Competing organisations, being aware of the advantage experienced by their competitors through the use of IT, would have to use IT just to remain competitive and ensure their survival (April and Cradock, 2000). IT thus moved from being a strategic resource to being a "strategic necessity" (April and Cradock, 2000; Ayres and Williams, 2004).

Cloete (2002) shows that as technology progressed and became more sophisticated, organisations would continually upgrade their use of IT. Out of this continuous search and development for new strategic IT resources, came the development of the Internet for commercial use. The Internet provided organisations with another way to reach their target market and also to improve internal efficiency (Cloete, 2002).

In lieu of the advantages that the Internet brought, companies were more likely to use new technologies that emerged from this new system. Therefore the introduction of Internet and Web technologies revolutionised the sharing and distributing of information across the world within seconds (Maamar, 2003). While many organisations initially used the Internet simply to market products and services, the Internet was later used to transact with consumers and other organisations; this was known as "E-Commerce" (Ayres and Williams, 2004).

E-Commerce has now become so widely accepted and employed to the extent that organisations are "required" to utilise E-Commerce to some degree just to remain competitive and survive (Botha *et al.*, 2004). This is supported by Intel Chairman, Andrew Grove who said that by 2004 "all companies will be Internet companies or they won't be companies at all" (Pease and Rowe, 2003).

2.2.1.1 Progressive IT Adoption

Even in the rapid search for new technologies, Van Akkeren and Cavaye (1999) note that organisations progress in their use of IT and only use the sophisticated technologies once the entry-level technologies have been successfully utilised. Each progression in IT use serves as a testing ground and foundation for the next phase (Malhotra and Segars, 2005). Cloete (2002) explains that E-Commerce technologies range from "entry-level" to "sophisticated". As the technology advances so does the adoption of this technology by organisations and individuals, albeit on a lagged level.

In support of the evolution of IT and E-Commerce discussed, Cloete (2002) developed an evolutionary taxonomy of IT adoption. Cloete (2002) identifies several steps that an organisation potentially moves through in its adoption of Internet technologies:

Step 1: Email

This step refers to the use of e-mail to send and receive messages either internally or to external parties such as customers and suppliers.

Step 2: Website

This step occurs when an organisation creates a presence for itself on the Internet by setting up a web site whereby information on their products and services can be accessed online.

Step 3: E-commerce

This step allows an organisation to transact with clients and/or suppliers online.

Step 4: E-business

This step refers to the integration of some of the day-to-day business operations with E-Commerce technologies such as order processing and tracking.

Step 5: Transformed organisation

The final step is the full integration of internal business processes with the above-mentioned steps with the ultimate focus on greater customer service. For example, where an organisation would change their processes and procedures so as to take full advantage of IT.

Similarly, Maamar (2003) notes that organisations will implement one phase of E-Business before moving to the next level. To further illustrate this phased-level of IT adoption, Maamar (2003) proposes the following phases of E-Business evolution:

Phase 1: Digitalisation of Data

In this phase firms make their information available online. There is no restructuring of business processes

Phase 2: Process Reengineering

In this phase the pressure to remain competitive in the new "e" context causes organisations to implement significant changes in their existing processes and procedures.

Phase 3: Online Forms

In this phase these forms are used to accurately and effectively capture user requirements. All forms used to capture needed information are replaced with online capture screens.

Phase 4: Personalised services

In this phase customer profiles are used to capture interests and preferences to meet user requirements at a personalised level.

Phase 5: Joint Ventures

In this phase business processes are merged within the organisation as well as with the processes of external partnering organisations such as suppliers and retailers.

As organisations have to continually adapt, due to the competitive nature of markets, and utilise new technologies to remain competitive, current E-Commerce implementations act as a step towards a more encompassing form of E-Business and other future implementations, such as MC.

2.2.2 E-Commerce

E-Commerce can be defined as "any type of business, or commercial transaction, that involves the transfer of information across the Internet" (Maamar, 2003). There is little doubt that E-Commerce has radically changed the way in which organisations, society and consumers operate. The advantage of E-Commerce is that it allows organisations to compete on a global scale as well as give organisations such as Small to Medium Enterprises (SMEs) the ability to compete with their larger counter parts (Cloete, 2002).

E-Commerce is also a tool for improving business operations and reducing costs by improving efficiency, increasing revenue and creating opportunities for new business (Pease and Rowe, 2003). Consumers now have a wealth of information available on products and services equipping them to make more informed consumer decisions (Ayres and Williams, 2004).

E-Commerce is also credited as being an important tool in poverty alleviation in developing countries (Raisinghani, 2003; Stavrou *et al.*, 2000). Stavrou *et al.* (2000) note that E-Commerce can allow for those in rural areas to bridge the distance barrier and make their goods available to a wider market of consumers thus increasing income. Farmers can use E-Commerce to manage their financing when engaging in transactions with consumers in geographically disperse locations. This increases competition which ultimately provides more job opportunities (Raisinghani, 2003).

From these arguments it could be concluded that not only is there a great benefit and need for E-Commerce from an organisational point of view, as well as from a macroeconomic and social perspective. Raisinghani (2003) argues that E-Commerce can contribute to economic growth by improving trade efficiency and helping to integrate a developing economy into the global market.

Furthermore, April and Cradock (2000) note that organisations have undergone vast restructuring of business processes systems to take full advantage of E-Commerce capabilities. The movement from online marketing, to online shopping has put new

demands on organisations to also change their internal and external processes moving them to a complete E-Commerce solution, also known as E-Business (April and Cradock, 2000).

2.2.3 E-Business

April and Cradock (2000) provide the following definitions as the distinction between E-Commerce and E-Business:
"*E-Commerce is the marketing, buying, and selling of products and services on the Internet*"

"*E-Business encompasses all that has been called E-Commerce but extends further to include the using of electronic information and connectivity to improve business performance, open new channels, transform competitive landscapes and enable the creation of new relationships within organisations, as well as between organisations, their customers and suppliers.*"

This agrees with Turban and King (2003:3) who define E-Business as: *"E-business refers to a broader definition of E-Commerce, not just the buying and selling of goods and services, but also servicing customers, collaborating with business partners, and conducting electronic transactions within an organisation."*

The definitions imply that E-business is an all encompassing form of E-Commerce, an evolution of E-Commerce.

2.2.4 The evolution of E-Commerce to MC

As a majority of organisations are utilising E-Commerce to some degree (Pease and Rowe, 2003), competitive organisations are constantly looking for new ways to leverage this technology in order create a competitive advantage by utilising the benefits associated with E-Commerce (April and Cradock, 2000). In this development and search for new sources of technological advantage, the development of mobile technology in assistance to E-Commerce has attracted great interest.

Kuo and Chen (2006) note that the continued, rapid adoption and advancement of mobile technology like mobile phones have driven this increased interest giving birth to, the next phase of E-Commerce, MC. MC can be defined as the use of wireless devices such as mobile phones, PDA's and laptops to carry out E-Commerce transactions (Wang and Liao, 2007).

Another driving force of MC is convergence (Turban *et al.*, 2002). Mobile devices are converging with other technologies, such as location tracking via Global Positioning Systems (GPS), giving rise to one of the forerunners of MC known as Location Based Services (LBS) (Rao and Minakakis, 2003). An example of this is the release of Helio and Samsung's "Drift" phone. The phone is embedded with satellite positioning technology and will allow users to "find out their current location and look up traffic conditions or directions to specific addresses by using Google maps" (Reuters, 2006:a).

An illustration of this convergence is where Internet technology is embedded into mobile devices allowing users to connect to the Internet independent of time and place, giving mobile phones characteristics of stationary computer terminals (Ralph and Graham, 2004). WAP (Wireless Application Protocol, which enables mobile devices to connect to the internet) is an example of this convergence.

In much the same way, mobile technology is able to converge with various other technologies such as computer technology in the form of PDA's. PDAs are an example of the miniaturisation of computer technology that allow for the seamless evolution from E-Commerce to MC. PDAs are small computers with virtually the same functionality as desktop or laptop computers which fit into a pocket making it the ideal "assistant" for people who spend most of their time working outside the office (Kumar and Zahn, 2003). Ralph and Grahams (2004) note that the typical specifications for a PDA was 400MHz, which was enough to power a desktop computer in 1997.

These various convergences allow people to have all the functionality of a wired office environment in the palm of their hands (August and Wilson, 2005). People are

able to send and receive emails, send faxes, set up appointments, make notes and set reminders all from their mobile phone.

This is supported by Kumar and Zahn (2003) who note that PDA's address the transformation of organisations into "an extended, virtual enterprise supported by a highly mobile, geographically dispersed workforce requiring fast, easy remote access to networked resources and electronic communications."

Video and photo technology is also merging with mobile technology in the form of camera integrated mobile phones, allowing users to capture digital photographs and video clips (Srivastava, 2004). Along with the development of 3G (see section 2.4.2), these technologies allow for video conferencing via a handheld device.

Furthermore, as computer technologies such as chipsets and storage are becoming much smaller and cheaper, user demands for "all-in-one" convenience increases. Thus, the integration between computer technology and mobile technology becomes a natural and logical progression (Stafford and Gillenson, 2003).

Given all the advances and drivers towards mobile technology, MC is seen as the next logical evolutionary step in E-Commerce (Maamar, 2003; Stafford and Gillenson, 2003). MC however, brings with it a new set of success factors, potential applications, business opportunities as well as numerous challenges (such as security, privacy) (Jarvenpaa *et al.,* 2003) and providing value adding services that consumers want (Malhotra and Segars, 2005). This is supported by Mahatanankoon *et al.* (2004) who state that "MC adds convenience and mobility to the Internet and creates a whole new set of opportunities".

Even though this is seen as the decade of mobile computing (2000 – 2010) the promises have exceeded the delivery (Urbaczewski *et al.* 2003). Organisations impressed with the predictions of mobile phone penetration, transactional estimates and advocated potential benefits, have experienced a less than desirable outcome. Major reasons being that not enough people signed up for MCSs offered and networks speeds were less than desirable (which could have explained the lack of interest).

Many were thus left sceptical about the future of wireless technology and particularly MC (Urbaczewski *et al.*, 2003).

Despite the scepticism and setbacks, MC has still remained at the forefront of E-Commerce development with organisations and researchers investing vast amounts of time and money into this technology (Wang and Liao, 2007). August and Wilson (2005) confidently state: "Wireless is everywhere and its here to stay". One can deduce that it is the unique characteristics and advantages of MC that keep the interest of both business and academia.

Coursaris *et al.* (2004) note that MC and E-Commerce share many similarities, particularly their underlying business principles. However not only does MC provide an avenue in which to support E-Commerce objectives (Stafford and Gillenson, 2003) but it also opens up new opportunities for meeting evolving customer needs and generating new revenues (Gerstheimer and Lupp, 2004).

It is therefore important to note the distinct differences between E-Commerce and MC as MC applications and systems can be inhibited if based solely on E-Commerce design principles (Lee and Benbasat, 2003). However, as MC stems from E-Commerce and is considered a subset of E-Commerce with which it shares numerous characteristics, it is believed that lessons learned from E-Commerce can be leveraged in making MC a success (Venkatesh *et al.*, 2003).

2.3 MC Adoption

MC adoption is similar to E-Commerce adoption in terms of it's evolutionary nature. Malhotra and Segars (2005) state that MC generally follows a staged adoption. Given the reluctant uptake of MC by South Africans, amidst the availability of technology such as 3G and 3.5G (i.e. HSDPA (High Speed Download Packet Access)) (Brown, Cajee, Davies and Stroebel, 2003) it can be concluded that the South African adoption of MC also follows a staged process.

In other words, the major use of SMS and ringtone downloads, by South Africans, can be seen as the foundation for more advanced mobile applications such as streaming

video, mobile web purchases and mobile banking. It is noted that even with the advances in network speeds such as 3G many users have not adopted these advanced technologies, implying that users might still not be comfortable enough to experiment with these advanced applications and services (Urbaczweski *et al.*, 2003; World Wide Worx, 2005a)

2.3.1 Social Impact of Mobile Technology

Without mobile devices there is no MC. In understanding MC, an understanding of the devices which act as a portal through which it is accessed is of utmost importance (Sarker and Wells, 2003). Mobile phones, the predominant mobile device, have had numerous significant impacts at all levels of society (Srivasta, 2004).

Mobile phones have impacted the business world by creating wireless working environments allowing for people to work on the move, it has changed the way people interact with one another and has even become an object by which people can create or emphasise their individual social identities (Srivasta, 2004; Hong *et al.*, 2006).

Srivastava (2004) notes that mobile phones have had a major influence on society, from the individual, to political, cultural and even religious streams of life. Srivastava (2004) accredits this to the personal and instantaneous nature of these devices which allow for highly specific and immediate use.

There is sufficient evidence to suggest that mobile phones have become more than just practical tools. Hong *et al.* (2006) argue that mobile phones now carry with them a great sense of personal identity and uniqueness. This is supported by Srivastava (2004) who states that people have a more intimate relationship with their mobile phones than with any other technological device. Mobile phones that started out with the aim of improving productivity now have a much more comprehensive function which also helps users satisfy personal needs such as playing games or keeping in touch with their social contacts (Hong *et al.*, 2006).

Goldstuck commented that one of the key findings of the World Wide Worx Mobility 2005 survey is that "South Africans love their cellphones" (World Wide Worx,

2005b). This is supported by the Generation Next Youth Brand Survey 2006 which noted that the majority of youth surveyed, claimed their mobile phone to be their most valuable possession (Sunday Times, 2006).

Mobile phones have also changed the lives of the physically challenged. Power *et al.* (2006) illustrate how the SMS function of mobile phones has greatly impacted the lives of the deaf by putting them on an equal footing with the non-deaf. Deaf people can communicate easily via SMS both with the deaf and the non-deaf. They (Power *et al.*, 2006) note that for many deaf people that have adopted SMS, it has become their primary means of communicating. With video phones deaf people will be able to communicate with one another without having to be in the same physical location (Power *et al.*, 2006).

The grand prize winner of the 2006 MOTOFWD contest by Motorola was John Finan who created the "Mood Phone". This phone was designed to improve social interactions especially for the tens of thousands of people who suffer from a mild form of autism called Asberger's Syndrome. The phone analyses voice modulations then changes colour ranging from "warm reds" to "cool blues", allowing people to read the moods of Asberger's Syndrome sufferers and respond accordingly (Motorola, 2006).

2.3.2 Implications for business

As an organisation, understanding the current state of adoption in any given industry is critical in order to identify new potential and untapped markets (Malhotra and Segars, 2005). Looking at the Smart Case study, in Appendix A, it is evident that that their success lies in identifying and catering to the needs of the bottom segment of the market. Similarly in South Africa the adoption trends of MC are of importance to an organisation's strategic planning.

As stated, mobile technology, particularly MC mostly experiences a staged adoption. MCSPs should therefore be cautious in implementing mobile initiatives. For example, organisations founded on products and services without the aid of MC, should only

move to the mobile platform if they can provide something of great value to their existing clients (Malhotra and Segars, 2005).

This is supported by Whetstone, the former Chief Marketing Officer of MobiTV, he argues that one of the main reasons for the success of Southwest Airlines mobile site is that they didn't simply shift their website to a mobile platform but rather examined what users wanted to do with their phones and then provided only that functionality in a "clean, easy-to-navigate site" (Cuneo, 2006).

Now that MC history and adoption have been discussed, it is suggested that at least a basic understanding of the underlying technology and infrastructure is also important (Coursaris *et al.*, 2004).

2.4 MC Technical Infrastructure

Coursaris *et al.* (2004) discuss the technical infrastructure of MC in terms of wireless networks, wireless protocols and wireless devices.

2.4.1. Wireless Devices

Coursaris *et al.* (2004) note that wireless devices are grouped into three main categories: wireless phones, wireless PDAs, and wireless laptops, with the addition of "hybrid" devices that have the characteristics from two or all of the categories. Tarasewich (2003) presents a detailed list of wireless device categories in Table 2.1.

Wireless Device Categories

Laptop Computer
Handheld (e.g., Palm, Pocket PC, Blackberry)
Telephone
Hybrid (e.g., "smartphone" PDA/telephone combination)
Wearable (e.g., jewelry, watches, clothing)
Vehicle Mounted (in automobiles, boats, and airplanes)
Specialty (e.g., the now defunct Modo)
Input Interaction with Wireless

Table 2.1 - Wireless Device Categories (Tarasewich, 2003)

Coursaris *et al.* (2004) maintain that the devices used to access the Mobile Internet space are one of the main differentiators between MC and E-Commerce. The devices present the main limitations of MC as well as the main source of potential. E-Commerce is accessed mainly through wired desktop computers which have significantly larger screens as outputs with a keyboard and mouse as input peripherals. Devices that access the Mobile Internet such as mobile phones and PDA's have much smaller display screens with very limited input utilities such as a keypad and/or touch screen (Schrott and Glückler, 2004).

These general interfacing differences are key factors to be considered in the development of successful mobile applications. This is supported by Varshney and Vetter (2002) who argue that if user interfaces are difficult to use, users may not see MC applications as significantly valuable.

Furthermore as mobile devices can be tracked and are mostly used by a single user, MCSPs have the opportunity of offering highly personalised resources (Venkatesh *et al.*, 2003).

2.4.2. Wireless Networks

E-Commerce predominantly utilises wired networks whereas MC is accessed through wireless networks. The use of wireless networks removes location specific limitations thus allowing MC to be utilised anywhere, at anytime (Rao and Minakakis, 2003).

Coursaris *et al.* (2004) describe wireless networks as the backbone of MC as they allow data to be transmitted between various mobile and fixed devices (by means of wireless receivers). Since 1983 wireless networks have evolved from 1G (First Generation) to 3G (Third Generation).

In 1983, AMPS (Advanced Mobile Phone System) was introduced in the United States, which marked the beginning of cellular phone systems and is termed as 1G (Coursaris *et al.*, 2004). As an analogue system, AMPS, was used for voice communication. Figure 2.1 illustrates the evolution of wireless communication technology.

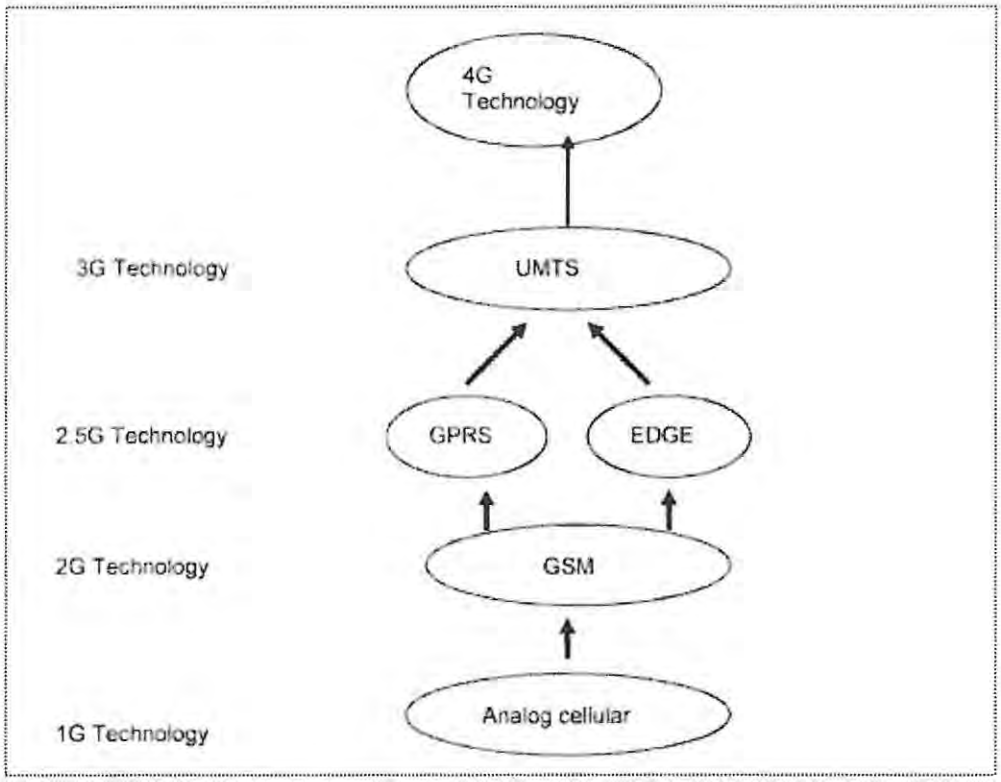

Figure 2.1 - Evolution of wireless communication technology (Siau *et al.*, 2003)

The next stage of wireless networks is known as 2G (Second Generation), introduced in the 1990's. Examples of 2G systems are: Timed Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), General System for Mobile Communication (GSM) (Siau *et al.*, 2003). GSM technology allowed for voice communication as well as SMS (Short Message Service) and is the dominant mobile platform in South Africa (CellularOnline, 2006).

Coursaris *et al.* (2004) discusses 2.5G as an intermediate technology that serves as an upgraded version of the 2G network e.g. High-Speed Circuit-Switched Data (HSCSD), General Packet Radio Service (GPRS) and Enhanced Data Rates for GSM Evolution (EDGE). GPRS is widely available in South Africa and the penetration rates of GPRS and EDGE are growing rapidly (WISP Centric, 2006). Two point five G is mainly intended to allow for increased transmission rates (Coursaris *et al.*, 2004).

Coursaris *et al.* (2004) observe that the interest in wireless networks now rests on 3G technology. South Africa already has access to 3G with the three main network providers, VODACOM, MTN and CellC offering 3G connectivity to clients in certain

areas (VODACOM, 2006; MTN, 2006; CellC, 2006). Third Generation networks enable high speed data transmission, allowing for the effective transfer of audio and video data with higher bandwidth rates (Siau *et al.*, 2003).

On the 22nd of March 2006. MTN made high-speed downlink packet access (HSDPA) or 3G Evolved available to their subscribers. This offered access speeds up to five times faster than current 3G services with speeds up to 1.4 Mbps, which is even faster than current ADSL connections (MTN, 2006).

The ITU (International Telecommunications Union) defines 4G as wireless technology that enables data transfers at 100Mbps while mobile moving and 1Gbps second when stationary (Reuters, 2006:b). Organisations such as NTTDoCoMo and Samsung are already experimenting with prototypes of this technology (NTT DoCoMo, 2006; Ashford, 2006). Fourth Generation is expected to be commercially available by 2010 (Reuters, 2006b).

2.4.3. Wireless Protocols

Wireless protocols enable wireless devices to access the Internet. The two dominating protocols that were developed are WAP (Wireless Application Protocol) and i-Mode.

2.4.3.1. WAP

Leigh *et al.* (2004) describe WAP as a standard that allows various hand-held devices such as cellular phones to "securely" access internet facilities such as page browsing and e-mail. Mallick (2003) describes the idea behind WAP as a method through which Internet content could be simply delivered to wireless devices.

WAP is a set of global standards that allows for various wireless devices (e.g. cellular phones, PDAs, pagers, etc) to connect to the mobile Internet. Leigh *et al.* (2004) argue that the unsuccessful launch of WAP in Europe was primarily due to customer expectations exceeding WAP's offering.

WAP initially created a lot of hype in the market place, but saw little value derived due to bandwidth constraints. The speeds with which mobile phones connected to

WAP using 2G were too slow and ended up frustrating users (Mennecke and Strader, 2003). GPRS was then introduced which raised interest in the mobile Internet. With the introduction of 3G, WAP promises capabilities to allow for two-way communication form any data from voice to video (Turban *et al.*, 2002). The combination of location identification technologies such as GPS combined with WAP opens up opportunities for location aware applications which allow for content to be sent that is specific to a mobile user's location, enhancing the usefulness and value of information (for example, tourists on the move can be directed to historical landmarks or entertainment centres in their immediate location) (Giaglis in Mennecke and Strader, 2003).

2.4.3.2. i-Mode

i-Mode is a wireless protocol launched by NTT DoCoMo in Japan. i-Mode shares a commonality with WAP in that it was intended to provide similar functionality like providing text and Internet services to mobile devices. i-Mode, however, experienced greater success in adoption in Japan as opposed to WAP in Europe and other parts of the world (Rosenblatt, 2003; Leigh *et al.* 2004). Mennecke and Strader (2003) argue that this is due to the fact that the right services were offered, coupled with the right marketing and good customer relationships.

2.5 Players and relationships

In Figure 2.2, Lehrer and Watson (2001) illustrate of the players and their roles in MC. The network infrastructure operator facilitates the backbone of MC.

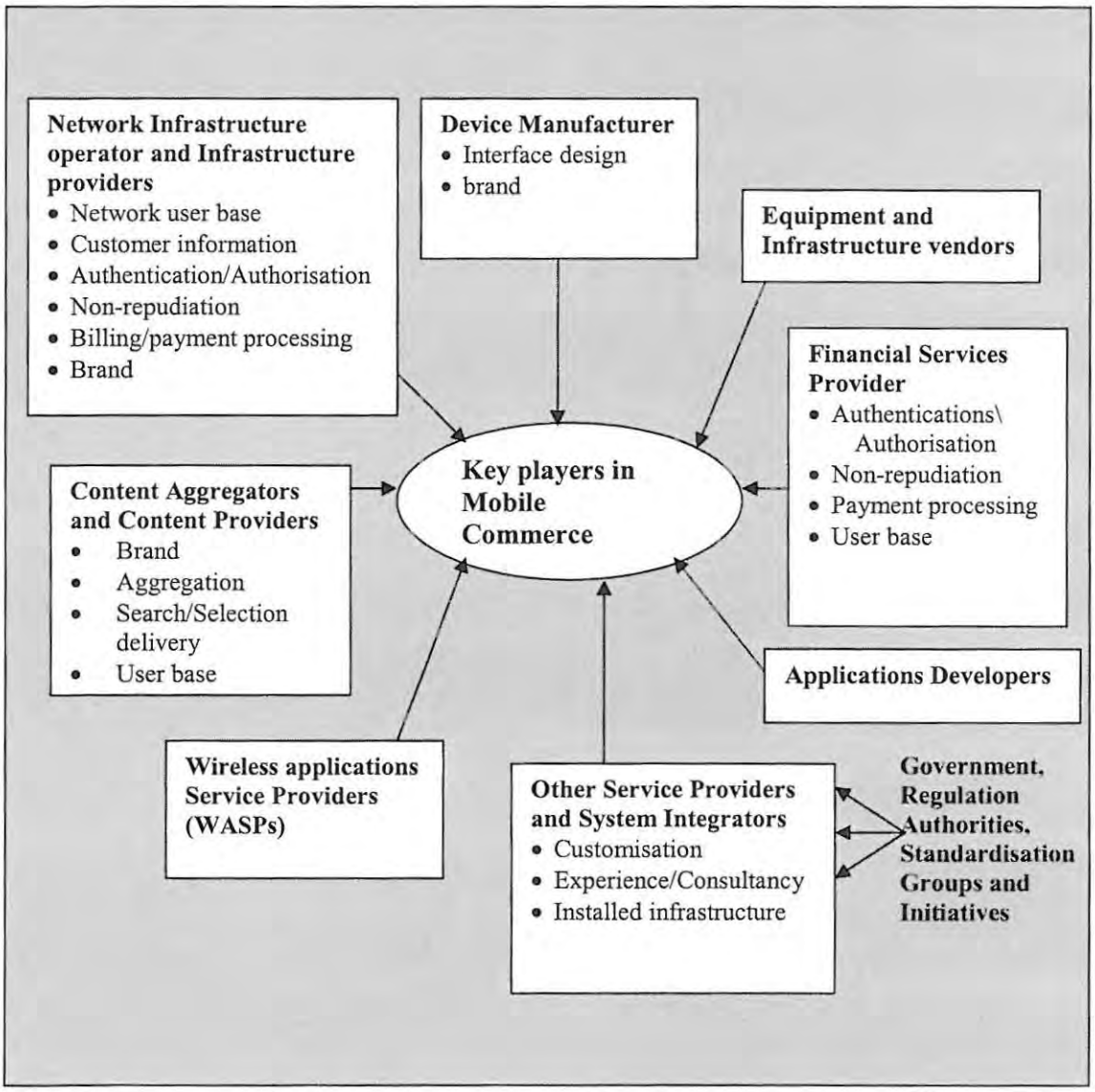

Figure 2.2 - Key Players in MC (Lehner and Watson, 2001)

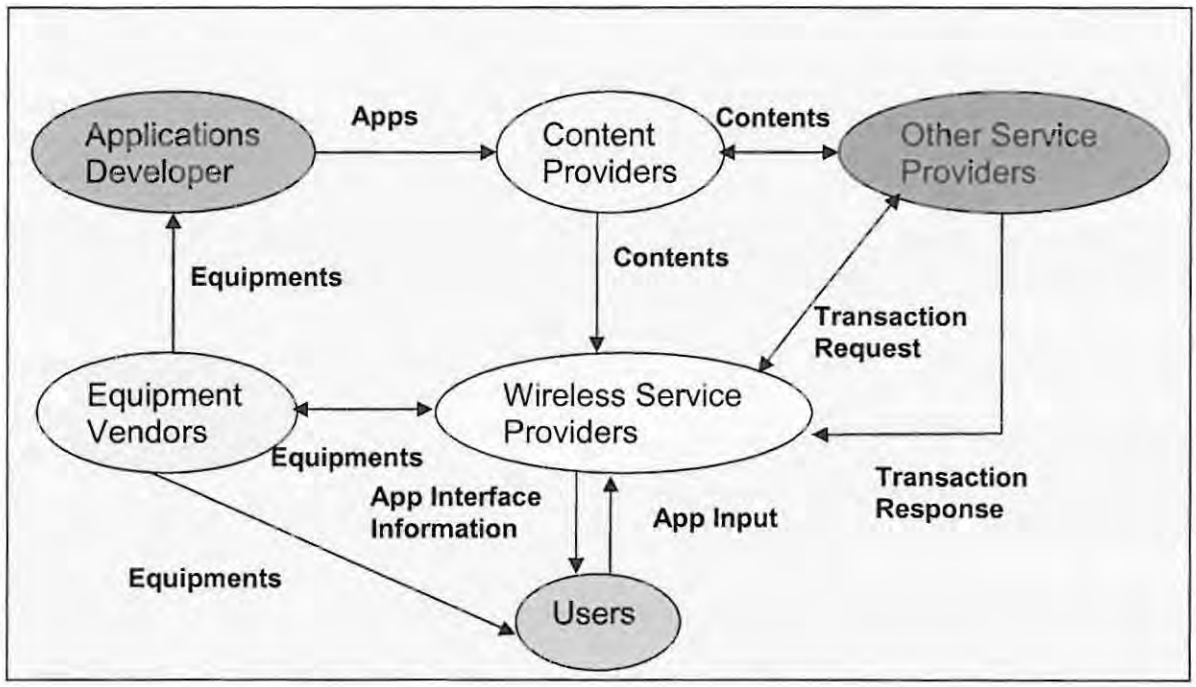

Figure 2.3 - Mobile Commerce Life Cycle (Varshney and Vetter, 2002)

Lehner and Watson (2001) give an illustration of the various key players involved in MC, Varshney and Vetter (2002) provide a slightly different outlook which they identify as the MC Life Cycle (Figure 2.3). Figure 2.3 illustrates the various players in relation to one another in the MC life cycle.

Equipment Vendors provide users with equipment such as, PDA's, mobile phones and smart phones. Wireless Service Providers (Wireless Service Providers are known in this research as MCSPs) are also provided with equipment such as servers from Equipment Vendors. Application Developers acquire equipment like computer hardware necessary to develop applications. Content Providers then use the applications from application developers to construct their new services.

Content Providers can partner with other Content Providers to supply MCSPs and other service providers, such as financial institutions, with the necessary service information. Varshney and Vetter (2002) note that MCSPs assist application and content providers by distributing their products and services to end-users. Users provide the input to the application in terms of the type of application they want to use and the interface of the application is provided to the user by the service provider.

There are various levels of interaction evident in MC which can be identified as follows:

- **Business-to-business** interactions involve business transacting with one another over wireless networks. In Figure 2.3, all relationships and interactions that do not involve the user can be considered business-to-business transactions such as that between the application developer and the content provider. Another example of business-to-business transactions is in supply chain management where companies utilise MC to effectively and efficiently manage their organisational needs with other business e.g. ordering and delivering of stocks.

- **Business-to-consumer** interactions involve consumers transacting with business companies such as retailers. In Figure 2.3 any relationship or interaction between the user and a business, such as the relationship between the equipment vendor and the user, represent a typical business-to-consumer interaction. Coursaris *et al.* (2004) argue that the majority of these types of interactions involve the consumer initiating the transaction.

- **Consumer-to-consumer** interactions occur when mobile consumers request a service or product from another mobile user for example SMS, gaming and/or email (Coursaris *et al.* 2004). For example when a user asks a friend with a mobile to send them a ringtone or picture message.

Coursaris *et al.* (2004) introduces a fourth type of interaction they term "consumer-to-self". This occurs when a mobile user communicates with their own network e.g. interacting with a home network/computer to check on the contents of their refrigerator or phone messages via a mobile device.

This research is aimed at the MCSPs on a business-to-consumer interaction level. Given the current technological advances in mobile devices and network infrastructure (i.e. faster connection speeds) the responsibility lies with MCSP's to

provide the services that will take MC to the next stage of adoption. Services are needed that take advantage of the continuously growing capabilities of mobile and network technology and can meet dynamically changing user needs (Malhotra and Segars, 2005).

2.6 Advantages and Disadvantages of MC

2.6.1 Advantages of MC

Turban and King (2003) discuss MC in terms of two main characteristics which produce resulting "value-added" characteristics. The two distinct characteristics are:

- **Mobility** – Devices like mobile phones and PDA's are generally carried by their users wherever they go. This allows them to access various communication and commercial systems wherever they may be at any time. Portability is thus implied by mobility.

- **Broad Reachability** – As MC users can access various systems at anytime wherever they are, they can also be reached through the same systems instantly given that their devices are left open. There are also more mobile phones than TV's owned globally.

Turban and King (2003) contend that these characteristics break geographic and time barriers, leading to some of the following value-added attributes/benefits:

- **Ubiquity** – Devices such as PDA's and mobile phones can provide real-time information and anywhere, anytime communication, allowing for convenient access to information in a real-time environment.

- **Convenience** – A mobile terminal, such as a PDA, provides convenience as it stores data which is always at hand. A mobile terminal is also able to connect to the Internet, intranets and databases.

- **Instant Connectivity** – with technology like GPRS, users are constantly connected to the Internet.
- **Localisation of products and services** – with the availability of GPS on mobile handsets, users are able to receive information relevant to their current location. This is known as a location based service.

- **Personalisation** – The ability to locate a user's position via GPS on their mobile device combined with a user's personal profile enables organisations to send users highly personalised and relevant information.

Turban and King (2003) graphically illustrate the below in figure 2.4.

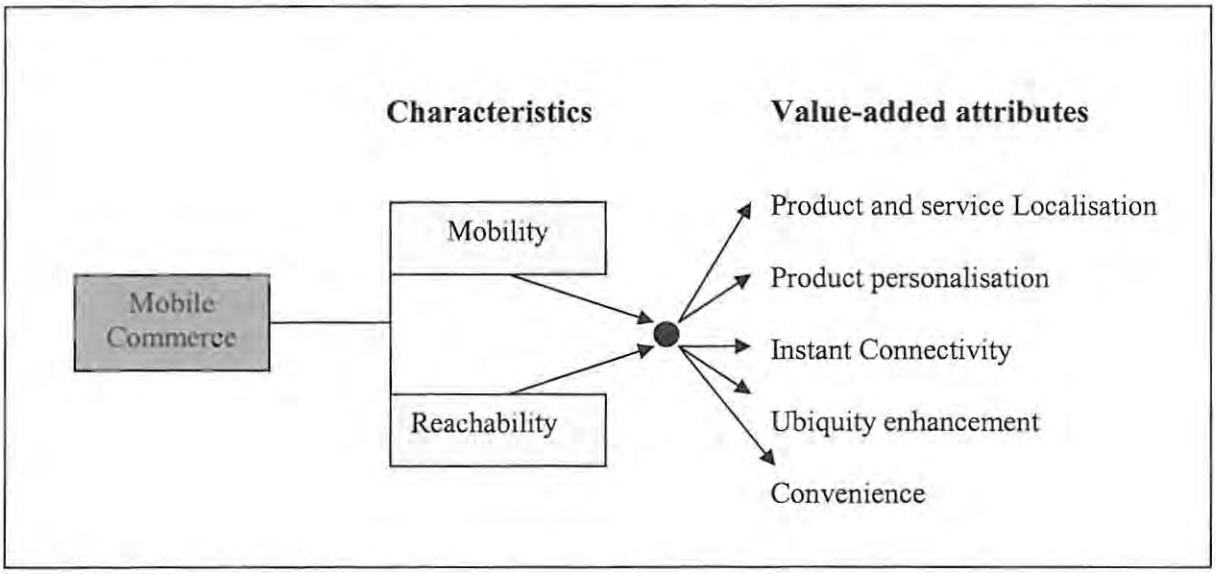

Figure 2.4 - The Characteristics of M-Commerce (Turban and King, 2003)

Leestma, Wilson and Nohria (2001) argue the following characteristics to be the most distinctive advantages of MC:

- **Immediacy** – MC creates a new opportunity for organisations to capture consumers at their "moment of intention". This is useful as the time between the initial intention to purchase and actual purchase is where most sales are lost. MC thus allows consumers to purchase products when and where needed. "Everything is available anytime, anywhere"

- **Connectivity** – Mobile phones can connect people to friends and family. MC applications that utilise this aspect of mobile phones can generate new sales. For example, someone that is sent a "buy-one-get-one-free-coupon" to their favourite restaurant is more likely to make the purchase if they could also make the booking, invite friends and redeem the offer all through their mobile phone. Mobile conferencing is already used by professionals, such as building contractors, to manage projects. The advent of integrated digital camera technology into cellular phones gives MC a new dimension for interaction. For example, integrated cameras give contractors the ability to now view and share project work via streaming video.

- **Localisation** – One of the speculated killer applications of MC is believed to lie in localisation. The fact that the location of a mobile handset can be located with the aid of GPS and software on a mobile device allows companies to provide goods and services specific to a user's locality.

- **Personalisation** – Mobile phones are viewed as personal devices. User's preferences and profiles can be stored and accessed on mobile handsets. In order for a user to view a MCS as useful, marketers utilise such information to send alerts specific to the consumer's profile.

2.6.2 Disadvantages of MC

There are clear benefits in MC and its potential is vast, however with this technology increasing in acceptance there are issues to be considered. The following are some of the disadvantages related to MC:

- **Device Limitations and Constraints**
  E-Commerce users have desktop or laptop computers, with a separate keyboard and mouse as input devices and relatively large display screens. MC users have small portable devices which contain both the input and display mechanism. The display screens are small, with limited keypads and touch screens as the most common inputs (Turban and King, 2003).

As mentioned mobile devices such as mobile phones have much smaller screens which greatly limit a user's experience when shopping online (Venkatesh *et al.*, 2003). This has led to user dissatisfaction. Application developers have had to reconsider their previously successful Internet applications designed for desktop computers or laptops, to that of mobile handsets(Venkatesh *et al.*, 2003). Thus surfing the wired Internet and surfing the Mobile Internet are two different experiences.

- **Security**

  Security is an issue that has and still plagues E-Commerce. Turban and King (2003) argue that not only do the majority of the security issues found in E-Commerce (SPAM, securing transactions, user Privacy etc.) exist in MC but that issues like privacy, authentication, integrity, and nonrepudiation are harder to enforce in MC.

  Security issues in the form of fraud and viruses have been the biggest hindrances to E-Commerce growth. In 2004 it was estimated that fraud at E-Commerce sites was worth about $1.2 billion a year (Gordon, 2004). Furthermore, virus attacks have increased 400% in 2004 (Gordon, 2004). Patrick Evans, the regional manager at Symantec, says that as smart phones become more prevalent the emergence of viruses aimed at these devices are likely to increase (Gordon, 2004).

2.7 MC Applications

As noted, organisations progress in their use of IT from the entry-level technologies through to more sophisticated uses of technology. The same is true for MC (Cloete 2002, Mamaar, 2003). An organisation may first use entry–level MC applications such as SMS promotions before utilising the more advanced applications such as mobile financial applications. It may be because the organisation lacks the confidence in MC to justify large investment in MC. First National Bank is an example of this. FNB started with SMS notifications and moved on to more extensive mobile banking such as mobile transfers and statements. Each application has a different set of requirements which has implications on the size and cost of the investment.

MC applications can generally be grouped into four main catgories: communication, entertainment, transaction and information (Kuo and Chen, 2006). Varshney and Vetter (2002) however maintain that there are potentially an unlimited number of opportunities and applications yet to be discovered. They (Varshney and Vetter, 2002) identify a number of applications in Table 2.2.

Mobile applications

Mobile financial applications (B2C, B2B)	Applications where a mobile device becomes a powerful financial medium.	Banking, brokerage, and payments for mobile users.
Mobile advertising (B2C)	Applications turning the wireless infrastructure and devices into a powerful marketing medium.	User specific and location sensitive advertisements.
Mobile inventory management (B2C, B2B)/ Product locating and shopping (B2C, B2B)	Applications attempting to reduce the amount of inventory needed by managing in-house and inventory-on-move. Applications helping to find the location of product and services that are needed.	Location tracking of goods, boxes, troops, and people. Finding the location of a new/used car of certain model, color and features.
Proactive service management (B2C, B2B)	Applications attempting to provide users with information on services they will need in the near-future.	Transmission of information related to aging (automobile) components to vendors.
Wireless re-engineering (B2C, B2B)	Applications that focus on improving the quality of business services using mobile devices and wireless infrastructure.	Instant claim-payments by insurance companies.
Mobile auction or reverse auction (B2C, B2B)	Applications allowing users to buy or sell certain items using multicast support of wireless infrastructure.	Airlines competing to buy a landing time slot during runway congestion (a proposed solution to air-traffic congestion problem).
Mobile entertainment services and games (B2C)	Applications providing the entertainment services to users on per event or subscription basis.	Video-on-demand, audio-on-demand, and interactive games.

Mobile office (B2C)	Applications providing the complete office environment to mobile users any where any time.	Working from traffic jams, airport, and conferences.
Mobile distance education (B2C)	Applications extending distance/virtual education support for mobile users everywhere.	Taking a class using streaming audio and video.
Wireless data center (B2C, B2B)	Applications supporting large amount of stored data to be made available to mobile users for making "intelligent" decisions.	Detailed information on one or more products can be downloaded by vendors.

Table 2.2 - Details and networking requirements of MC applications (Varshney and Vetter, 2002)

2.8 MC initiatives in South Africa

- **Mobile Advertising**

  Varshney and Vetter (2002) maintain that the ultimate aim in Mobile advertising should be to personalise the message as much as possible. This can be done by using a combination of the user's preferences and their current location. In the basic form, iMessage by Clickatell in South Africa allows, any organisation or individual, access to SMS campaigning by simply registering a word and attaching a process (or processes) to be carried out when the registered word is SMSed to a particular number (iMessage, 2006).

- **Product Locating and Shopping**

  In South Africa a service called iFind has been developed which allows users to find a location or product by SMSing the product and location to 34600 for example: "pizza Sandton". At a cost of R2 the user will receive up to eight locations and contact details for pizza outlets in the Sandton area (Weidmann, 2005).

- **Mobile Entertainment Services and Games**

  35050 is an organisation that provides a service that allows clients to SMS a word or phrase to the number "35050", which then for a fee of R3 sends them anything from a ringtone, a logo, or a picture to a poem (35050, 2006). The 35050 organisation had increased its revenue from R6.6 million in 2003 to R14.3 million in 2004 in South Africa (iTouch PLC, 2004).

- **Mobile Financial Applications**

  Varshney and Vetter (2002) speculate that mobile financial applications are likely to be one of the most important components of MC as mobile devices could be used as business tools replacing ATMs, banks and credit cards. Examples of these applications are mobile banking, brokerage, money transfers and micro payments. As mentioned, First National Bank in South Africa offers their client a host of SMS banking services from statements to transfers (Ashford, 2005).

2.9 Conclusion

MC is a rapidly growing sector with numerous benefits and untapped potential (see Section 2.5). As with any technological adoption, depending on the level of sophistication from elementary to sophisticated, there is a continuous and clear progression (see Section 2.1.5). Due to the evolving nature of mobile technology, along with the benefits that accompany this technology, companies that do not view MC as a necessary resource that requires continuous investment and innovation are at a disadvantage to those who do (See Section 2.1). Even though the technology for MC, such as faster network speeds (e.g. 3.5G), are in place and its benefits noted, there is a lag in the rate of adoption by end-users.

Given the current technological advances in mobile devices and networks in South Africa (i.e. faster connection speeds), the responsibility lies with MCSPs to generate the services that will take MC to the next stage of adoption. Services are needed that exploit the specific advantages related to MC (see Section 2.3.1) and take advantage

of the continuously growing capabilities of mobile technology (see Section 2.1.4) to meet the dynamically changing needs of users.

The question then arises: "What factors influence the adoption of MCSs?". The next chapter reviews existing models that explain the adoption of MC by end-users in order to identify specific factors that influence successful adoption.

CHAPTER 3: CURRENT MODELS

Chapter 2 introduced MC, giving a foundational description of its characteristics, infrastructure, current adoption and use. This chapter reviews specific research explaining MC adoption. The purpose of this chapter is to identify the factors that may influence the successful adoption of MCSs.

3.1 Introduction

Industry is only beginning to realise the benefits and potential of MC. Technology is developing at a rapid pace in terms of both network infrastructure and handheld mobile technology (see Section 2.2.5 and Section 2.3). However, it is noted that there is still very little acceptance from the consumer side in terms of the low MCS adoption rate (Urbaczweski, 2003; World Wide Worx, 2005a). An assumption can thus be made that the right types of services are not being offered. The following sections review current models that explain adoption of MCS through which the main factors influencing successful adoption can be identified for MCSPs.

3.2 Buellingen and Woerter's Critical Success factors for the use of MCS

Buellingen and Woerter (2004) state that when providing users with various MCSs, there are a generic set of critical success factors that should be observed.

- **Transmission rate** - As mobile applications, networks, devices and users evolve, so to does the need for faster transmission speeds. As the number of Internet users increased, it's transmission rate became rapidly more important. They believe that the transmission rate is a key to MC even to the extent that faster connection speeds should at least be offered as a "premium" service i.e. available at extra cost. However, they warn that even though fixed line services may be available on a mobile platform, they will not be adopted by users on the mobile medium as long as fixed line services remain quicker and cheaper.

- **Personalisation** - It is a generally accepted marketing principle that the more customised a product, service or advert to the target customer, the more successful the outcome. Personalisation allows for convenience through flexibility, time saving, comfort, efficient search methods and the provision of time sensitive information. They (Buellingen and Woerter, 2004) add that personalisation helps make products and services more valuable to consumers by utilising personal profiles and habits.

- **Data Security and IT Security** - Due to the personal nature of mobile devices, users value privacy and require secure transactions over wireless networks. An agreement between the United States of America (USA) and European Union (EU) led to the creation of the "safe harbour principle" which makes the protection and the generation of confidence, pivotal requirements in the emerging electronic processes.

- **User-friendliness** - User friendliness should extend from the applications and services to the devices with which they are accessed. Users require effective and simple access to MCS before these services are fully adopted.

Analysing Buellingen and Woerter's (2004) factors from a MCSP point of view the transmission rate is not something MCSP have direct control over, as that has to do with the network infrastructure and technology which is managed by the network operators (Lehner and Watson, 2001). However, MCSP's can take note of the speed of their networks and adjust their services accordingly. For example MCSP's can, in an environment with slow network speeds, offer services that provide the bare essentials of the service and reduce the number of unnecessary graphics so as to decrease the amount of time it takes people to get what they want. The transmission rate can also be seen as the speed of the service.

The personalisation, user-friendliness and security components are all features MCSPs can instil in their services. Even though MCSP's may not have developed the application themselves, they still have the ability to put across their requirements to the application developer. In summary, from a MCSP point of view, the following

factors are identified as important: speed (transmission rate), personalisation, security (IT security), privacy (data security) and ease of use (user friendliness).

3.3 Astroth's Criteria for Adoption of Wireless Data Services

Astroth (2003) identified three criteria that he claims are essential for the adoption of wireless data services; they have to be personalised, localised and actionable. Astroth describes personalisation and localisation as ways in which a service can be made easier to use. Astroth (2003) argues that mobile information services exhibit the most success when they include the aspect of locality.

Astroth (2003) notes there are numerous challenges in MCSs such as limited display and interface capabilities. He further explains that a mobile web user should not need to click through many pages in order to enter preferences or use a service as is currently the case with fixed line desktop internet users. Due to the limitations of mobile devices, particularly mobile phones with small screens and keypads, Astroth (2003) argues that users require greater customisation with limited interactions.

Astroth (2003) suggests that MCSP's should thus aim to reduce the complexity of interactions required to use a MCS and asserts that the complexity of MCSs can be reduced through personalisation and customisation.

Personalised

Astroth (2003) states that personalisation plays an even more critical role with particular regard to location based services. Astroth (2003) notes that the various user preferences like services used, commuting routes, credit card details and banking habits along with the numerous other daily interactions can be recorded then preloaded on the user's mobile device and recalled when necessary without the user having to specify details like personal information and preferences again.

Localisation

Astroth (2003) describes localisation in the context of web searching. He describes how "search" is the most utilised activity on the internet but is much more complex when used on a mobile interface. He suggests that localisation can greatly reduce the occurrence of irrelevant results by only displaying results relevant to the user's location. For example, a user will only be given the locations of ATMs close to their current location.

Astroth (2003) proposes that personalisation can further reduce the occurrence of irrelevant information when combined with localisation. For example, the user will only be provided the locations of ATMs in their current vicinity that belong to their banking group.

Actionable

Astroth (2003) defines information that is actionable as information that can immediately be used to make a decision or transaction. For example, a user that knows what theatre shows are on in the next 30 minutes and also has information on the traffic situation on the road they are currently on is in possession of timely, actionable information. Astroth (2003) found that urgent information or mobile transactions that have been personalised and localised are the foundation for MCSs and that these services witness a constant if not increasing consumer adoption. This makes the service more valuable to the user by increasing convenience.

Analysing Astroth's criteria for adoption from a MCSP point of view the following factors are identified: ease of use, personalisation (personalised and localisation), and convenience (actionable and localisation).

3.4 Mahatanankoon *et al.*'s Value Propositions

Mahatanankoon *et al.* (2005) argue that E-Commerce providers utilising mobile devices would experience most success if they provided services around the following value propositions:

Always on

Mahatanankoon *et al.* (2005) note that mobile phones are portable and can be contacted at will, users are thus able to perform various activities while transacting, such as video conferencing or travelling.

Location Centric

Mahatanankoon *et al.* (2005) note that along with mobile devices being location independent, GPS further allows for the specific location of a mobile device to be known. This provides a great advantage over wired e-commerce systems as this technology can be utilised to better personalise services and information relative to the user's location.

Convenience

Mahatanankoon *et al.* (2005) base convenience on the fact that MC allows people to be free of the limitations of accessing E-Commerce services via fixed terminals i.e. time and place. They (Mahatanankoon *et al.*, 2005) argue that MC should reduce some of the day-to-day activities of consumers such as being able to access Internet based activities while waiting in a queue or stuck in traffic. Mahatanankoon *et al.* (2005) further argue that by utilising the convenience aspect of mobile technology, consumers may increase in loyalty. In other words, the more convenient a product the more indispensable it becomes to consumers, causing users to integrate it into their daily lives.

Customisation

Mahatanankoon *et al.* (2005) suggest that due to the high penetration of mobile phones and the ability to identify their location, MCSs have the potential to offer more creative and personalised services. Mahatanankoon *et al.* (2005) argue that by

either consulting the user at an earlier stage or accessing the consumer history, MCSPs are able to customise marketing messages.

Identifiablility

Mahatanankoon *et al.* (2005) argues that since mobile devices are generally utilised by only one person, they are well suited for individual-based target marketing. Mahatanankoon *et al.* (2005) state that with GPS, mobile technology allows providers to combine location and time information to offer highly personalised services to various segments.

Analysing Mahatanankoon *et al.*'s value propositions, the MCSP should offer customised services by taking advantage of the identifiable nature of mobile phones (personalisation). These services should also be location specific and time sensitive making sure that services offer utmost convenience. Mahatanankoon *et al.* (2005) argue that when these value propositions are exploited, value to the customer is maximised, increasing user satisfaction.

Analysing Mahatanankoon *et al.*'s Value Propositions from a MCSP point of view the following factors are identified: convenience (convenience and location centric) and personalisation (customisations, identifiability and location centric).

3.5 Kleijnen *et al*'s Critical Factors in the Adoption Process of MCSs

Kleijnen *et al.* (2003) identify the following factors to be pertinent to the adoption of MCS:

Perceived risk

Kleijnen *et al.* (2003) define perceived risk as the amount of risk that consumers associate with a certain MCS. The perceived risk is based on either the total risk or a specific risk. Kleijnen *et al.* (2003), in their study, mention various types of risk but

only performance and privacy risk are discussed as essential to the adoption of MCSs. Performance risk includes factors such as disconnection from the service due to network breakdown or browser error on the mobile device. Privacy risk refers to user mistrust in the security of a MCS. Privacy risk is particularly relevant where a service may require a user to enter confidential information, as users are reluctant to disseminate personal information. Kleijnen *et al.* (2003) found that perceived risk was the single most important factor that influenced the adoption of MCSs. (Kleijnen *et al.*, 2003)

Complexity

Kleijnen *et al.* (2003) note that complexity is often referred to as ease of use. Complexity is referred to as the ease with which a user can understand and use a service.

Compatibility

Kleijnen *et al.* (2003) use the definition of compatibility put forward by Rogers (1995) as the fit between the innovation, the value experiences and needs of the user. Simply put compatibility refers to how well a MCS fits into the daily lives of its consumers. A MCS thus needs to compliment a user's life style for example: mobile games could be compatible with students that spend an hour travelling to and from school everyday.

Payment options

Kleijnen *et al.* (2003) suggest that payment options refers to how a user will be billed for using a MCS. Kleijnen *et al.* (2003) found that a convenient billing system is crucial to the success of a MCS. Dolan's (2000) finding substantiates this by suggesting that one of the key factors responsible for the success of i-Mode in Japan was the presence of a convenient billing system.

Kleijnen *et al.* (2003) note that there are three payment options available: 1) users can be charged for the time they are online e.g. per minute; 2) users can be charged for the amount of data they download independent of the time used to access the service; 3) or a flat fee can be charged for accessing the service. This allows users to have an awareness of the costs involved in using a service. Depending on the market, per

minute billing can be perceived to be less costly than paying a flat fee. In a poor market, paying a flat fee may turn people away from using a service as they may not be able to afford the flat fee. Payment options can thus affect the perceived cost of using a MCS.

Navigation

Navigation is related to the design of hand held devices used as input for MCSs. Kleijnen *et al* (2003) argue that mobile applications need to address the capabilities of the navigational options that users have, i.e. keyboards, keypads, touch screens and how the user has to navigate these various input/output devices.

Relative advantage

Rogers (1995) argues that an innovation will only be adopted if it provides an advantage over the idea that succeeds it. Klejnen *et al.* (2003) observe the main advantage of MCSs is the fact that they can be accessed anywhere at anytime. For example, First National Bank's mobile banking allows users to make transfers at any location from their mobile phone where before they would either have to go to the bank or have access to a desktop computer with an Internet connection. Users are therefore independent of time and location constraints (e.g. banks in South Africa generally close at 3:30pm however, mobile bankers have access to electronically banking services 24 hours a day; additionally having to physically go to the bank, to make transfer payments and balance enquiries, is eliminated through mobile banking which allows for anywhere, anytime access to these services).

Critical mass

Kleijnen *et al* (2003) found that there is a critical mass that when given a choice of various means of communication, a user will choose the one that is most used by their communication community, even if it is not their preferred method. For example on the Rhodes University campus many students utilise the mobile chat application known as MXiT (an instant messaging application specifically designed for mobile phone usage) to communicate cheaply with one another.

Communicability

Communicability refers to how well the means of communication actually communicates something about itself and the user. In other words, "what does this form of communication say about the status of the user?" Kleijnen *et al* (2003) note that communicability can also be referred to as social influence. MCSPs should take into consideration the social influence the use of their service is intended to have as well as the actual effect. The idea is to create a positive social influence so that it will influence more people to use the service. This is done by building relationships with customers.

Analysing Kleijnen *et al.*'s (2003) Critical Factors from a MCSP point of view the following factors are identified: privacy (perceived risk), ease of use (complexity and navigation), personalisation (compatibility), cost (payment options), convenience (relative advantage), awareness (communicability) and relationship (communicability).

3.6 Wang and Liao MC User Satisfaction

Wang and Liao (2007) argue that "user satisfaction has become the prevailing proxy construct for measuring system success, and it is therefore frequently measured in past studies." However, the past satisfaction constructs were applied to mainframe, PC, or wired-based technologies of "times gone by". These constructs are therefore not valid to a mobile context.

In achieving mobility Wang and Liao (2007) note, that mobile devices suffer from various limitations over their wired counter parts such as small screens, small inputs such as keypads, less processing power, limited disk space, increased chance of storage and transaction errors, display and graphical limitations. These limitations make it clear that relying on wired based constructs would be insufficient. They thus (Wang and Liao, 2007) researched MC User Satisfaction (MCUS).

Wang and Liao (2007) describe MCUS as a tool through which the success of MC systems can be evaluated. They investigate the elements that contribute to MCUS. These elements are grouped into four main categories: content quality; appearance, service quality and ease of use. The table below lists the factors that they found

contributed most to MCUS. Table 3 lists the factors that most contributed to consumer satisfaction.

It is clear from the table that factors identified by Wang and Liao's (2007) MCUS relate specifically to MCSs provided via a mobile website. However, even though MCSs such as receiving stock updates, does not require a user to access a mobile website, many do. And value can still be extrapolated into the general use and development of MCS.

Mobile Commerce User Satisfaction Factors

Content Quality
The content of the mobile web site is useful
The content of the mobile web site is current
The content of the mobile web site is concise
The content of the mobile web site is clear
The content of the mobile web site is stable
Web pages load fast from the mobile website
The content of the mobile web site is accurate
The mobile web site has valid links
The mobile web site is always up and available
The mobile web site provides information content that exactly fits your needs
Appearance
The mobile web site uses colours properly
The mobile web site uses fonts properly
The mobile web site uses multimedia features properly
The layout of the mobile web site is appropriate
The mobile web site looks organised
The mobile web site is user-friendly
Service Quality
The mobile web site responds to your request fast enough
The mobile web site provides convenient payment procedures
The mobile web site provides good after-sales service
The mobile web site provides adequate FAQ (Frequently Asked Questions) services
Ease of use
The mobile web site has many interactive features
The mobile web site has adequate search facilities
The mobile web site can be personalized or customised to meet ones needs
The mobile web site is easy to use

Table 3.1 - Factors contributing to MCUS (Summarised from Wang and Liao, 2007)

From Table 3.1 the following features for MCSP's can be identified: ease of use (the mobile web site is user-friendly), convenience (the content of the mobile web site is useful), personalisation (the mobile web site can be personalized or customised to meet ones needs), speed (The mobile web site responds to your request fast enough) and relationship (the mobile web site provides good after-sales service).

3.7 Siau and Shen's Framework for Building Customer Trust in MC

Siau and Shen (2003) identify trust to be a key component through which MCSPs can utilise the new opportunities for initiating customer relationships afforded through MC and the Internet. They (Siau and Shen, 2003) divide trust building into initial trust formation and continuous trust development. Siau and Shen (2003) identify several ways in which mobile vendors, aka MCSPs, can initiate trust:

Enhance Customer Familiarity – People tend to trust what is familiar. This is the idea that MCSPs expose themselves to potential users frequently through publicity and/or advertising creating familiarity with the company name or logo. Another way in which to create familiarity is to officially request user permission to begin a service to their mobile device. For example, MCSPs should market themselves even before their products are available, making way for the marketing of the actual products. This was evident in CellCs "C" marketing campaign before they officially opened to the public.

Build vendor reputation – Reputation suggests past behaviour. MCSPs are to focus on creating a good reputation which gives non-users a sense of certainty and trust. For example, MSCPs can become involved in social responsibility initiatives and make sure to maintain a high level of customer satisfaction.

Deliver high-quality information – MCSP are to provide information to customers that is accurate, time-sensitive and useful. For example, if someone is racing to the a movie show that starts in 30min accurate information that indicates available parking

and allows them to make a booking for the relevant movie while on the move would be of most significance and offer high value.

Elicit third party recognition and certification – An independent authority helps generate a sense of security among users and should thus be elicited by MCSPs. For example, each country has its own set of governing and regulation bodies, it would add value to MCSPs be to certified by the relevant bodies and undergo regular external audits.

Provide attractive rewards – Incentives should be offered to stimulate initial use. For example, a MCSP could offer free minutes to those who purchase their services within the first week of offering or enter those users into a a draw with attractive prizes that would entice potential users.

After initiating trust and eliciting the first transaction Siau and Shen (2003) purport the following in order to maintain and develop trust:

Improve site quality – This refers to the design of the website. Siau and Chen (2003) state that as the mobile website is the interface between the MCSP and the customer there should be adequate information to guide the user, simple navigation and seamless interaction. For example, a mobile website should contain the minimum amount of information, links, graphic necessary to allow users to access there services they want in a speedily manner.

Sharpen business competence - This refers to the MCSPs skills, technical aptitude and expertise in providing MCSs. Users that view organisations as competent also exhibit trust. For example, customer support should be made available to potential and current users to effectively handle queries.

Maintain company integrity – Due to the scepticism surrounding MC, MCSPs are to live up to their promises. They are required to conduct transactions responsibly and in a fair manner while being friendly and reliable. This builds customer predictability and trust. For example, MCSPs are to make sure that consumers are made fully aware of what the service provides along with all associated costs.

Post privacy policy – A privacy policy states a company's procedures in protecting customer's personal information as well as any transactional information gathered during their interaction with the organisation. This will encourage customers to share their personal details. For example, MCSPs should, in their marketing, create awareness about the existence and location o their privacy policy.

Strengthen security controls – Due to the wireless nature of MC, mobile technology is more prone to security threats. MCSPs can use means such as digital signatures, encryption systems and authorisation protocols to reduce consumer's perceived risks of doing business with them. For example, MCSPs should allocate a significant amount of their budget to ensure that the latest security precautions and technology are utilised in their service offering.

Foster a virtual community - Some E-Commerce companies like Amazon.Com have virtual communities which create a sense of belonging and cultivate a communal sense of trust. MCSPs can replicate these community environments. For example, websites like www.vodacom4me.co.za allow users of VODACOM services to access various other online services like free SMSes and contacts to keep in touch with other users and also provides the latest product information.

Encourage Communication and increase accessibility – MCSPs are to communicate clearly with customers and stimulate dialogue. Goodwill should be portrayed through communications. This is the foundation for non-opportunistic relationships and makes the organisation more credible and trustworthy. For example, MCSPs can make use of 24 hour toll-free call centres where users can make all inquiries.

Use external auditing to monitor operations – External audits force the MCSPs to act legally and fairly which help maintain customer trust. For example, MCSPs should participate in regular external audits from third party organisations to increase the level of transparency.

Analysing Siau and Shen's (2003) Framework, for Building Customer Trust in MC, from a MCSP point of view the following factors are identified: relationship (enhance

customer familiarity, foster a virtual community, encourage communication, increase accessibility), awareness (enhance customer familiarity, provide attractive awards), convenience (deliver high-quality information), permission (enhance customer familiarity), privacy (post privacy policy) and security (strengthen security controls).

Current Model's Analysis

Factors Identified	Astroth (2003)	Kleijnen *et al.* (2003)	Siau and Shen (2003)	Buellingen and Woerter (2004)	Mahatanankoon *et al.* (2005)	Wang and Liao (2007)	Number of Times Identified
Ease of Use	X	X		X		X	4
Convenience	X	X			X	X	4
Cost		X					1
Privacy		X	X	X			3
Security			X	X			2
Personalisation	X	X		X	X	X	5
Permission			X				1
Awareness		X	X				2
Speed				X		X	2
Relationship		X	X			X	3
Intention to Use	X	X	X	X	X	X	6
User Satisfaction	X	X	X	X	X	X	6

Table 3.2 – Current Model's Analysis

3.8 Evaluation of Models

Factor Identification Rankings

Factor Identified	Number of Times Identified	Ranking
User Satisfaction	6	1
Intention to Use	6	1
Personalisation	5	2
Convenience	4	3
Ease of Use	4	3
Relationship	3	4
Privacy	3	4
Speed	2	5
Awareness	2	5
Security	2	5
Cost	1	6
Permission	1	6

Table 3.3 – Factor Identification Rankings

The models listed in Section 3.1 to 3.5 are evaluated and summarised in Tables 3.2 and 3.3. Table 3.2 is represents each of the models discussed and the factors identified. Table 3.3 summarises the rankings of the factors according to number of times they were identified in the models presented. From Table 3.3 it appears that user satisfaction was the most mentioned measure that the models were trying to explain. It should be noted however that only Siau and Shens (2003) trust framework addressed both non-users and current users by specifying between initial trust formation and continuous trust formation.

The value of the models is evident in the components that are considered to be in the power of the MCSP's to affect. However, the speed component in this research refers to the design of the service. For example, where slow transmission rates are experienced the MCSP can minimise the amount information or additional content so as to speed up access.

Another factor indicated to be of most importance and prevalent in five out of the six models reviewed was personalisation, followed closely by ease of use and convenience which were identified in four of the six models. The relationship a MCSP has with its users and non-users was noted to be the third most mentioned factor along with privacy which was identified in three of six models. Security, awareness and speed were identified in two of the six models. Lastly, cost and permission were identified in one of the models.

3.9 Conclusion

Six models are presented that describe factors that influence the successful adoption of MC. A common factor set was then identified from a MCSP point of view and by counting the number of times a particular factor appears in all the models. The common factors are identified as being significant determinants of intention to use and user satisfaction:

- Personalisation
- Convenience
- Ease of Use
- Relationship
- Privacy
- Speed
- Awareness
- Security
- Cost
- Permission

Using these factors, Chapter 4 proposes a list of success factors that may influence the successful adoption of MCSs.

CHAPTER 4: MC SUCCESS FACTORS

The previous chapter identified six models that described factors that affect the successful adoption of MCS. Intention to use and user satisfaction were identified as measures of MC success. Ten factors were identified that may influence the successful adoption of MCSs. This chapter describes the proposed model of the identified factors for MCS adoption.

4.1 Introduction

The purpose of this research is to identify the factors that influence the successful adoption of MCSs with a core focus on the end-user needs and wants. Chapter 2 and 3 are the basis for this chapter which will present the proposed factors that could be used to help ensure the success of MCS offerings by MCSPs.

Gerstheimer and Lupp (2004) state: "useful applications and profitable business models can only be designed by focusing on the user's needs". This argument is substantiated by Marais (2005); Mahatanankoon *et al.*, (2005); Dholakia and Dholakia (2004) who state that the key to MC success is having a firm understanding of user needs. Jarvenpaa *et al.* (2003) claim that the only thing users will pay for are products and services that improve their quality of life or add value. By understanding the needs of users, services can be provided that meet these needs and thus add value to the user's quality of life. One concludes that the goal of MC should thus be to provide users with value added services. The factors discussed in this chapter are derived from customer needs that MCSPs could deliver in their MCS offerings.

4.2 MC Success

In deriving success factors, the question arises: "What is meant by MC success and how is it measured?". The success of an IT product or service can be measured by how widely it is adopted i.e. system usage (Wang and Liao, 2007). This could refer to both the number of people using it and/or the frequency with which it is being used.

Thus researchers have studied the factors influencing the actual usage of a system in order to identify what determines success. This is supported by Venkatesh *et al.* (2003b) and Wu *et al.* (2007), who note that explanations of technology adoption have been widely researched in an attempt to increase the chances of success. Given that, in a MC context, a market can generally be classified into two groups, users and non-users, it would stand to reason that two differing measures should be used to explain the adoption or usage of MC. User satisfaction (for users) and intention to use (for non-users) are two measures used in this research to measure system success.

4.2.1 User Satisfaction

Wang and Liao (2004) state that user satisfaction is a widely accepted measure for the success of information systems. Furthermore Wang and Liao (2004) argue that user satisfaction yields more value as a measure of system success than both; system use (how often a system is used) and perceived usefulness (how users view the systems value). This is because user satisfaction encompasses both of these aspects as well as a "wider range of needs, costs and benefits" (Wang and Liao, 2004).

The interest in user satisfaction is driven by the search for a standard measure of MC success. A proven measure would help service providers predict, to a degree, the success of a product or service that they would be offering. It would also assist regulators in creating and measuring service standards. User satisfaction has been used as a measure to evaluate systems, however, there is little with regard to user satisfaction related specifically to MC (Wang and Liao, 2004; Lin and Wang, 2004; Turel and Serenko, 2006). It should be noted that in this research user satisfaction and customer satisfaction are used interchangeably.

Turel and Serenko (2006) observe user satisfaction to be a determinant of "repurchase likelihood" (intention to re-use), price tolerance and customer complaints. Lin and Wang (2006) show user satisfaction to have a significant impact on customer loyalty. Kuo and Chen (2006) and Liew *et al.* (2004) also place critical focus on user satisfaction, in their research on MCSs, as a measure for success.

Given that the term satisfaction can be defined as "the state or fact of being satisfied" and "gratification or pleasure occasioned by some fact, event, or state of things" (Oxford English Dictionary, 2006: a), which implies previous use, it is thus a measure used in this research to determine MC success among those who have used MCSs.

It is thus necessary to identify the factors that contribute user satisfaction. Figure 4.1 illustrates Turel and Serenko's (2006) model that shows some of the affects and inputs of customer satisfaction (user satisfaction).

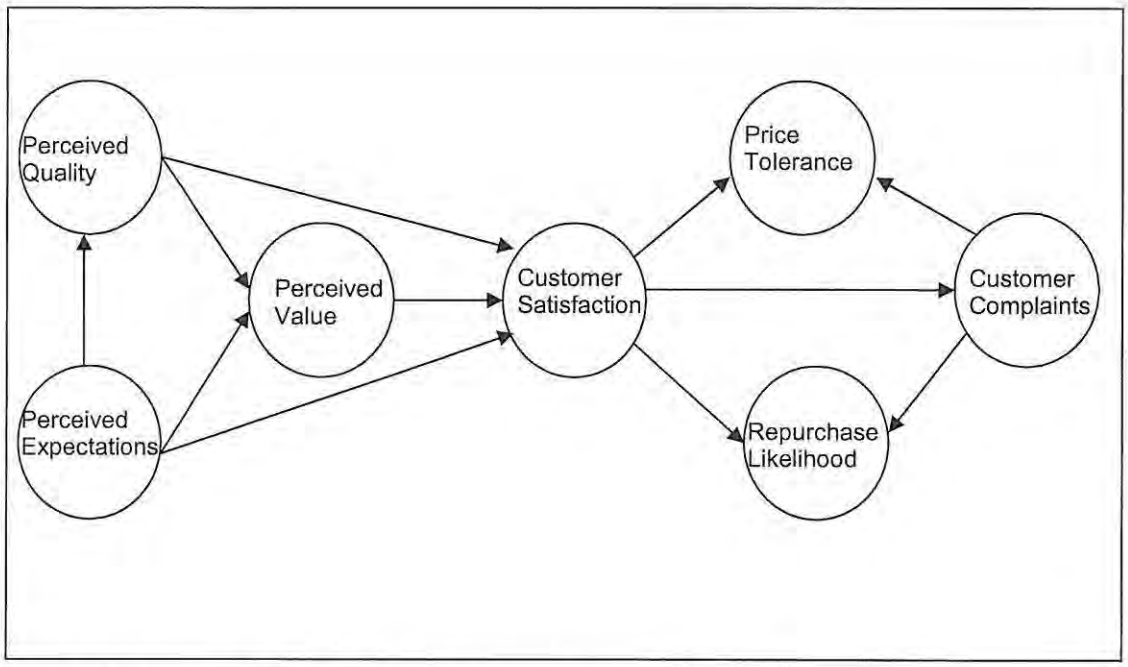

Figure 4.1 - Customer Satisfaction Model (Turel and Serenko, 2006)

Turel and Serenko (2006), in a competitive landscape, draw little distinction between customer satisfaction and loyalty. In fact they argue that you cannot have one without the other. This is supported by Lin and Wang (2004) who add the dimensions of perceived value and trust as contributors to both customer satisfaction and customer loyalty. Turel and Serenko (2006) argue that in developed economies with competitive markets customer loyalty becomes increasingly important with respect to MC as these markets experience numerous service providers. The drive towards loyalty is further underscored by low network switching costs in moving from one service provider to another, and options that allow customers to retain the same phone number even when switching known as mobile number portability (MNP).

Turel and Serenko (2006) argue due to the aforementioned factors along with the fact that consumer acquisition costs can be relatively high, e.g. $180 in the UK in 2001, customer loyalty through user satisfaction should be the focus of MCSPs. It should however be noted that customer retention and customer loyalty are not the same. For example: mobile users can be bound to contract agreements for periods of one to two years. Therefore customer retention does not imply customer loyalty. Research has also found that there are proven links between loyalty, customer retention and profitability (Turel and Serenko, 2006). It is thus in an organisations best interest to investigate and improve loyalty through customer satisfaction.

4.2.2 Intention to Use

Intention to use is a widely used measure in understanding adoption patterns (O'Hara and Perry, 2002; Ho and Kwok, 2003; Venkatesh *et al.*, 2003:a, Venkatesh *et al.*, 2003:b; Yang, 2005; Hong *et al.*, 2006). In these works, intention to use is believed to be a precursor to the actual use of a system. Figure 4.2 illustrates the basic underlying conceptual framework explaining individual acceptance of IT. As part of this research, intention to use will refer to those people who have not used MCSs i.e. non-users.

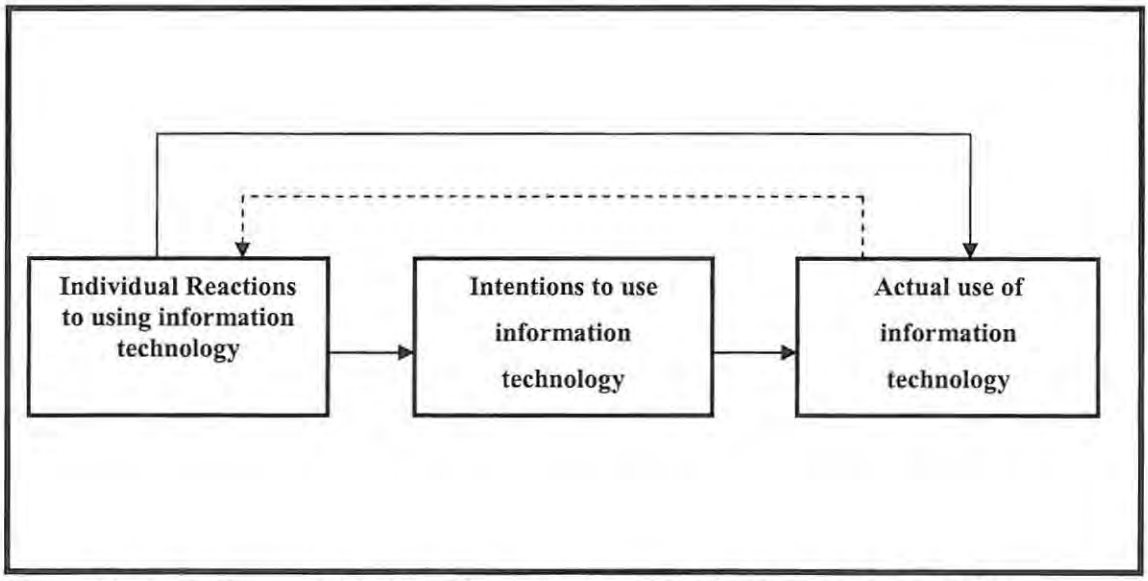

Figure 4.2 - Basic Concept Underlying User Acceptance Models (Venkatesh et al., 2003)

It is noted that intention to use is also used in contexts, where a product or service has already been used (Wang and Liao, 2007; Turel and Serenko, 2006; Lin and Wang,

2006). However, in these contexts, intention to use can be referred to as "repurchase likelihood" (Turel and Serenko, 2006), "intention to re-use" (Wang and Liao, 2007) or "repurchase intention" (Lin and Wang, 2006). This however would still only be applicable to people who have already used the said system i.e. users. Thus the term intention to use is used to refer to those people who have not used MCSs and intention to re-use will be used to refer to those people who have used MCSs.

Combining user satisfaction (Turel and Serenko, 2006) and intention to use (Venkatesh *et al.*, 2003), Figure 4.3 shows the relationship between intention to use, actual use and user satisfaction. Intention to use is a predictor of actual use. Once the technology has been used, a level of user satisfaction results. This user satisfaction then determines the intention to use the technology again (repurchase likelihood/intention to re-use), which in turn determines the actual use of the technology again.

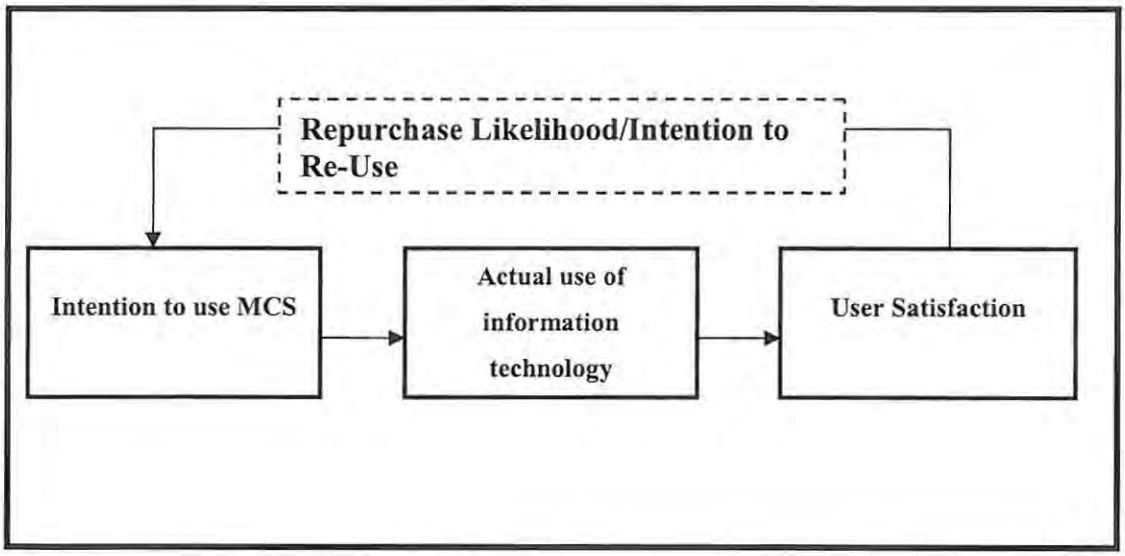

Figure 4.3 – Adapted model of Intention to Use and User Satisfaction (Turel and Surenko, 2006; Venkatesh et al., 2003)

4.2.3 Simplicity/Ease of use

One of the reasons advocated for the success of MC in Japan and the Philippines is their non-technical, consumer centric strategies (Fu *et al.*, 2005). Simplicity and ease of use are necessary at every point in the MC experience from registering to

conducting transactions (Marais, 2005). Mahatanankoon *et al.* (2005) conclude that simplified yes-no transactions are a key success factor of MC success. Venkatesh *et al.* (2003:a) adds further support to the above arguments by noting limitations imposed by mobile devices such as a "small screen size, limited screen resolution, and cumbersome input mechanisms" which would be alleviated by simple yes-no transactions.

It stands to reason that in the busier modern mobile life-styles people would have little time to learn how to utilise complex devices, applications or services. This argument is supported by Tarsewich (2003) who states that in dynamic environments user's experience increased demands on their attention, which MC can alleviate through the provision of applications and services that require less attention.

Perhaps the answer to the success of mobile devices and services is as Sarker and Wells (2003) advocate, that consumers would prefer intuitive, simple and user friendly services. This is supported by Astroth (2003) who says that greater customisation is required so as to minimise the number of "click" interactions required. Buellingen and Woerter (2004) support these arguments mentioned in what they term user-friendliness. They (Buellingen and Woerter, 2004) purport that MCSs need to have simplicity in both access and use. Ease of use thus impacts user satisfaction and intention to use as using the service is viewed as simple and convenient (Sarker and Wells, 2003;)

4.2.4 Cost

Due to the numerous unmet promises of MC thus far, consumers are hesitant in paying for MCSs, especially those that have not explicitly been proven to add value or convenience to the life of the consumer (Jarvenpaa *et al.*, 2003). Marais (2005), after conducting various case studies and researching Gartner reports, argues that MC initiatives should focus on low cost high volume transactions. Marais (2005) concludes that instead of focusing on high margins, the focus should lie on high volumes.

A study by Sarker and Wells (2003) found that for many individuals with limited budgets (such as university students), even if the value of a MCS was apparent and desired, the added convenience was not found to be worth the added expense. It can be assumed that the costs of the services are still viewed as too high. Users are generally not willing to pay costs exceeding that of their basic monthly mobile subscription fee (Sarker and Wells, 2003).

In Norway text messaging has been greatly adopted compared to Thailand. The significant difference in the adoption text messaging between Norway and Thailand has been accredited to the different pricing structures i.e. lower cost in Norway compared to Thailand (Sarker and Wells, 2003). From the above arguments it can be suggested that low cost transactions would aid in encouraging consumers to adopt MCSs.

Lin and Wang (2006), in their research, show that customer satisfaction is affected by a user's perceived value of using a MCS. They (Lin and Wang, 2006) note that perceived value is generally accepted to be the ratio between a customer's evaluation of the perceived benefits and perceived costs of using a MCS. It can thus be concluded that in order to affect a customers perceived value the perceived cost should be minimised.

4.2.5 Relationships

MCSPs need a close relationship with the application developer. MCSPs need to communicate their business requirements as well as the user needs to the application developer. The MCSPs thus also need close relationships with their clients so that they can be aware of their customer needs and simultaneously build trust (Siau and Shen, 2003). The MCSPs relationship with their financial institution may become more critical the more advanced the mobile applications become. For example, when a MCSP utilises mobile advertising the financial institution may only be required to provide the funding for the project whereas mobile financial applications will require a more complex partnership between the MCSP and financial institutions (Varshney and Vetter, 2002).

Due to MC being in the early stages of adoption, the most important relationship a MCSP has is with their potential and existing customers. This is supported by Siau and Shen (2003) who show that MCSPs need to build trust with their customers through relationships. MCSPs need to firstly create a sense of familiarity in potential customers and secondly maintain open communications with existing customers to build trust and loyalty (Siau and Shen, 2003).

4.2.6 Convenience

Definitions given by the Oxford English Dictionary (2006:b) of convenience are "the quality of being personally convenient; ease or absence of trouble in use or action; material advantage or absence of disadvantage; commodity, personal comfort; saving of trouble". In these definitions it is suggested that an important requirement of MCSs is to reduce the effort or "trouble" taken to carry out certain tasks. This is supported by Jarvenpaa *et al.* (2003) who have researched MC in terms of the new freedoms one experiences through mobility, such as increased productivity. Jarvenpaa *et al.* (2003) found that participants felt MC did not give them new freedoms for which they would be willing to pay. The focus then shifts to the creation of these "new freedoms".

Mahatanankoon *et al.* (2005) suggest that MCSs should compliment user's lifestyles by enabling users to reduce some of the day-to-day activities in their lives, such as being able to read emails or do banking on the bus to work. Eliminating tedious activities from peoples lives can thus affect user satisfaction and intention to use as a service. Looking at another definition of convenience given, "ease or absence of trouble", it can be concluded that a MCS cannot be convenient if it is difficult to use. Looking at another part of the definition, "personal comfort", it is concluded in order to be convenient a service should be personalised. The level of convenience of a MCS can thus be said to be influenced by, personalisation and ease of use.

4.2.7 Personalisation

Jarvenpaa *et al.* (2003) noted that, in their MC research study, participants viewed their mobile devices as personal extensions of their identities. The personal nature of mobile devices needs to be carried over to the mobile applications and services that

businesses provide to end users on these devices (Hong *et al.*, 2006). Hong *et al.* (2006) argue that MCSs are used to satisfy the personal desires of individuals. MC technology is increasingly being used by users to create unique identities among others. Hong *et al.* (2006) conclude that user's desire for uniqueness is increasing the rate of MCS adoption. Thus, mass marketing over mobile devices is not where the most value can be given to consumers, neither is it the way in which the service provider e.g. the MCSP will get the most out of mobile technology services (Ho and Kwok, 2003).

The most value, to both the consumer and business, lies in the personalisation of mobile services (Ho and Kwok, 2003). By personalising the services provided, MCSPs can offer consumers services that cater to their specific needs thus adding value to their daily living (Ho and Kwok, 2003). Consumers who discover services that cater to their specific needs effectively often reward it with their continued support and loyalty as well as the added benefit of word of mouth advertising (Ho and Kwok, 2003). This is supported by Matti Alahuhta, President of Nokia Mobile Phones who states, "For a user, a mobile phone is a highly personal device that today is expected to be easily and securely tailored according to an individual's need" (Lembke, 2002).

4.2.8 Privacy

Lembke (2002) argues that before a mobile service is accepted by the market, customers need to be confident that their personal data will be protected. Coursaris *et al.* (2004) observe privacy to be one of the main concerns for users of MC. Coursaris *et al.* (2004) note two types of privacy concerns namely users may be uncomfortable with organisations having information on their interests; and users fear the ability of interested parties knowing their locations, through location tracking.

One way to obtain consumer confidence is to make the organisation's privacy policy freely available for consumers to view e.g. post it on the website (Siau and Chen, 2003). A privacy policy is the service provider's (MCSP's) regulation on how it will protect and use consumer information gathered from using the service (Siau and Chen, 2003).

4.2.9 Security

According to Siau and Shen (2003), pivotal to the success of MC is gaining consumer trust. MCSPs that are planning to rollout MCS as part of their business should begin establishing consumer trust from the early phases of development and continue building trust after the system is implemented. One area noted in which trust should be gained is security.

As wireless data transmissions are less secure than data transmissions over wired networks, security is a major concern due to the open nature of the networks (Lam *et al.*, 2003). MCSPs will thus need to communicate security needs clearly to the application developer and ensure that security measures are continuously strengthened (Siau *et al.*, 2003).

4.2.10 Permission

Lee (2003) observes that MCSPs, such as mobile marketers, have the ability to greatly influence consumer's purchasing decisions. He argues that this should only be done in a non-intrusive way that respects the consumer's privacy. Spamming would have an adverse effect on consumers. Lee (2003) further states that permission can be achieved by allowing the consumer to dictate the terms of their relationship

When the customer does not initiate the service, normally during the early phases of development, MCSPs should obtain permission from current and potential customers or at least give customers the option to-opt out of a service to gain consumer trust (SkyGo, 2001). When an organisation provides a service to a user without request, the opt-out option allows the user to cancel the service. The opt-out option may be more applicable in different situations and give consumers a chance to see its benefit before opting-out of the service. This also gives the consumer the perception of control so that if they feel insecure about the service they can terminate it at any time (SkyGo, 2001).

4.2.11 Speed

Users of MCSs, that are not technologically aware, may not be able to differentiate between slow access speeds, as a result of network operators, and a slow service, offered by the MCSP. This could mean that should there be a connection error on the network side of the transaction; the user may view the service and the MCSP as unreliable.

As indicated in Chapter 2, MCSPs, may interact with numerous other entities to provide a MCS i.e. application developers, network infrastructure operators and infrastructure providers, equipment vendors, financial service providers and/or content aggregators (Varshney and Vetter, 2002; Lehner and Watson, 2001). Yet because a MCSP is the only entity the end-user may interact with all resulting service functionality is viewed as the responsibility of the MCSP.

It can thus be argued that MCSP should provide services that take into account any performance uncertainties such as speed and offer basic services that are executed as quickly as possible so as to minimise the chance of service incompletion. Rao and Minakakis (2003) argue that MCS need to satisfy the human demand for speed and convenience.

4.2.12 Awareness

Malhotra and Segars (2005) suggest that customers may not be fully aware of the benefits of MC, and recommend that targeted marketing strategies be used to raise customer awareness. Siau and Shen (2003) propose that organisations create familiarity with consumers to gain trust. This they (Siau and Shen, 2003) purport is done through exposure through publicity and advertising which creates awareness of the company and its services. This is supported by O'Hara and Perry (2002) who found that the level of awareness of MC technology was a critical factor that affected consumer's behaviour to adopt this innovation. MCSPs thus need to create awareness

about the MCSs they provide including all aspects such as the benefits and costing involved.

4.3 Hypotheses

The following hypotheses were constructed in order to test and validate the significance of the MCS success factors to adoption proposed by this research. Each of the hypotheses relates to a specific success factor identified in this study.

User Satisfaction

Simplicity

H0: *There is no relationship between the ease of use of MCSs and user satisfaction*

H1: *There is a relationship between the ease of use of MCSs and user satisfaction*

Cost

H0: *There is no relationship between the cost of using MCSs and user satisfaction*

H1: *There is relationship between the cost of using MCSs and user satisfaction*

Relationship

H0: *There is no relationship between the extent of the relationship between a MCSP and a user and user satisfaction*

H1: *There is a relationship between the extent of the relationship between a MCSP and a user and user satisfaction*

Convenience

H0: *There is no relationship between the convenience of MCSs and user satisfaction*

H1: *There is a relationship between the convenience of MCSs and user satisfaction*

Personalisation

H0: *There is no relationship between the personalisation of MCSs and user satisfaction*

H1: *There is a relationship between the personalisation of MCSs and user satisfaction*

Privacy

H0: *There is no relationship between the privacy of MCSs and user satisfaction*

H1: *There is a relationship between the privacy of MCSs and user satisfaction*

Security

H0 *There is no relationship between the security of MCSs and user satisfaction*

H1: *There is a relationship between the security of MCSs and user satisfaction*

Permission

H0: *There is no relationship between permission based MCSs and user satisfaction*

H1: *There is a relationship between permission based MCSs and user satisfaction*

Awareness

H0: *There is no relationship between the awareness of MCSs and user satisfaction*

H1: *There is a relationship between the awareness of MCSs and user satisfaction*

Intention to Use

H0: *There is no relationship between user satisfaction and intention to re-use MCS.*

H1: *There is no relationship between user satisfaction and intention to re-use MCS.*

Intention to Use

Ease of Use

H0: *There is no relationship between the perceived ease of use of MCSs and a non-users' intention to use MCSs*

H1: *There is a relationship between the perceived ease of use of MCSs and a non-users' intention to use MCSs*

Cost

H0: *There is no relationship between the perceived cost of using MCSs and non-users' intention to use MCSs*

H1: *There is a relationship between the perceived cost of using a MCS and a non-users' intention to use MCSs*

Relationship

H0: *There is no relationship between the extent of the relationship between a MCSP and a non-user and their intention to use MCSs*

H1: *There is a relationship between the extent of the relationship between a MCSP and a non-user and their intention to use MCSs*

Convenience

H0: *There is no relationship between the perceived convenience of MCSs and a non-users' intention to use MCSs*

H1: *There is a relationship between the perceived convenience of MCSs a non-users' intention to use MCSs*

Personalisation

H0: *There is no relationship between the perceived personalisation of MCSs and a non-users' intention to use MCSs*

H1: *There is a relationship between the perceived personalisation of MCSs a non-users' intention to use MCSs*

Privacy and Security

H0: *There is no relationship between the perceived privacy and security of MCSs and a non-users' intention to use MCSs*

H1: *There is a relationship between the perceived privacy and security of MCSs a non-users' intention to use MCSs*

Permission

H0: *There is no relationship between the perceived permission based MCSs and a non-users' intention to use MCSs*

H1: *There is a relationship between the perceived permission based MCSs and non-users' intention to use MCSs*

Awareness

H0: *There is no relationship between the awareness MCSs and non-users' intention to use MCSs*

H1 *There is a relationship between the awareness MCSs and non-users' intention to use MCSs*

4.3.1 Conclusion

Previous research found that there is a relationship between intention to use and intention to re-use MCSs based on user satisfaction of the MCSs. These three factors were also shown to be accepted measures of system success. Additionally, factors were identified in this chapter that appear to contribute to these measures i.e. simplicity/ease of use, cost, convenience, relationship, awareness, personalisation, speed, privacy, security and permission. It is believed that these factors can be used to increase the successful adoption of MCSs. Hypotheses were constructed to test the possible influencing factors from the proposed MCS success factors and their influence on user satisfaction and intention to use.

CHAPTER 5: RESEARCH METHODOLOGY

This chapter describes the design of the empirical study used to test the proposed model of successful adoption factors for MCSs. The sample selection, questionnaire construction and hypothesis measurements are discussed.

5.1 Introduction

In fulfilling the aim of this research, to identify factors affecting the adoption of MC with a core focus on the end-user needs and wants, various tools have been used. A literature survey was carried out on related research on MC (Chapter 2) and existing MC adoption models (Chapter 3). Based on Chapter 2 and 3 list of critical success factors for MCSP was derived in Chapter 4. In order to test the validity of the proposed factors that affect the adoption of MC, a questionnaire was developed and distributed. This chapter details the design, the sample and the results of the questionnaire. The hypotheses created from the proposed list of success factors are tested (using the Chi-Square statistic) and results presented in this chapter.

5.2 Sample

When researching mobile technology market trends, researchers often divide consumers into varying age groups (Malhotra and Segars, 2005, Hong *et al.*, 2006, World Wide Worx, 2005b). One such age group is known as 18-24 also known as young adults (Malhotra and Segars, 2005). Malhotra and Segars (2005) found that 50% of the 18-24 age groups were classified as "late adopters" of new technology such as the Mobile Internet. Furthermore, Liew *et al.* (2004) in a case study on MCS in Japan found that MCSP must target young adults at the initial stages of service launch to create awareness and understand the reasons for this latent interest.

A convenience sample of Rhodes University students were chosen to take part in the online questionnaire. Ninety-five percent of the student population fall between the ages of 18 and 24 which covers the young adults age group.

5.3 Questionnaire Construction

To test the research hypotheses a questionnaire was developed. The questionnaire was based on similar empirical works such as Turel and Serenko's (2006) study of user satisfaction of MCS in Canada; Wang and Liao's (2007) study on "the conceptualization and measurement of m-commerce user satisfaction" and Hong *et al.*'s (2006) study on how MCS fuels the desire for uniqueness. A pilot study was done with 22 students from Rhodes University to test the validity and complexity of the developed questions. Based on the outcome of this pilot study the questionnaire was improved to make questions less ambiguous and more comprehendible to students.

Questions 1-6 are background questions that asses the past experience and habits of participants in terms of computer, internet and MC usage. To assess MC usage, four questions (Questions 3-6) were constructed, each representing a different type of MCS as identified by Kuo and Chen (2006) i.e. transaction, entertainment, information and communication.

The questionnaire is divided into two parts: the first part of the questionnaire surveys the students who have used their mobile phones for more than basic phone calls, SMS and MMS functions (listed in Table 5.1). These students are classified as users. The latter part of the questionnaire surveys the students who have not used their mobile phones listed in Table 5.1. These students will be known as non-users.

Question 7 is a branching question (Nardi, 2003) where users are informed which segment of the survey to fill in. Table 5.1 lists various applications and services offered in South Africa as identified by the researcher.

Extract from Questionnaire: Options of MCSs in South Africa

Downloading ringtones, truetones, pictures, wallpapers
Downloading games, playing online games
Downloading movie clips, watching streaming TV
Downloading music
News updates, weather updates, stock updates, account updates and queries, location information, movie information etc
Accessing the Internet
Receiving marketing information via SMS/MMS e.g. club/pub promotions and events, clothing store sales etc.
Instant messaging e.g. MSN, MXiT
E-mailing
Online Banking
Booking tickets online
Online Shopping

Table 5.1 - Extract from Questionnaire: Options of MCSs in South Africa

It should be noted that in the survey the colloquial term "cellphone" is used instead of mobile phone, in order to make the questionnaire more user friendly. A copy of the questionnaire can be found in Appendix B.

Table 5.2 lists the independent variables, i.e. the proposed success factors which are measured by Questions 8 – 19, 23 – 32 and 34. The dependent variables are measured by Questions 20, 21 and 34. Table 5.2 also shows where each question was derived from.

Variables measured	Users (Questions 8 – 21)	Non-User (Questions 24 – 35)	Derived From
Ease of Use	8	27	Hong *et al.* (2006); Wang and Liao. (2007); Yang (2005)
Cost	9	25	Hong *et al.* (2006); Lin and Wang (2006)
Awareness of Product	10; 11	31; 32; 35	Wang and Liao. (2007)
Privacy	12	28	Yang (2005)
Convenience	13	29	Hong *et al.* (2006); Wang and Liao. (2007); Yang (2005)
Speed	14	26	Wang and Liao. (2007)
Secure	15	28	Yang (2005)
Personalisation	16	24	Hong *et al.* (2006); Wang and Liao. (2007)
Permission	17; 18	30	Lee (2003)
Relationships	19	33	Lee (2003)
Satisfaction (Dependent Variable)	20	n/a	Wang and Liao. (2007)
Intention to Use (Dependent Variable)	21	34	Hong *et al.* (2006); Lin and Wang (2006)

Table 5.2 – Variables and Questions

There are two dependent variables in the questionnaire to measure success: 1) user satisfaction; and 2) intention to use. The dependent variable "user satisfaction" is measured only in the first part of the survey as Question 20: "On the whole, I am satisfied with the MCSs I have used". Question 20 implies that only those students that have used a particular service can state their level of satisfaction.

The second part of the questionnaire evaluates a "non-users" intention to use MCSs as the dependent variable as well as a measure of success. It is noted that due to the fact that non-users have little experience with mobile technology applications they are assumed, in this research, to view security and privacy concerns as the same single issue within MC. This is supported by authors such as Mahatanankoon *et al.* (2005), Dholakia and Dholakia (2005) and Veijalainen *et al.* (2006) who suggest that privacy and security are related and should be implemented in combination. It is thus assumed that if a user's privacy is breached it would cause their perception of security to fall simultaneously. Thus privacy and security are thus measured by Question 28 for non-users.

The questions intended to measure the independent and dependent variables were designed as close-ended, intensity measures in the form of five-point Lickert Scales. Users were asked the extent to which they agreed or disagreed with various statements. Table 5.3 below gives an example from the questionnaire.

Mobile Commerce Services are easy to access and use.
○ Strongly Agree
○ Agree
○ Neither Agree nor Disagree
○ Disagree
○ Strongly Disagree

Table 5.3 - Extract from questionnaire: Question and Answer format

5.4 Questionnaire Distribution, Collection and Coding

An online application known as Moodle was used to create and distribute the questionnaire. Moodle is a well known and utilised resource on the Rhodes University campus. It is an open source program that allows educators to create "effective online learning communities" (Moodle, 2006).

Moodle, at Rhodes University, has over 5000 registered users including past students, current students and staff. When the questionnaire was registered on Moodle an automatic email was sent to all registered users inviting them to take part in the survey. In order to elicit user responses three prizes were offered in the invitation to complete the survey:

1) 1GB Flash Stick
2) R100
3) R100

Nardi (2003) purports that using an online sample restricts those who do not have access to the internet or are not familiar with it. However, understanding the environment of Rhodes University and course structures where computer literacy is a course taught in first year, the majority of the students have regular access to computers and the Internet. This makes questionnaire completion more convenient.

The questionnaire was available to be completed for one week. Thereafter the information was downloaded from Moodle as a CSV file, also know as a Microsoft Office Excel "Comma Separated Values" file. The contents of the CSV file were imported into a standard Excel spreadsheet. The submitted responses were then evaluated for inconsistencies to eliminate questionnaires that were not completed correctly. Duplicate entries were removed. The duplicated entries were identified via the mobile number entry, which was required in order to win one of the prizes. After removing the invalid responses the final list of valid entries were exported to STATISTICA version 7.

After removing the entries that were deemed not valid, the data was encoded for statistical analysis. Numbers were assigned to the Lickert scale options as follows:

5 - Strongly Agree

4 - Agree

3 - Neither Agree nor Disagree

2 - Disagree

1 – Disagree

The following section presents the results of the survey.

5.5 Questionnaire Results

The online questionnaire attracted 767 responses. The final number of valid entries used for analysis was 516, which is 67% of the total responses. Three hundred and sixty seven of the responses were grouped into the "Users" category and 149 were grouped into the "Non-Users" category.

It is noted that due to the rounding of percentages some of the percentage totals may not add up to exactly 100% (there may be a discrepancy of 1% in the percentage total).

5.5.1 Demographics

Demographics	Number	Percentage
Gender		
Male	220	43%
Female	296	57%
Nationality		
South African	361	70%
Foreigners	156	30%
Age		
18	15	3%
19	107	21%
20	134	26%
21	112	22%
22	82	16%
23	41	8%
24	25	5%
Network		
VODACOM	287	56%
MTN	150	29%
CELLC	78	15%
Virgin Mobile	1	0%
Account Type		
Contract	321	62%
Prepaid	195	38%

Table 5.4 - Demographics

5.5.2 Network

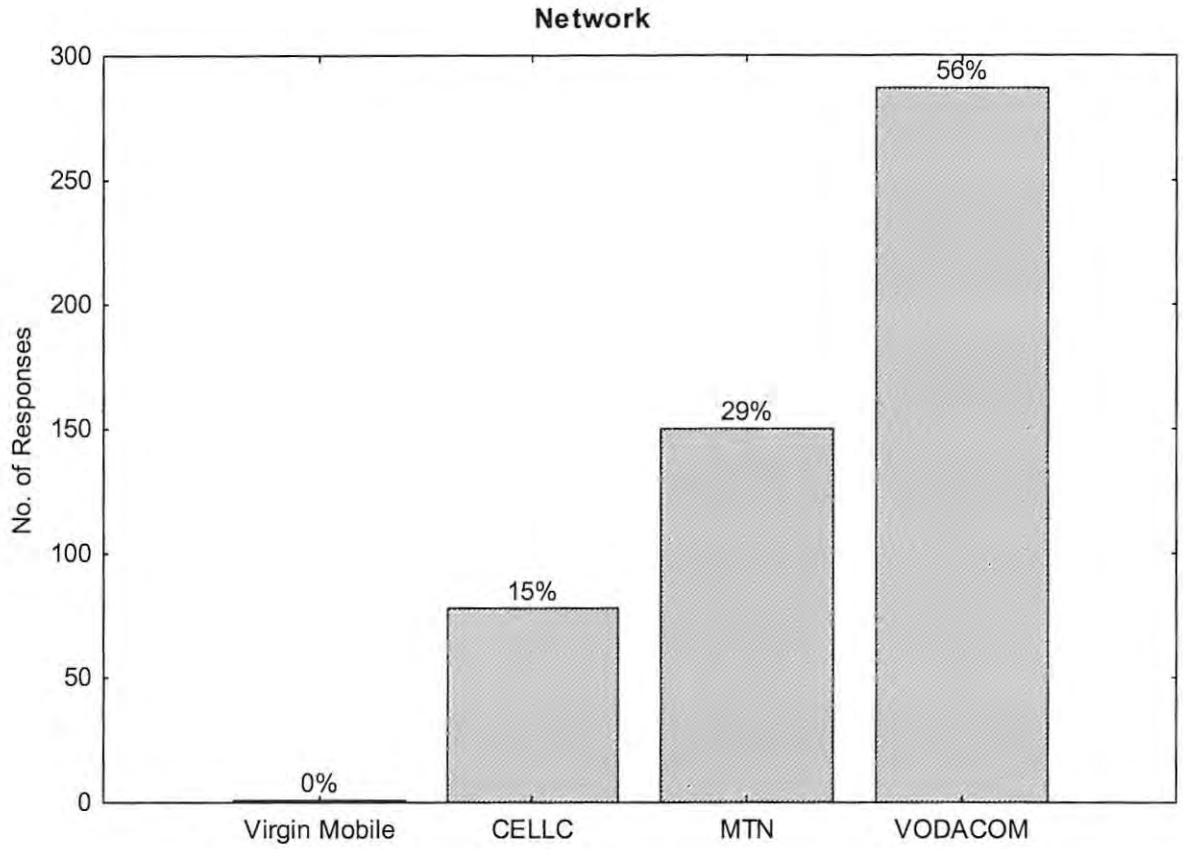

Figure 5.1 - Participant Network Distribution

Figure 5.1 shows the network user statistics of the sample. Fifty-six percent of the sample used VODACOM, 29% used MTN, 15 % used CELLC and 0.2% (before rounding) used Virgin Mobile. Table 5.5 shows the frequency distribution of the responses. These results can be used to compare the sample to the greater South African population which will be discussed in the next chapter.

	Virgin Mobile	CELLC	MTN	VODACOM	TOTAL
Count	1	78	150	287	516
%	0.2	15.1	29.1	55.6	100

Table 5.5 - Participant Network Distribution

5.5.3 General

Question 1: How often do you use a laptop or desktop computer?

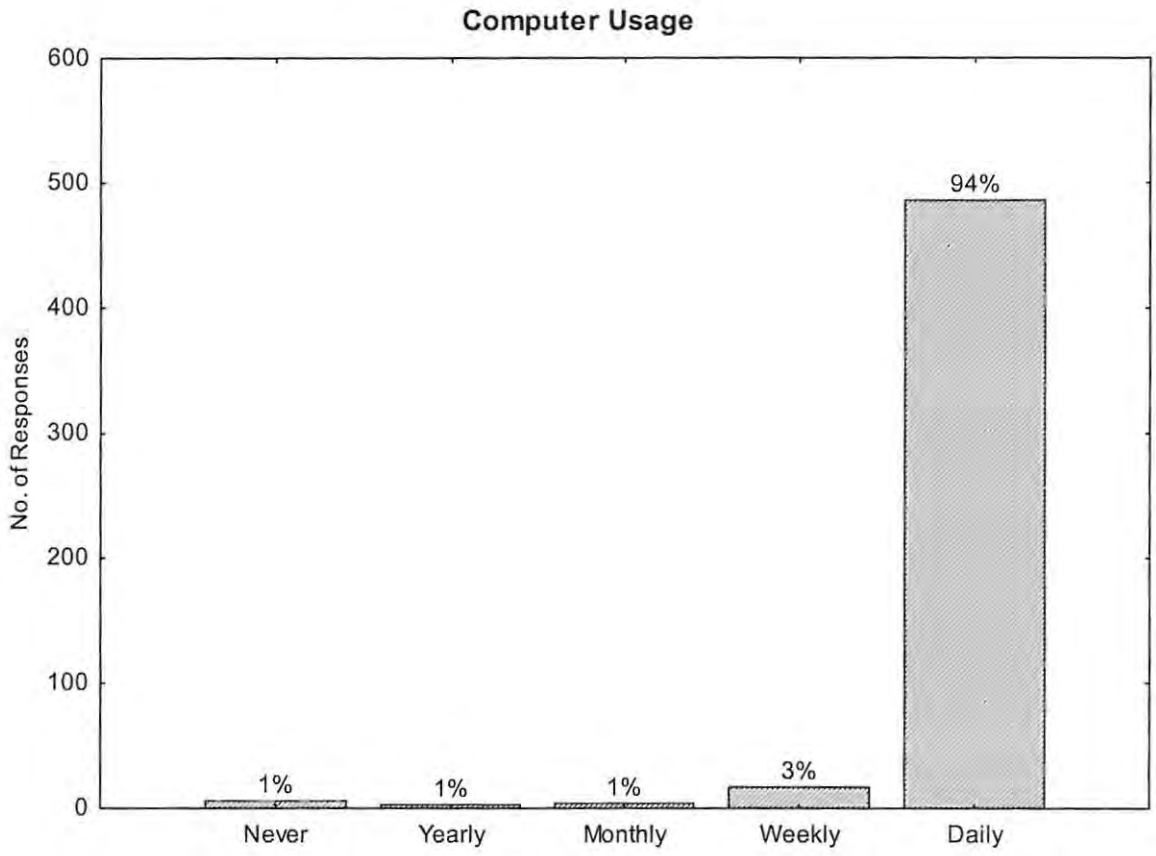

Figure 5.2 - Computer Usage

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	6	3	4	17	486	516
%	1	1	1	3	94	100

Table 5.6- Computer Usage

Figure 5.2 and Table 5.6 illustrate the distribution of respondents in terms of how often they used a computer. Given that Rhodes University has numerous computers available to them throughout the campus and that this questionnaire was completed online via a computer it is expected that 94% of the respondents used a computer on a daily basis. This implies that the majority of respondents have at least a moderate level of experience with other related technologies.

Question 2: How often do you access the Internet?

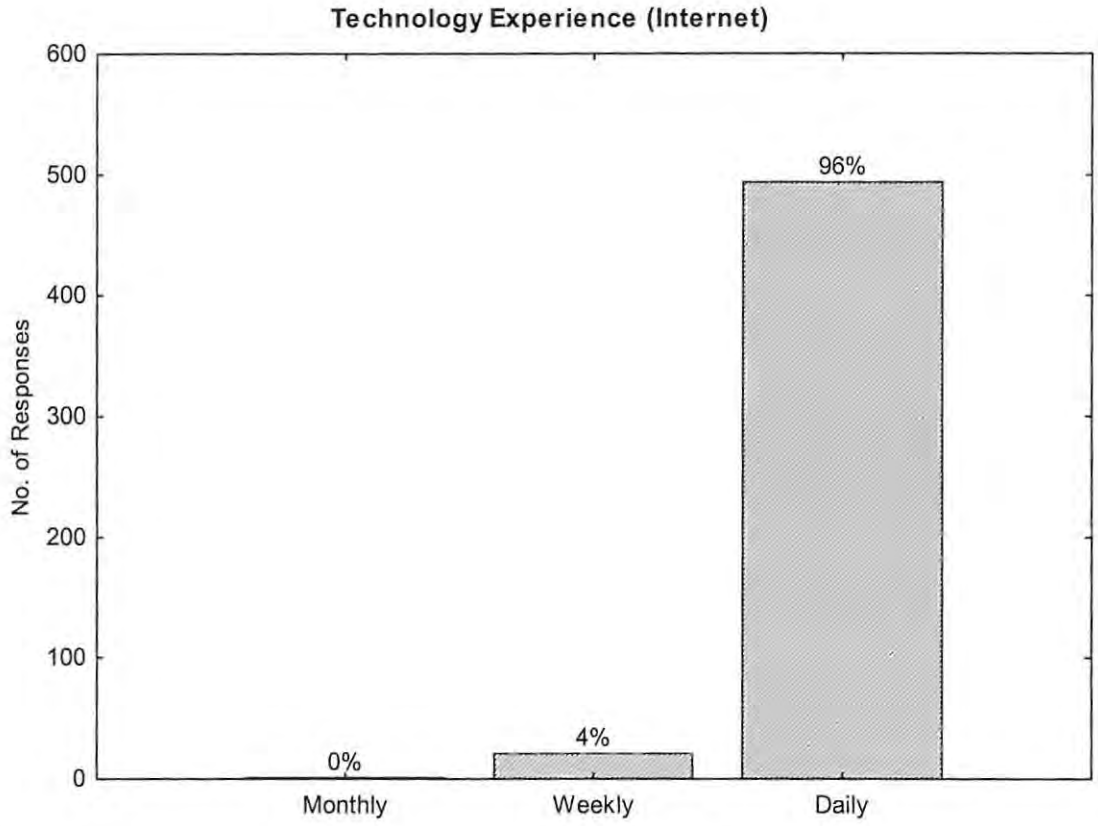

Figure 5.3 - Internet Usage

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	0	0	1	21	494	516
%	0	0	0.2	4.1	95.7	100

Table 5.7 - Internet Usage

Figure 5.3 and Table 5.7 illustrate the distribution of respondents in terms of how often they accessed the Internet. The responses to this question posed interesting differences from Question 1's responses. Given that internet is generally accessed via a laptop or desktop computer, 94 % said they used a computer daily while 96% said they accessed the internet daily. One could conclude that the 2% difference is due to these respondents accessing the internet via their mobile phone or that they did not understand the question.

Question 3: Please indicate how often you use your current cellphone for ENTERTAINMENT, for example, downloading ringtones, pictures, screensavers, audio and video clips, watching streaming TV, gaming, horoscopes etc.

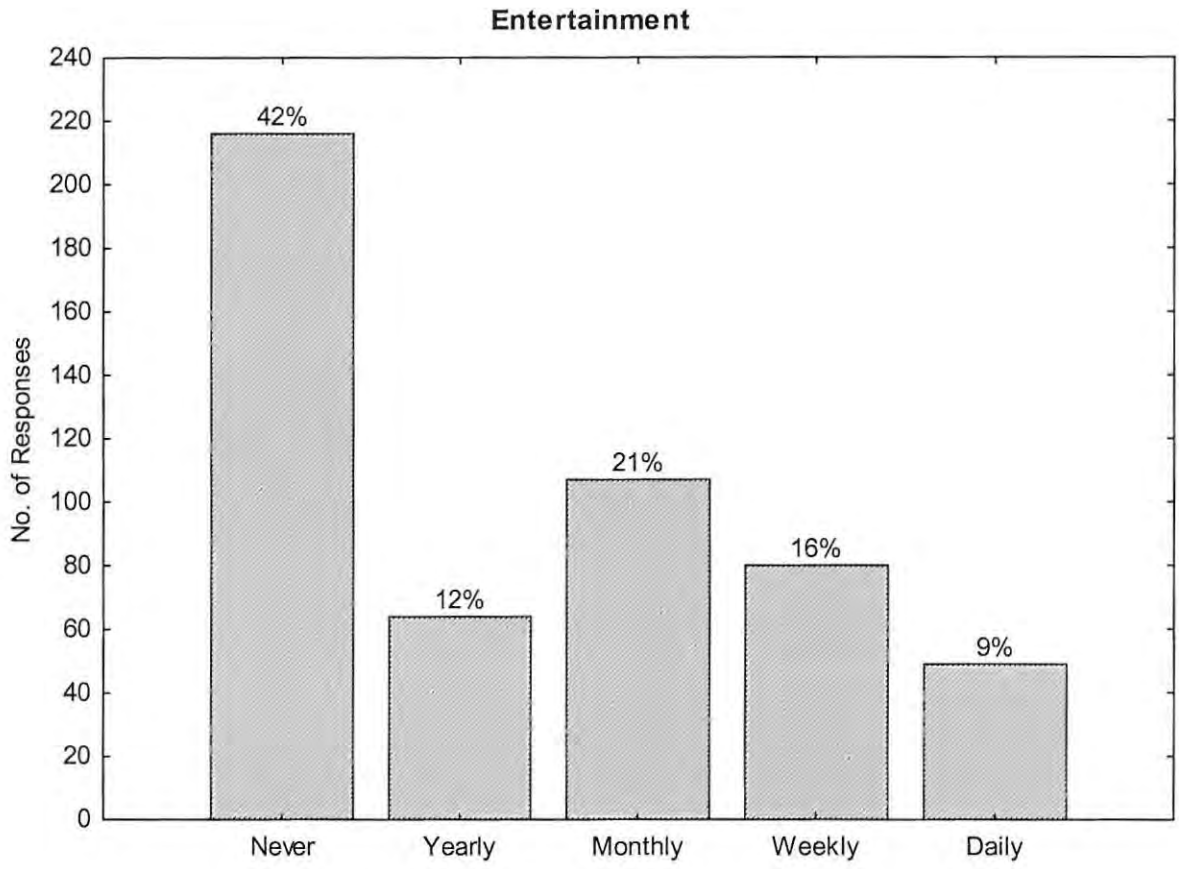

Figure 5.4 - Mobile Phone Usage: Entertainment

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	216	64	107	80	49	516
%	42	12	21	16	9	100

Table 5.8 - Mobile Phone Usage: Entertainment

Figure 5.4 and Table 5.8 illustrates the distribution of respondents in terms of how often they used their mobile phones to access entertainment services. Forty-two percent of respondents never used their mobile phone to access entertainment services, which could indicate that respondents were not interested in the current entertainment services available.

Question 4: Please indicate how often you use your current cellphone to retrieve INFORMATION, for example; weather updates, news headlines, stock updates, flight information etc.

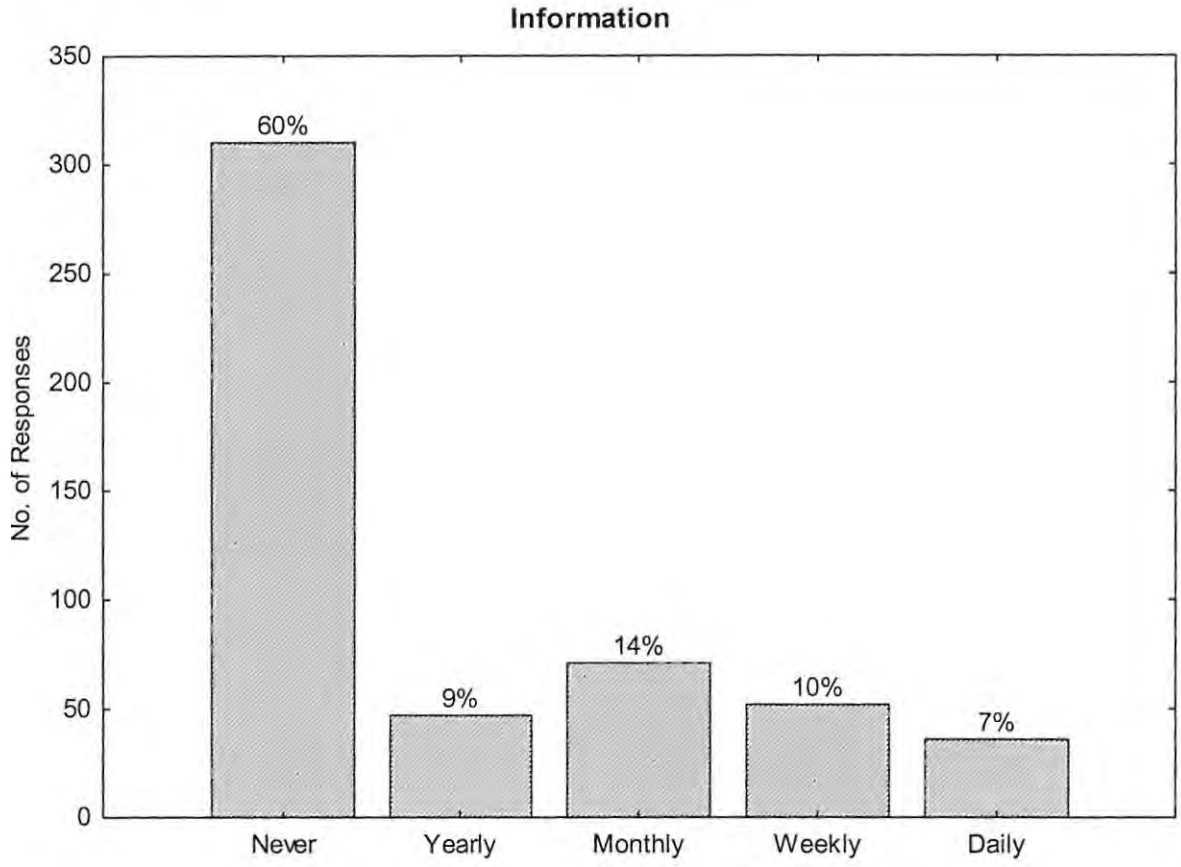

Figure 5.5 - Phone Usage: Information Retrieval

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	310	47	71	52	36	516
%	60	9	14	10	7	100

Table 5.9 - Phone Usage: Information Retrieval

Figure 5.5 and Table 5.9 illustrate the distribution of respondents in terms of how often they used their mobile phones to access information services. One of the main arguments for the mobile Internet is that it allowed for the dissemination of information to people at any time and place (Kuo and Chen, 2006). Sixty percent of the respondents indicated having never used their mobile phone for information purposes. This might indicate that people have not bought into using their mobile phones for information services.

Question 5: Please indicate how often you use your current cellphone for TRANSACTIONS, for example; bank account updates, requesting bank statements, money transfers, ticket reservations, shopping etc.

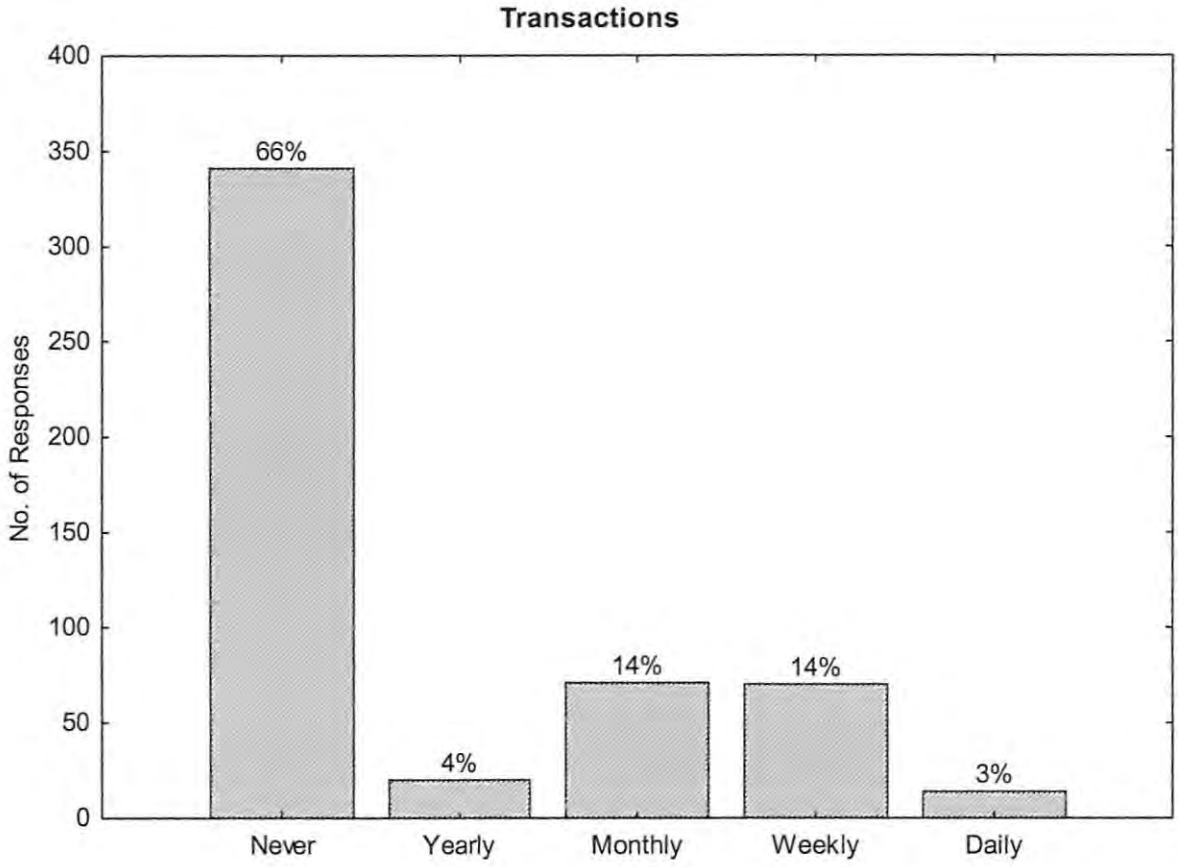

Figure 5.6 - Mobile Phone Usage: Transactions

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	341	20	71	70	14	516
%	66	4	14	14	3	100

Table 5.10 - Mobile Phone Usage: Transactions

Figure 5.6 and Table 5.10 illustrate the distribution of respondents in terms of how often they used their mobile phones to access transaction services. These results indicate that 34% of the sample used their mobile phones for some form of transaction. Comparing these results to Table 5.12 it is evident that 69 respondents used their phones for online banking, accounting for 13% of all respondents. This finding compares favourably with findings of FIN24.CO.ZA (2006) where less than 10% of the youth and young adults surveyed in the Mobility 2006 survey had used their mobile phones for banking.

Question 6: Please indicate how often you use your current cellphone to COMMUNICATE with other people e.g. instant messaging, emailing etc.

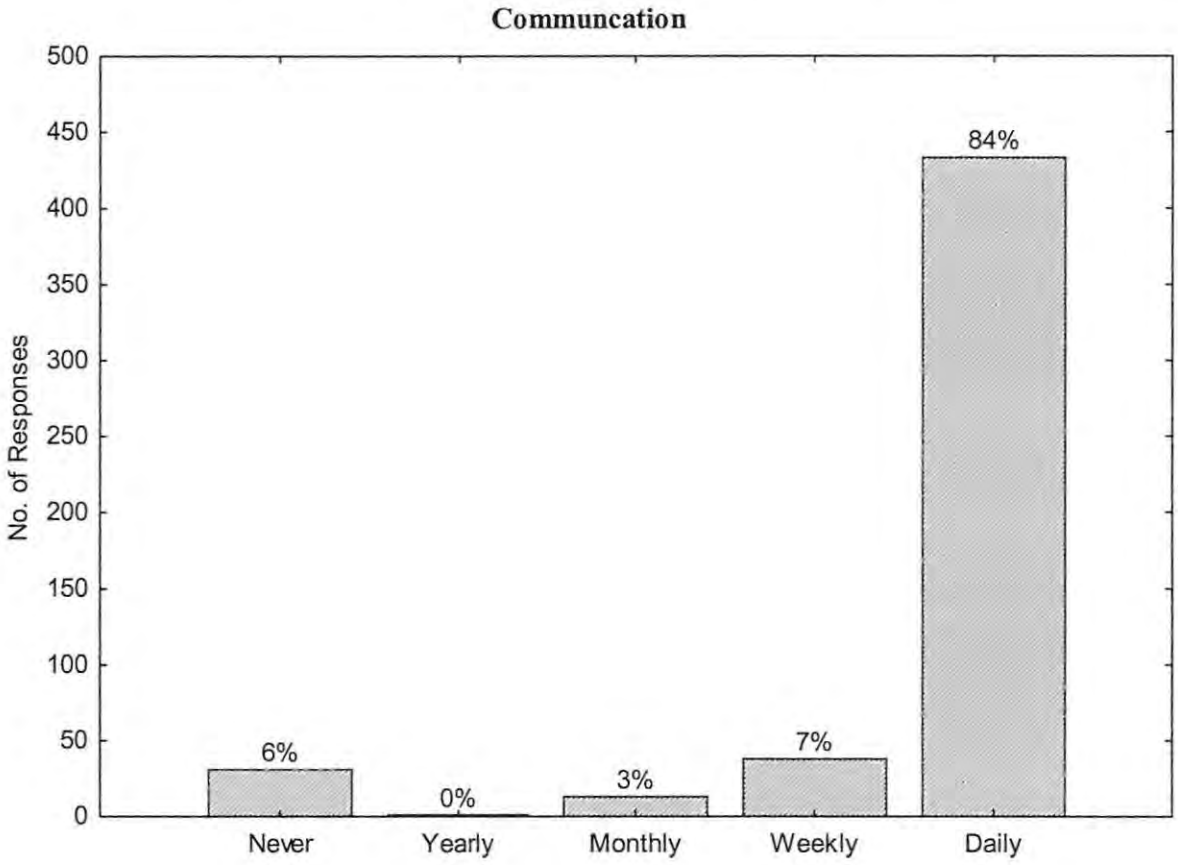

Figure 5.7 - Mobile Phone Usage: Communication

	Never	Yearly	Monthly	Weekly	Daily	TOTAL
Count	31	1	13	38	433	516
%	6	0	3	7	84	100

Table 5.11 - Mobile Phone Usage: Communication

Figure 5.7 and Table 5.11 illustrate the distribution of respondents in terms of how often they used their mobile phones to access communication services. The initial reason for mobile phone adoption is the ability to communicate independent of time and place (Hong *et al.*, 2006). Eighty-four percent of respondents indicated using their mobile phones for communication daily.

Question 7: In South Africa, which of the following functions have you used your CELLPHONE for, other than voice phone calls, SMS, MMS?

MCS	Number of Responses	Percentage of Responses (Rounded to the nearest 1%)
Accessing the Internet	211	57%
Booking tickets online	15	4%
Downloading games, playing online games	109	30%
Downloading movie clips, watching streaming TV	27	7%
Downloading music	92	25%
Downloading ringtones, truetones, pictures, wallpapers	259	71%
E-mailing	77	21%
Instant messaging	192	52%
News updates, weather updates, stock updates, account updates and queries, location information, movie information etc	132	36%
Online Banking	69	19%
Online Shopping	5	1%
Receiving marketing information via SMS/	180	49%

Table 5.12 - MCSs users have accessed via their mobile phones

Table 5.12 illustrates the distribution of respondents in terms of what MCSs they have used in South Africa. Only 367 respondents indicated to have used one or more of the

services in Table 5.1. The percentages in Table 5.12 are thus calculated on the number of users only and not the total number of respondents.

Of the user group, 71% have used their mobile phones for downloading ringtones. As mentioned in Chapter 2, South African users mostly use their phones for ringtones and other personalisation downloads. This also supports the personalisation factor, as noted by Hong *et al.* (2006) who found that personalisation was of critical importance to users in the arena of MCSs. Ringtones, wallpapers, picture downloads all allow for users to create a unique identity using their mobile handset. This could indicate that other MCSs available do not offer the same level of personalisation.

The next major use of MCSs was accessing the mobile Internet (57%), instant messaging (52%), and receiving marketing information (49%). As noted, the majority of respondents accessed the Internet daily (96%) and most of those connections were via fixed line connections (94%). The regular use of computers and the Internet would suggest that users are generally comfortable using this technology and well experienced with how to use it. It could be argued that users of these technologies have or are developing their use as habitual (Lin and Wang, 2006).

5.5.4 Questionnaire Results: Users

Question 8: Mobile Commerce Services are easy to access and use.

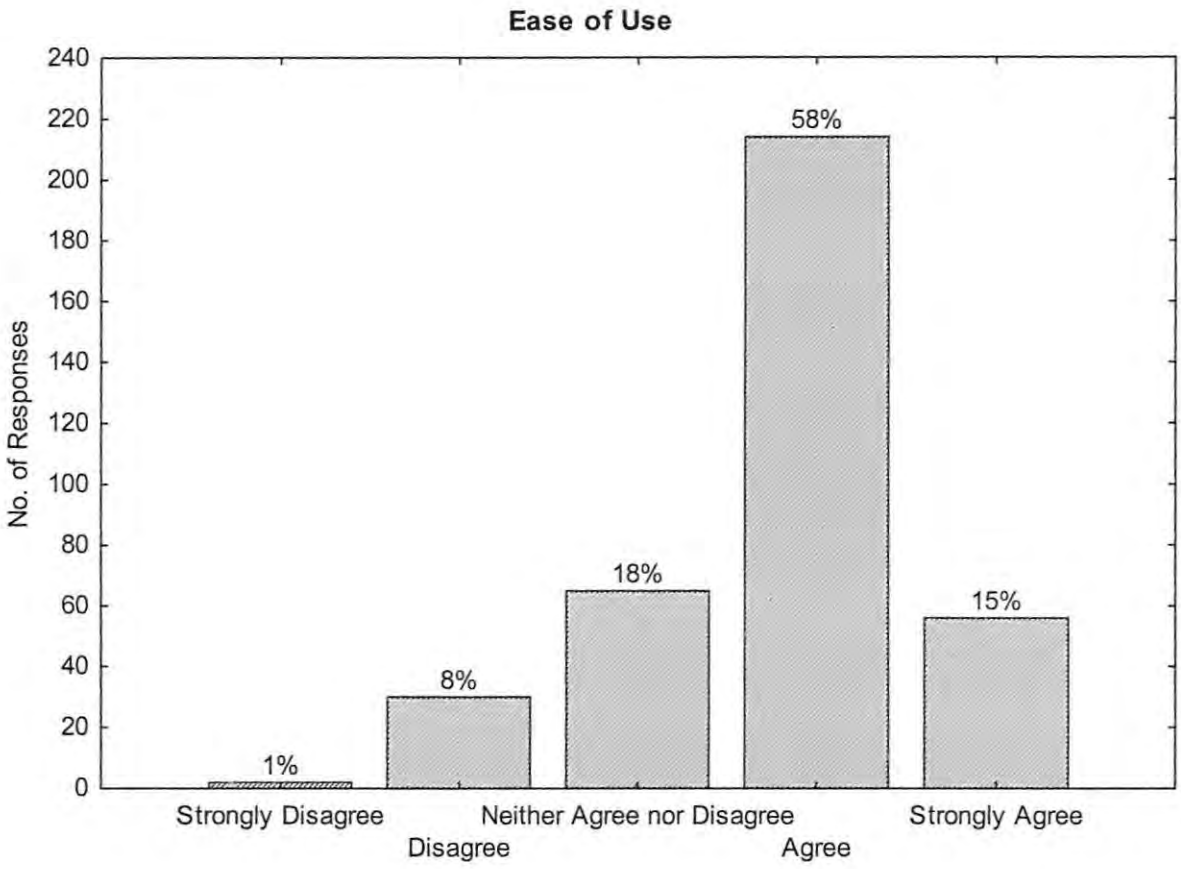

Figure 5.8 - Users: Ease of Use

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	2	30	65	214	56	367
%	1	8	18	58	15	100

Table 3 - Users: Ease of Use

Figure 5.8 and Table 5.13 illustrate the distribution of user's opinions in terms of the ease of use of the MCSs they have used. It is expected that the majority of users (73%) would indicate it to be user friendly. This is due to the fact that the more people use a technology, the more comfortable they become with it and its functioning (Malhotra and Segars, 2005).

Question 9: Mobile Commerce Services are reasonably priced.

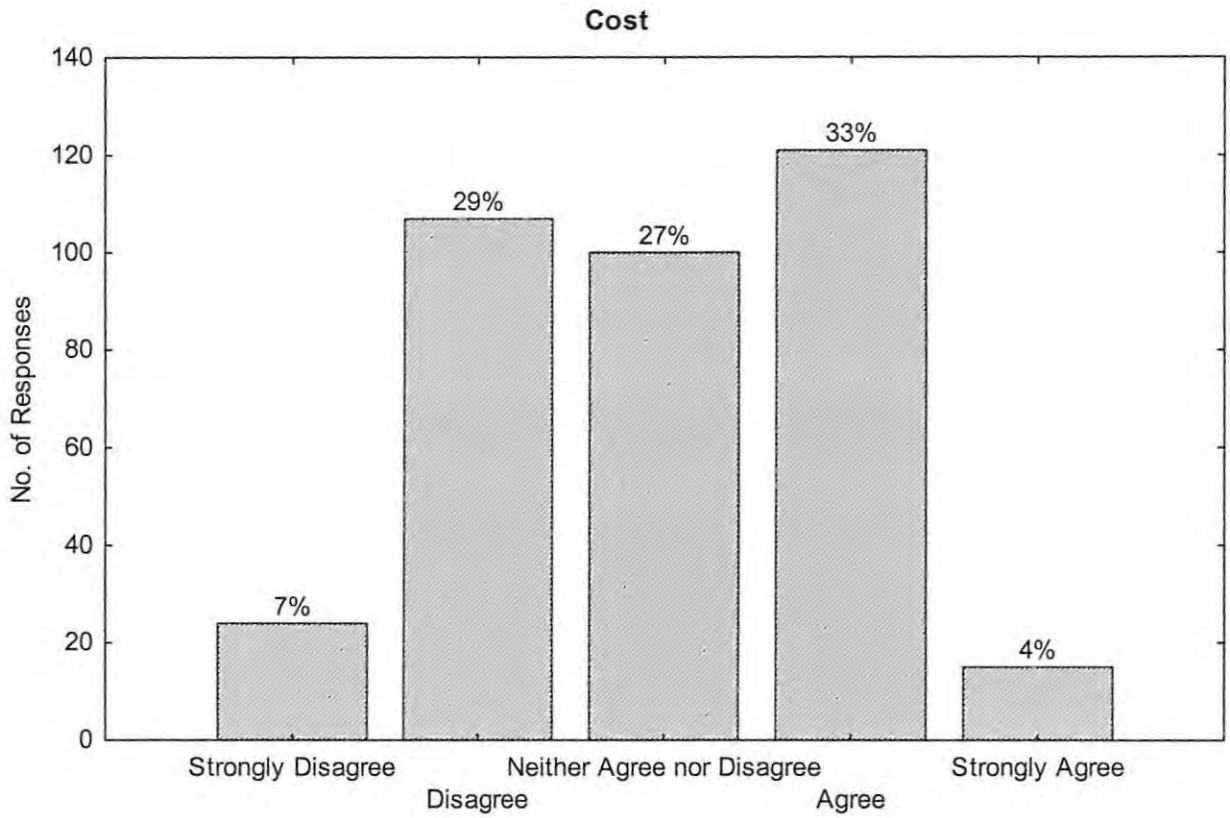

Figure 5.9 - Users: Cost

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	24	107	100	121	15	367
%	7	29	27	33	4	100

Table 5.14 - Users: Cost

Figure 5.9 and Table 5.14 illustrate the distribution of user's opinions in terms of the cost of the MCSs they have used. Thirty-six percent of users said that MCSs were not reasonably priced versus 37% that said they were, and 27% were uncertain. Due to the relatively even distribution of responses no conclusions will be drawn at this point.

Question 10: Mobile Commerce Services are well advertised.

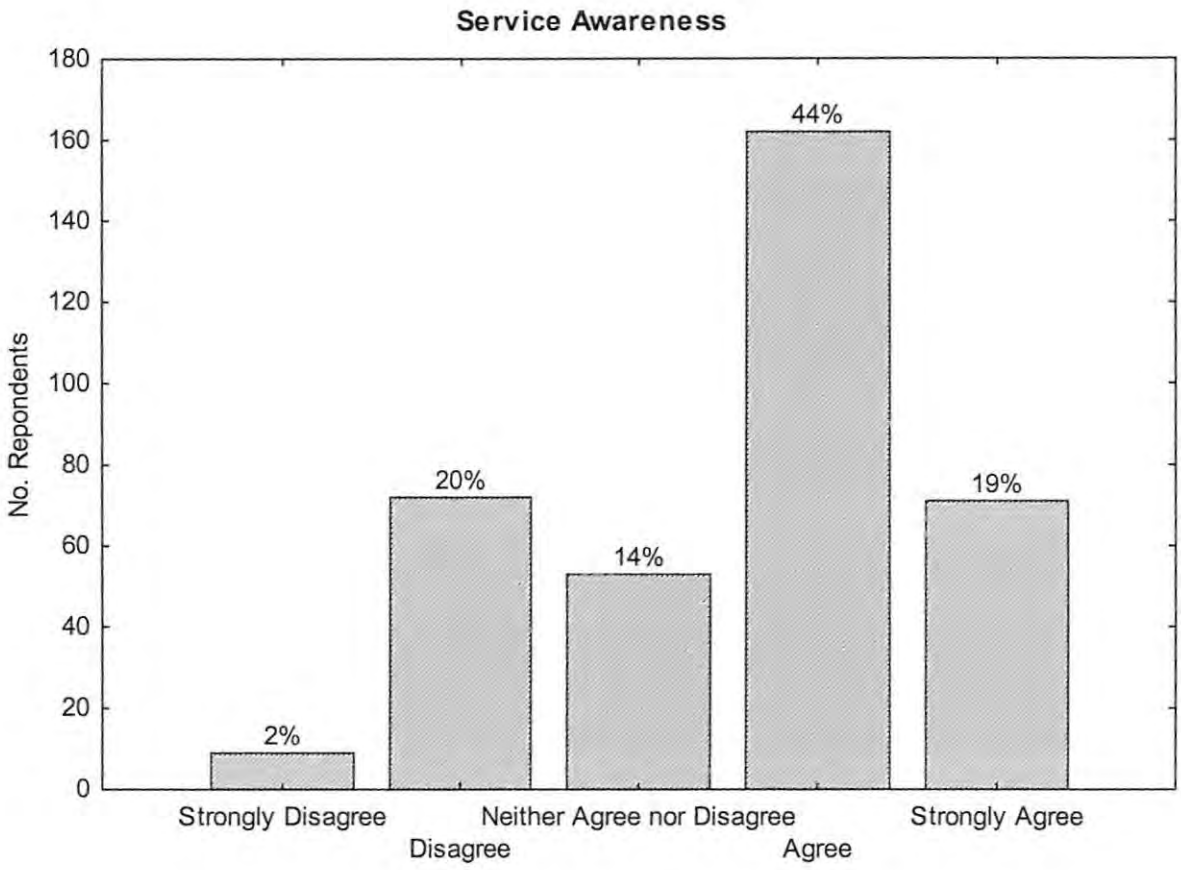

Figure 5.10 - Users: Service Advertising

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	9	72	53	162	71	367
%	2	20	14	44	19	100

Table 4 - Users: Service Advertising

Figure 5.10 and Table 5.15 illustrates the distribution of user's opinions in terms of the awareness generated about the MCSs they have used. Sixty-three percent of users indicated that the MCSs they used are well advertised. A reason for this could be that MCSPs, offering ringtone and other personalisation downloads, advertise frequently in South Africa on prime time TV, magazines, newspapers, radio and free booklets at various retailers.

Question 11: The cost structures of Mobile Commerce Services are clearly stated i.e. I know how much each service costs to use.

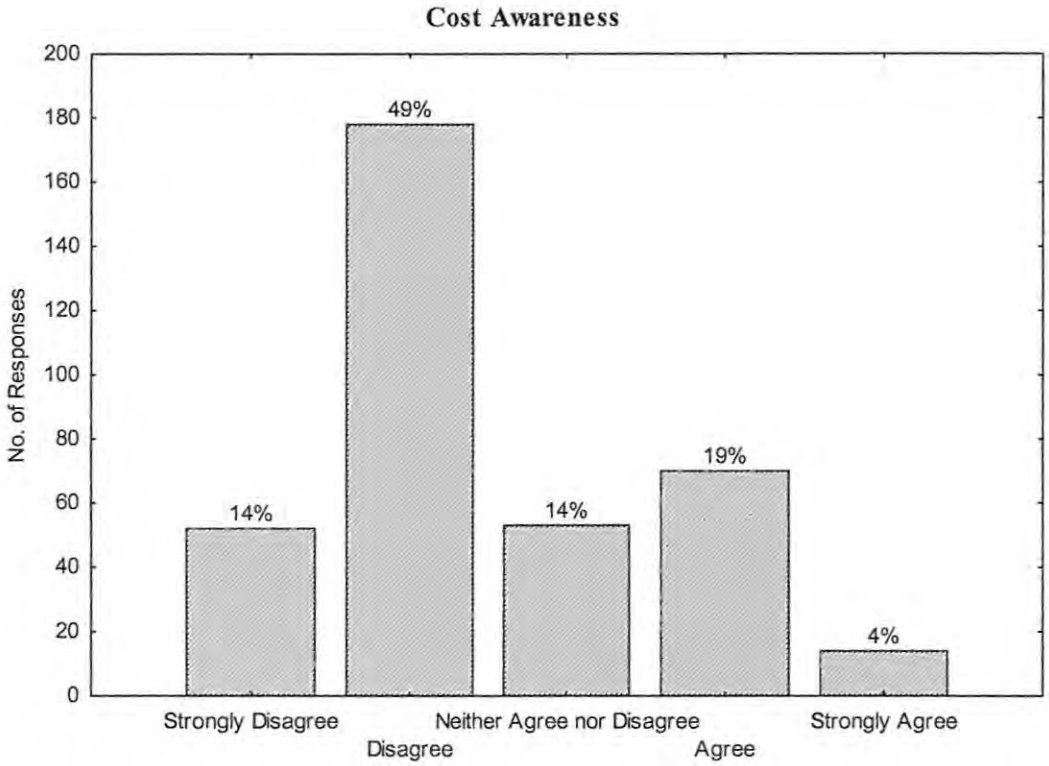

Figure 5.11 - Users: Cost Awareness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	52	178	53	70	14	367
%	14	49	14	19	4	100

Table 5.16 - Users: Cost Awareness

Figure 5.11 and Table 5.16 illustrate the distribution of user's opinions in terms of the cost structures of the MCSs they have used. Simmons (2006) noted that MCS users are often confused about tariffs and what they are charged for using services. Given that 63% of users indicated to not knowing the costs of the MCS they used could indicate that MCSPs do not provide enough information to users about their service costs. This confusion could be seen as a barrier to the successful adoption of MC. Simmons (2006)

Question 12: My personal details are kept private.

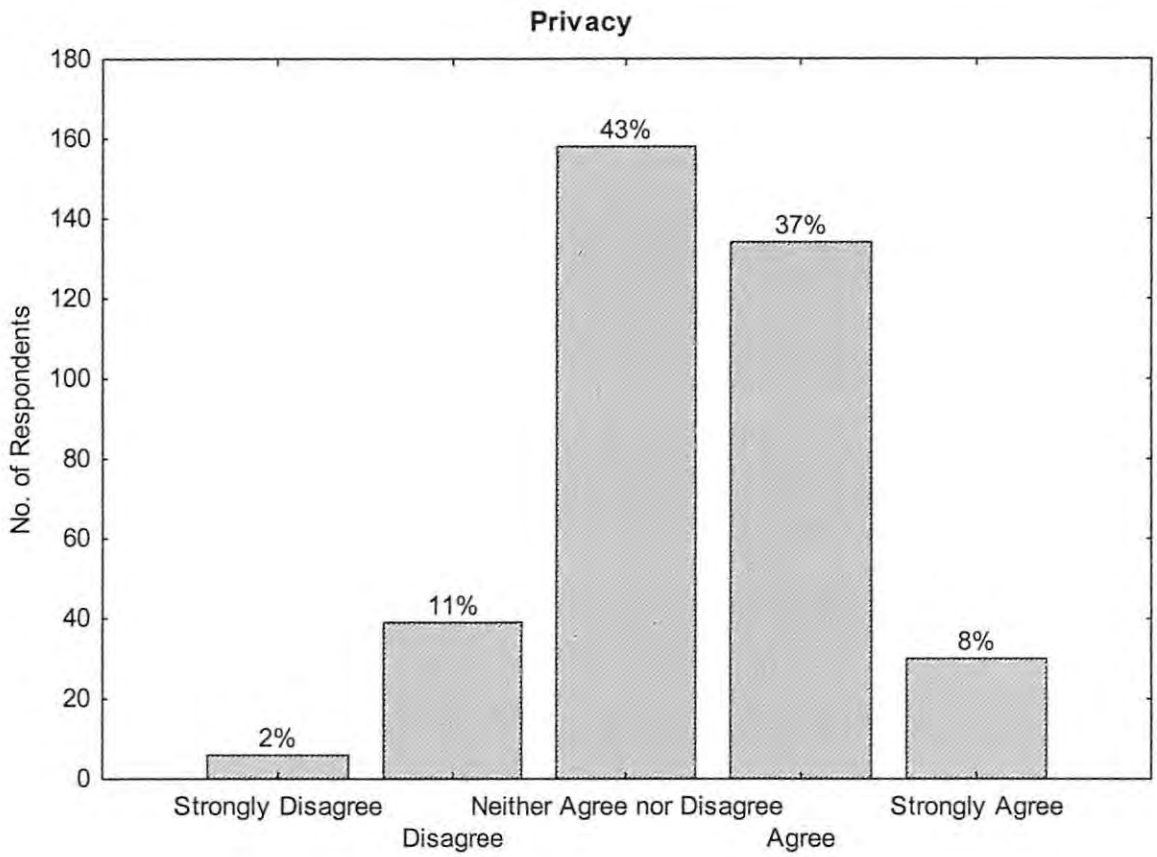

Figure 5.12 - Users: Privacy

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	6	39	158	134	30	367
%	2	11	43	37	8	100

Table 5.17 - Users: Privacy

Figure 5.12 and Table 5.17 illustrate the distribution of user's opinions in terms of the privacy of the MCSs they have used. The fact that almost 50% of users were unsure about the way MCSs treat their personal information may show that users do not have enough information from suppliers about the use of their information.

Question 13: Mobile Commerce Services generally offer me convenience and add value to my lifestyle.

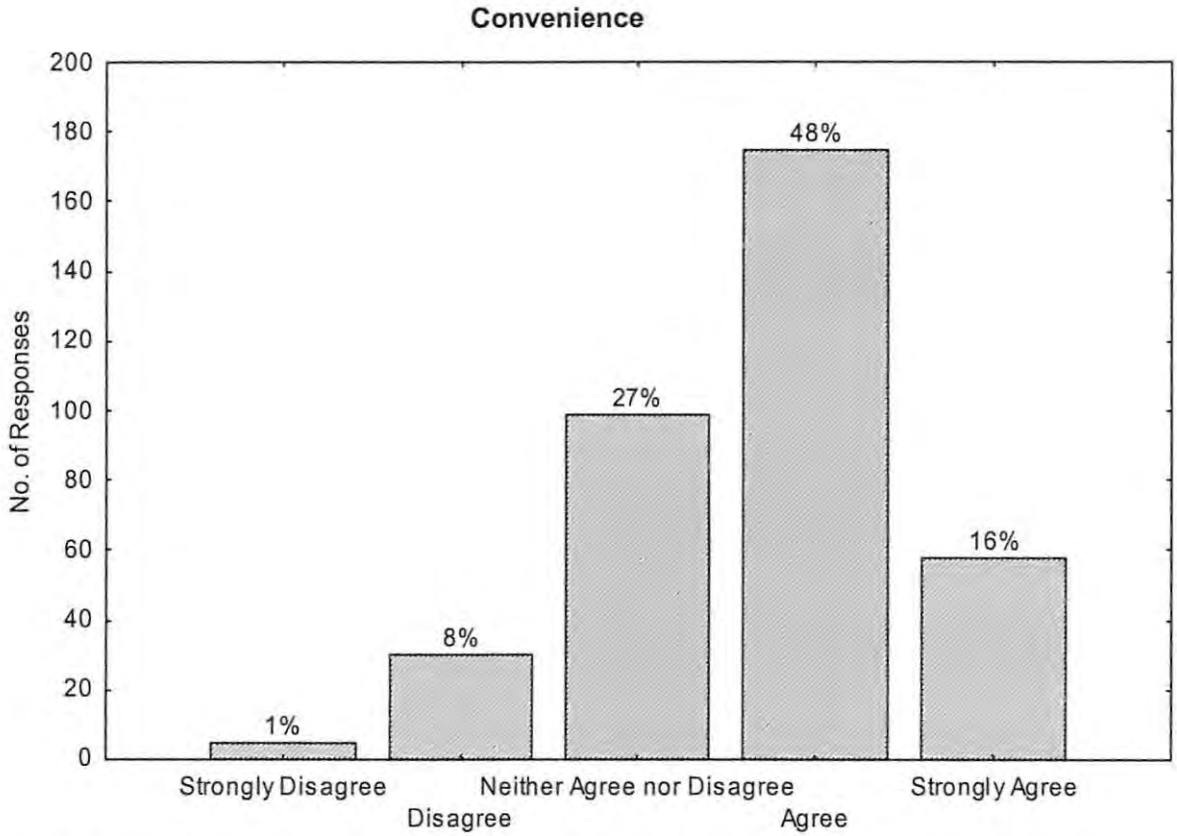

Figure 5.13 – Users: Convenience

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	5	30	99	175	58	367
%	1	8	27	48	16	100

Table 5.18 – Users: Convenience

Figure 5.13 and Table 5.18 illustrate the distribution of user's opinions in terms of the convenience of the MCSs they have used. Chapter 3 established that people would not willingly adopt a new technology if it did not add value, or benefit them in some way. The majority of users (64%) believed that the MCSs they used added convenience and value.

Question 14: Mobile Commerce Services are fast/quick.

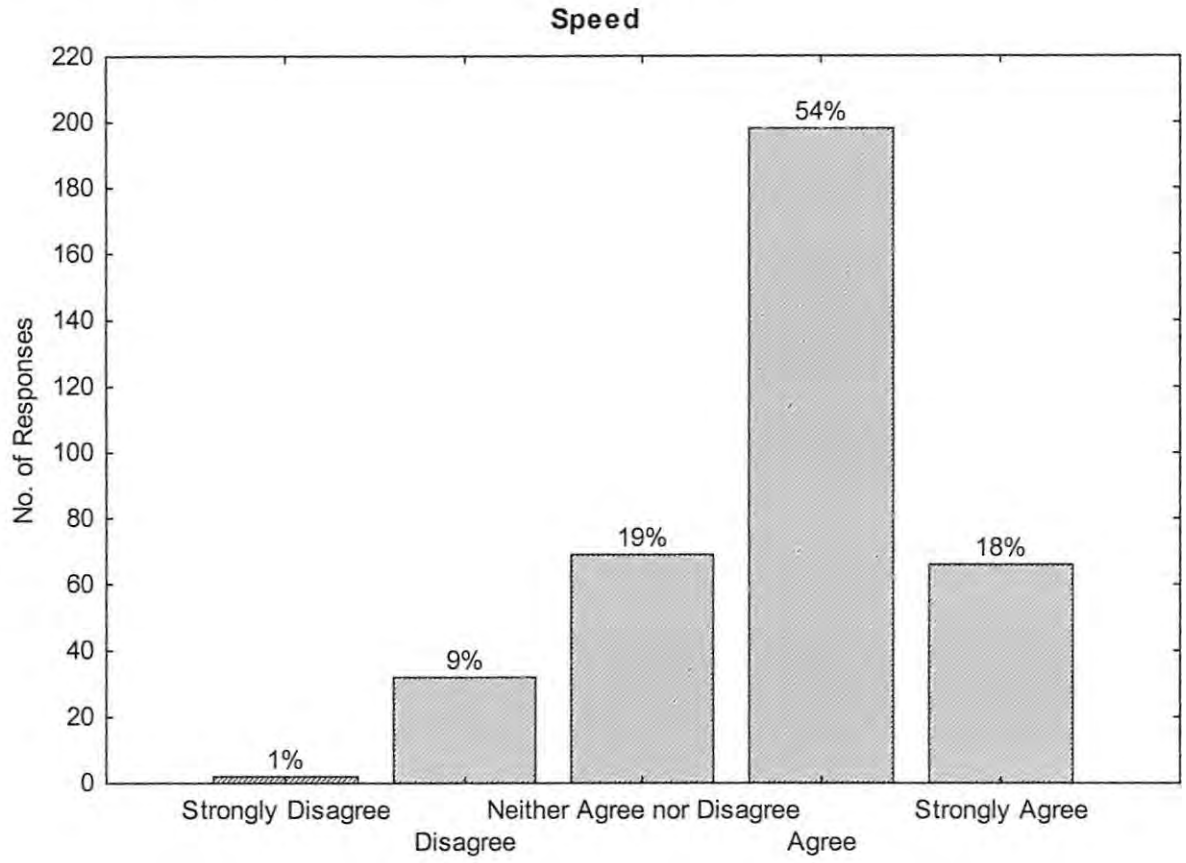

Figure 5.14 – Users: Speed

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	2	32	69	198	66	367
%	1	9	19	54	18	100

Table 5.19 – Users: Speed

Figure 5.14 and Table 5.19 illustrate the distribution of user's opinions in terms of the speed of the MCSs they have used. Seventy-two percent of users said that MCSs are fast, 10% disagreed and 19% were undecided. Cross referencing this question with Question 7, the high rate of users perceiving MCS as fast could be accredited to the fact that 71% of users have downloaded ringtones, pictures or wallpapers and 52% have used instant messaging. These services are generally instant in their response which could be perceived as fast.

Question 15: Mobile Commerce Services are secure and safe to use e.g. I would feel comfortable giving my credit card details to make a purchase via MCSs.

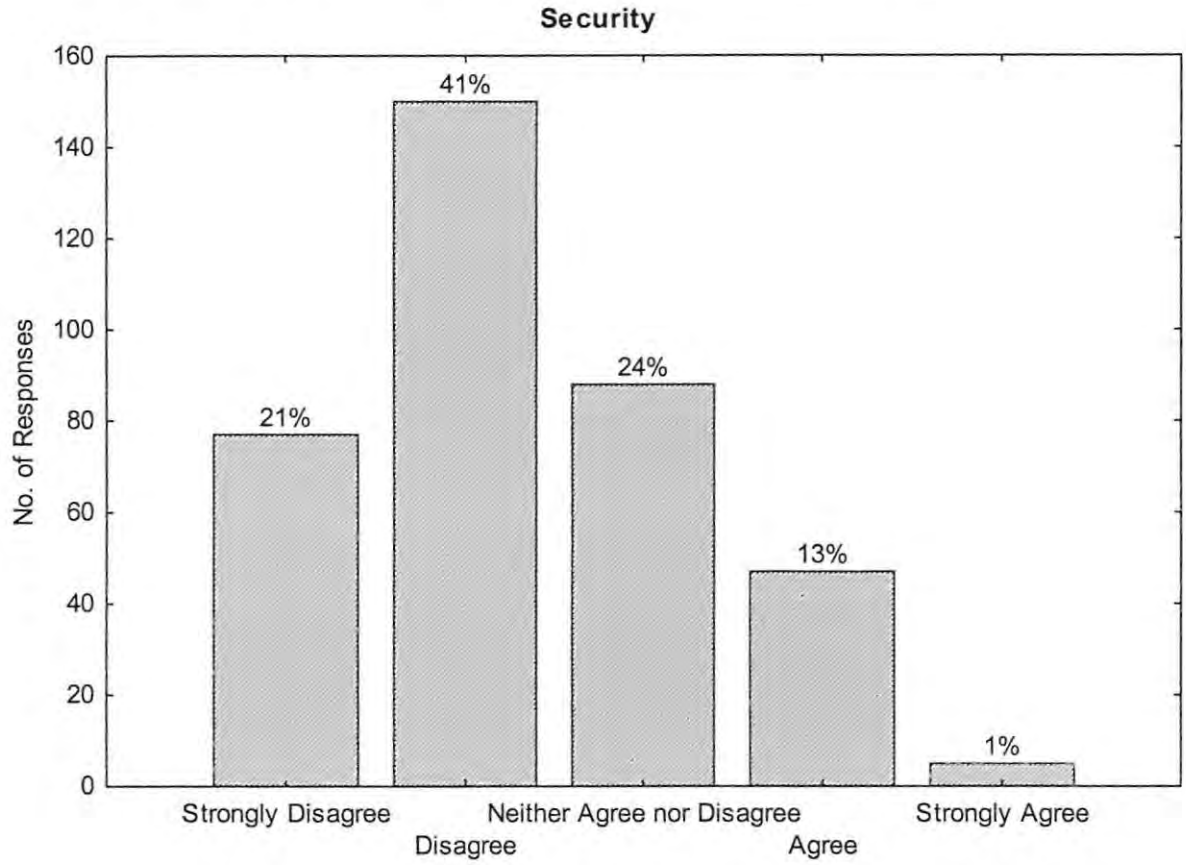

Figure 5.15 – Users: Security

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	77	150	88	47	5	367
%	1	8	27	48	16	100

Table 5.20 – Users: Security

Figure 5.15 and Table 5.20 illustrate the distribution of user's opinions in terms of the security of the MCSs they have used. Sixty-two percent of users feel that MC is unsafe and would hesitate to give their credit card details over their mobile device. Fourteen percent perceived MCSs to be secure enough to make credit card purchases and 24% were unsure. Cross referencing with Question 2, 96% of users used the Internet daily. It could be assumed that the frequent exposure to the Internet could create awareness to users of the security risks involved in using it. Given the

numerous warnings about security risks on the Internet, users could associate the risks of the Internet to that of MCSs.

Question 16: Mobile Commerce Services are or can be customised to suite my personal needs/wants.

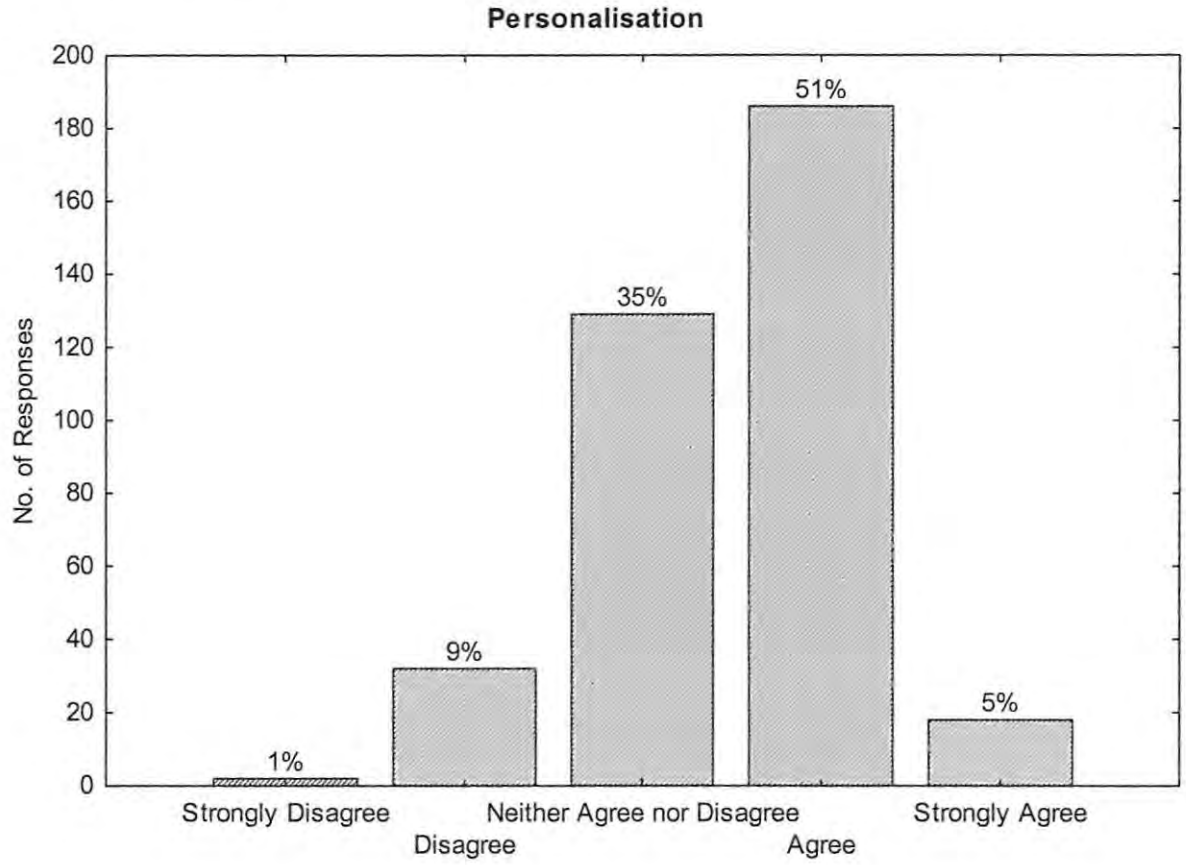

Figure 5.16 – Users: Personalisation

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	2	32	129	186	18	367
%	1	9	35	51	5	100

Table 5.21 – Users: Personalisation

Figure 5.16 and Table 5.21 illustrate the distribution of user's opinions in terms of the personalisation of the MCSs they have used. Fifty-six percent of users indicated that the MCSs they used were personalised. This could be related to the fact that there is a high degree of personalisation in downloading ringtones, wallpapers, given the numerous options available. Instant messaging caters to user's individual needs for communication which could affect users perception of MCS personalisation.

Question 17: Mobile Commerce Services generally require my permission before being activated.

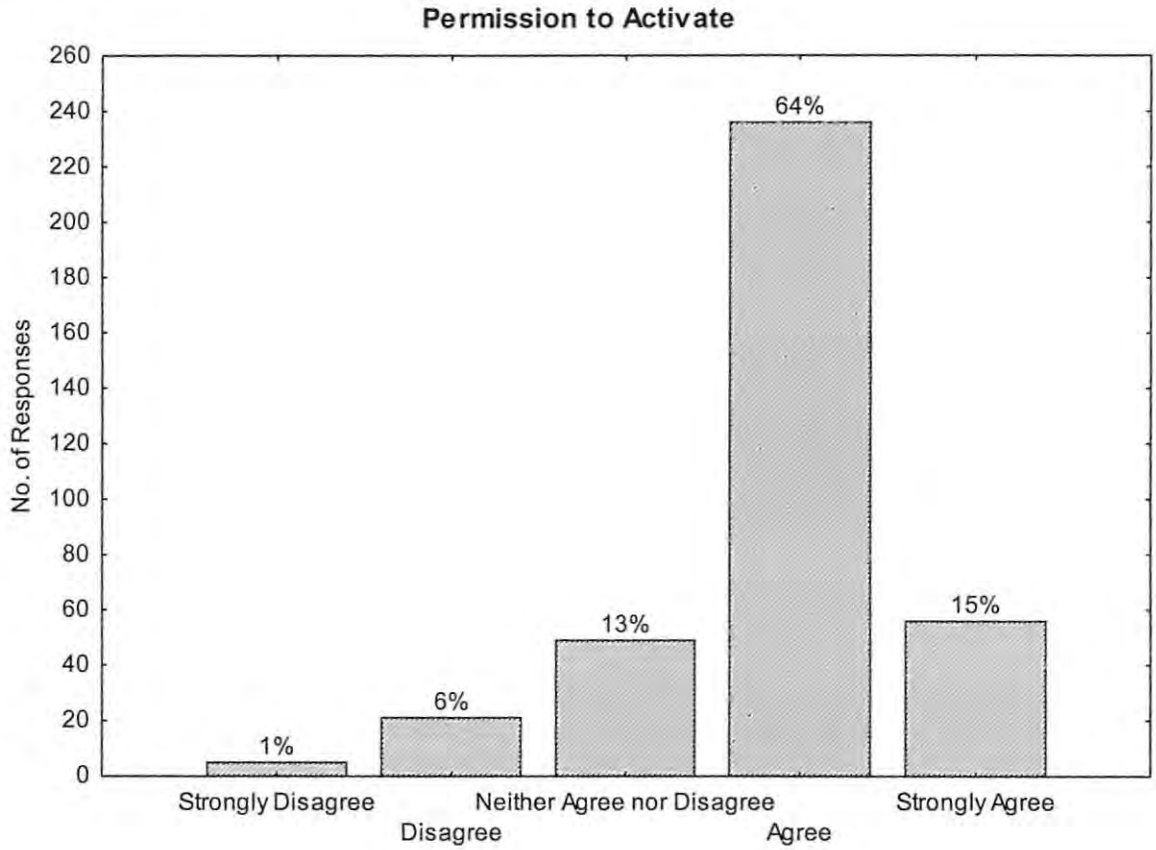

Figure 5.17 – Users: Permission to activate

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	5	21	49	236	56	516
%	1	6	13	64	15	100

Table 5.22 – Users: Permission to activate

Figure 5.17 and Table 5.22 illustrate the distribution of user's opinions in terms of whether the MCSs they have used require permission to activate the service. MCSs, like downloading ringtones, wallpapers and instant messaging, require the users to initiate the service which would account for 79% of users saying that MCSs require their permission to be initiated.

Question 18: Mobile Commerce Services give me the option to cancel my subscription whenever I choose.

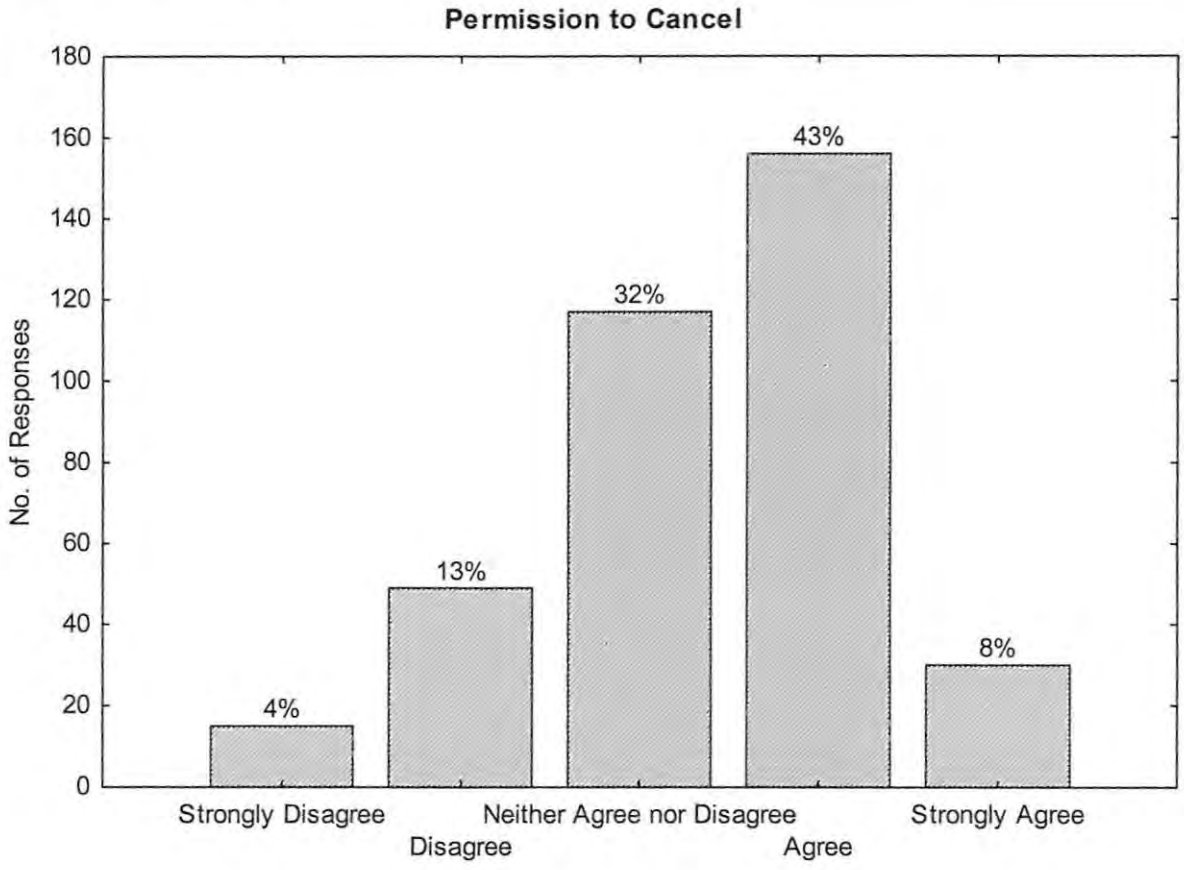

Figure 5.18 – Users: Permission to cancel

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	15	49	117	156	30	367
%	4	13	32	43	8	100

Table 5.23 –Users: Permission to cancel

Figure 5.18 and Table 5.23 illustrate the distribution of user's opinions in terms of the permission to cancel of the MCSs they have used. MCSs such as Internet access and instant messaging are terminated upon the users request and personalisation downloads are only sent as per user request. This could be the reason for the 51% of users agreeing that MCSs do give them options to cancel the service.

Question 19: Mobile Commerce Services are made available to me by companies I have used previously for other products and services.

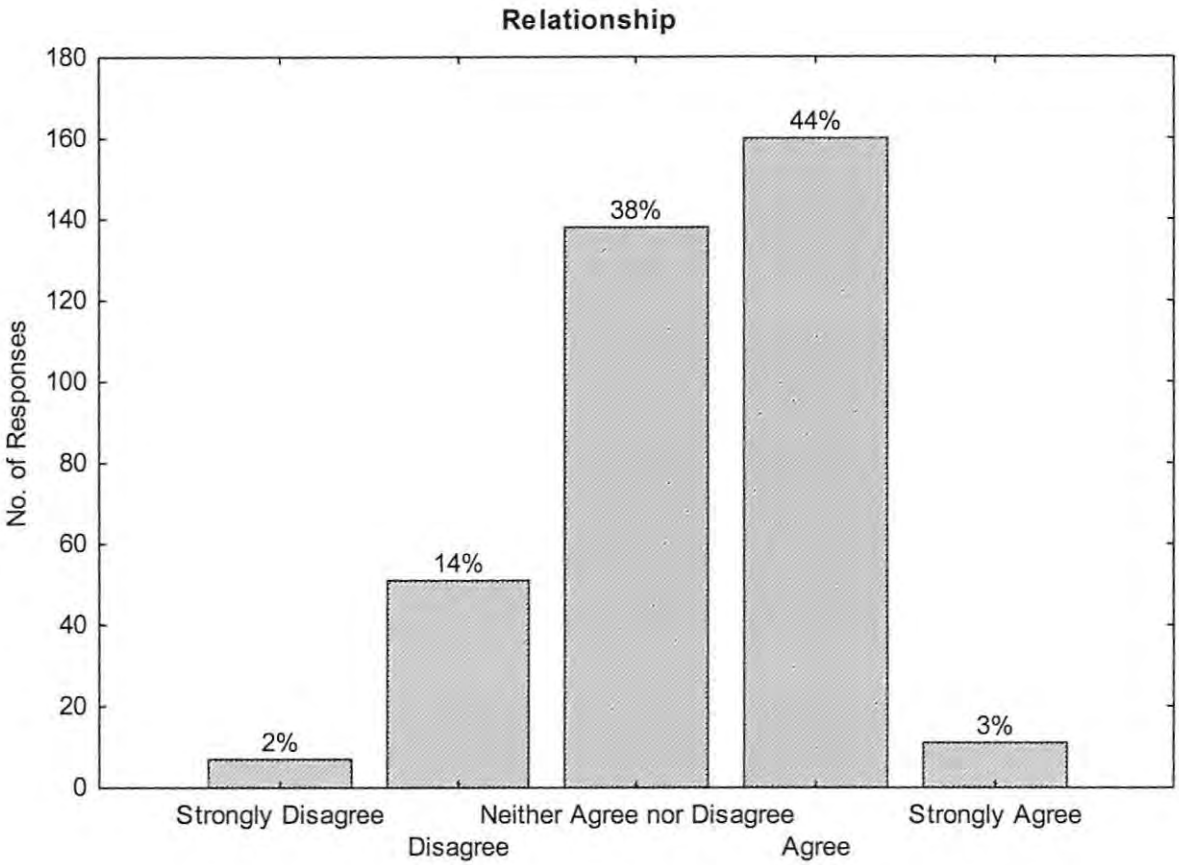

Figure 5.19 - Users: Relationship

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	7	51	138	160	11	367
%	2	14	38	44	3	100

Table 5.24 - Users: Relationship

Figure 5.19 and Table 5.24 illustrate the distribution of user's opinions in terms of whether their previous goods and services providers also provide MCSs. As cited in Chapter 3, MCSPs can increase user adoption of their services by gaining their trust. Organisations that have gained user's trust by providing non-mobile related services should find it easier to get users to use any MCSs they offer than those who do not have some form of past relationship with users.

Question 20: On the whole, I am satisfied with the Mobile Commerce Services I have used i.e. indicated in Question 7.

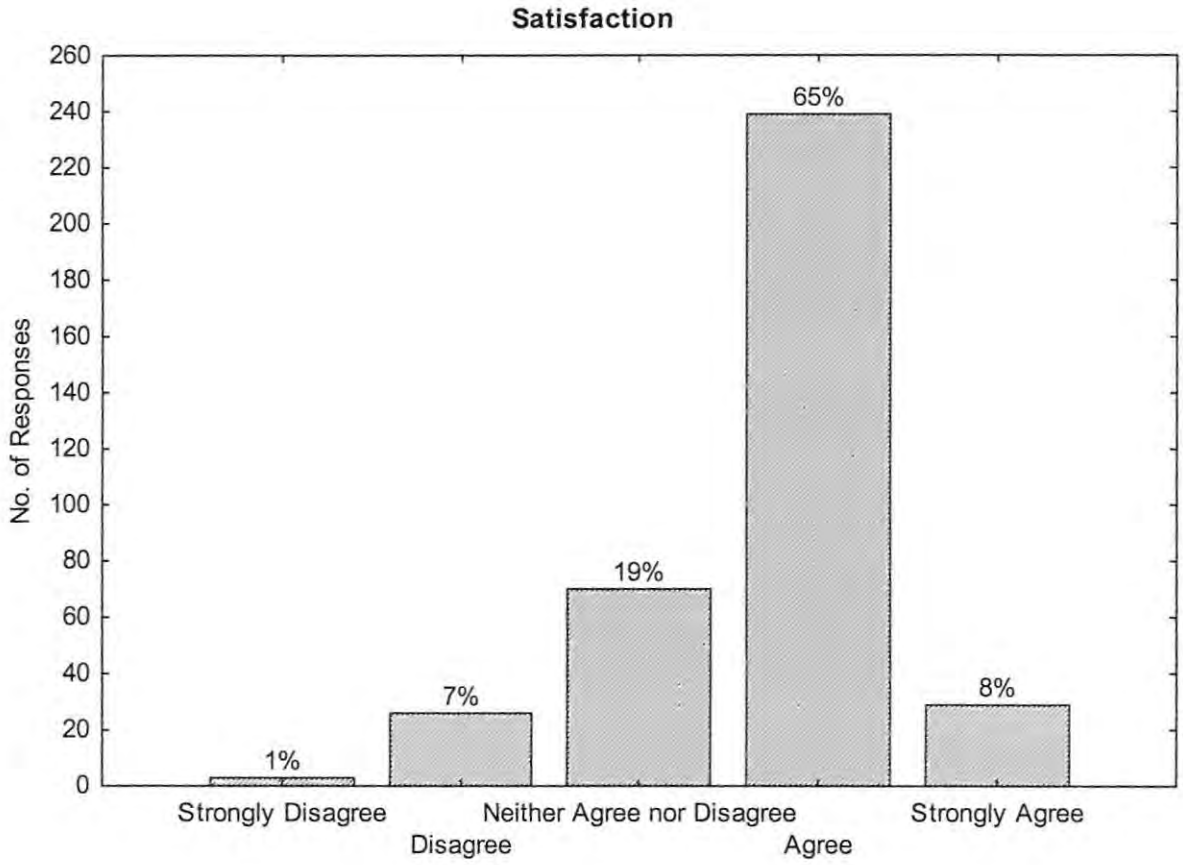

Figure 5.20 - Users: Satisfaction

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	3	26	70	239	29	367
%	1	7	19	65	8	100

Table 5.25 - Users: Satisfaction

Figure 5.20 and Table 5.25 illustrate the distribution of user's opinions in terms of their satisfaction with MCSs they have used. Seventy-three percent of users indicated they are satisfied with their MCSs. Given that the majority of users have used elementary MCSs such as ringtone downloads and instant messaging, which have been well adopted in South Africa, could explain user's satisfaction with the MCSs they use.

Question 21: I will use Mobile Commerce Services again in the future.

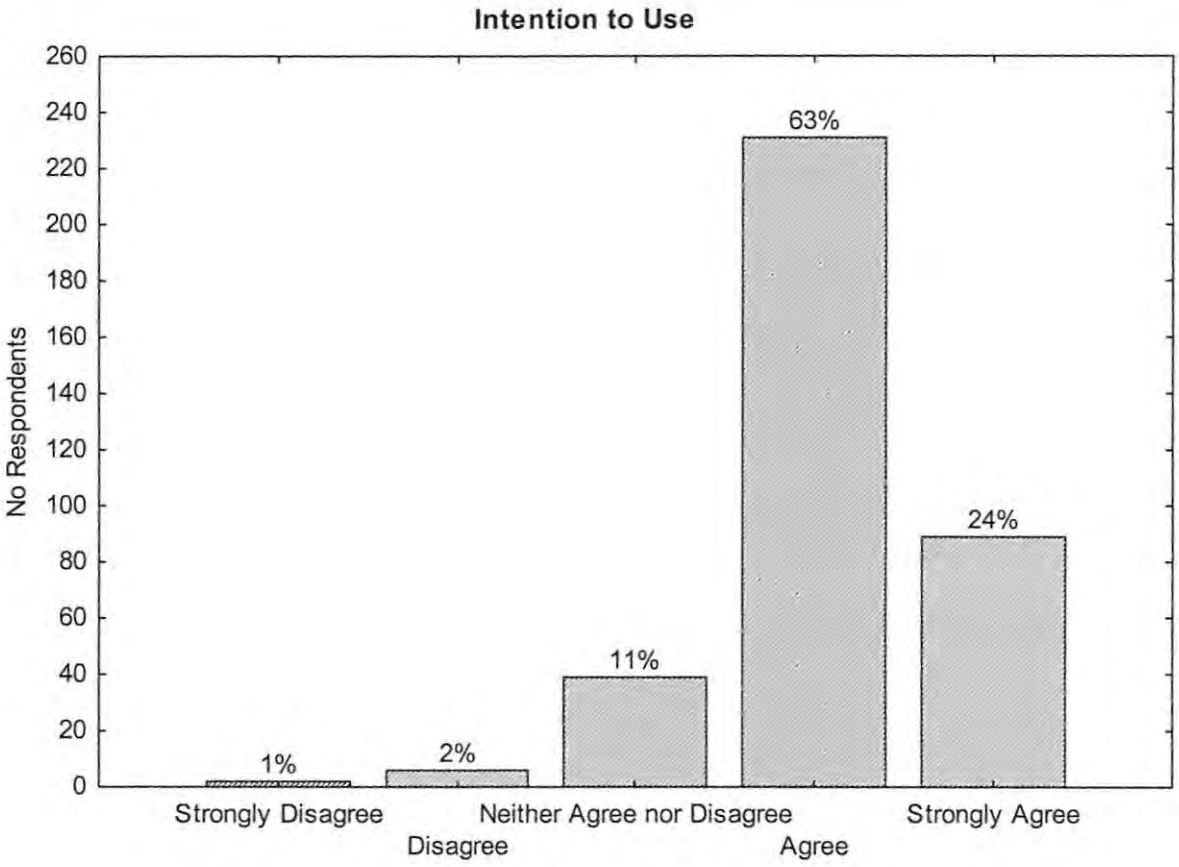

Figure 5.21 - Users: Intention to Use

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	2	6	39	231	89	367
%	1	2	11	63	24	100

Table 5.26 - Users: Intention to Use

Figure 5.21 and Table 5.26 illustrate the distribution of user's opinions in terms of their intention to use MCSs again in the future. Eighty-seven percent of users said they were likely to use MCSs again. For example, instant messaging is a service that is used daily, creating a habit of use, which is one explanation that could be given for this high rate of intention to re-use MCSs.

5.5.5 Hypothesis Tests: Users

Twelve (12) hypotheses were developed and described in Chapter 4. Each hypothesis was statistically tested using the Chi-Square test statistic.

The dependent variables in the user part of the questionnaire are user satisfaction and intention to use. User satisfaction is hypothesised to impact user loyalty in terms of their re-use of a service i.e. intention to use. User satisfaction is hypothesised to be impacted by the following factors:

- Ease of Use
- Awareness (Service Awareness and Cost Awareness)
- Cost
- Relationship with the supplier
- Privacy
- Permission (Permission to Activate and Permission to Cancel)
- Security
- Personalisation
- Convenience
- Speed

In the following tests it is noted that "awareness" is represented by Question 10 (Service Awareness) and Question 11 (Cost Awareness). The question results were combined and their average score used to create the variable "Awareness". The statistical tests that follow use only the "awareness" variable to test the relevant hypothesis. To further validate this, the same statistical tests were run using service awareness and cost awareness separately against user satisfaction and the individual results yielded the same results (i.e. null hypothesis is accepted). The same procedure was used with "permission" where "permission" is represented by Question 17 (Permission to Activate) and Question 18 (Permission to Cancel).

The hypothesis tests are used to show whether a relationship exists between the factors identified in Chapter 4 and user satisfaction. For the Chi-Square test, a confidence level of 95% was set as $P<0.05$ indicates a statistically significant relationship. The hypothesis test results are as follows:

Hypothesis 1: Ease of Use

H0: There is no relationship between the ease of use of MCSs and user satisfaction.

H1: There is a relationship between the ease of use of MCSs and user satisfaction.

Result: Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 2: Cost

H0: There is no relationship between the cost of using MCSs and user satisfaction.

H1: There is a relationship between the cost of using MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 3: Awareness

H0: There is no relationship between the awareness of MCSs and user satisfaction.

H1: There is a relationship between the awareness of MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p>0.05$ was produced. Thus the null hypothesis is accepted.

Hypothesis 4: Privacy

H0: There is no relationship between the privacy of MCSs and user satisfaction.

H1: There is a relationship between the privacy of MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 5: Convenience

H0: There is no relationship between the convenience of MCSs and user satisfaction.

H1: There is a relationship between the convenience of MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 6: Speed

H0: There is no relationship between the speed with which MCSs are executed and user satisfaction.

H1: There is a relationship between the speed with which MCSs are executed and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 7: Security

H0: There is no relationship between the security of MCSs and user satisfaction.

H1: There is a relationship between the security of MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p>0.05$ was produced. Thus the null hypothesis is accepted.

Hypothesis 8: Personalisation

H0: There is no relationship between the personalisation of MCSs and user satisfaction.

H1: There is a relationship between the personalisation of MCSs and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis is rejected.

Hypothesis 9: Permission

H0: There is no relationship between MCSs that are permission based and user satisfaction.

H1: There is a relationship between MCSs that are permission based and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 10: Relationship

H0: There is no relationship between the extent of the relationship between a MCSP and a user and user satisfaction.

H1: There is a relationship between the extent of the relationship between a MCSP and a user and user satisfaction.

Result: A Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis rejected.

Hypothesis 11: Intention to Use

H0: There is no relationship between user satisfaction and intention to re-use MCS.

H1: There is no relationship between user satisfaction and intention to re-use MCS.

Result: A Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis rejected.

Satisfaction	$p < 0.05$
Ease of Use	Rejected
Cost	Rejected
Awareness	Accepted
Privacy	Rejected
Convenience	Rejected
Speed	Rejected
Security	Accepted
Personalisation	Rejected
Permission	Rejected
Relationship	Rejected
Intention	Rejected

Table 5.27 – Users: Hypothesis Test Results

Table 5.27 summarises the hypothesis test results.

5.5.6 Reliability Test: Users

In measuring the reliability of the research instrument and the variables that were hypothesised to determine user satisfaction, the Cronbach Alpha coefficient was utilised. The Cronbach Alpha coefficient is registered as 0.72 for the user variable measures (Table 5.28). Leech *et al.* (2005) note that values above 0.60 are acceptable. Therefore it is concluded that the research instrument is reliable.

Now that the user section of the questionnaire has been presented, the next section presents the results of the non-user section.

variable	Summary for scale: Mean=33.4714 Std.Dv.=4.56165 Valid N:367 (Users) Cronbach alpha: .716996 Standardized alpha: .722658 Average inter-item corr.: .208527				
	Mean if deleted	Var. if deleted	StDv. if deleted	Itm-Totl Correl.	Alpha if deleted
Permission	29.8529	17.6228	4.1979	0.4394	0.6874
Awareness	30.4305	17.6239	4.1981	0.3353	0.7016
EaseofUse	29.6758	17.1960	4.1468	0.4279	0.6869
Cost	30.4823	17.0031	4.1235	0.3204	0.7072
Privacy	30.0817	17.2672	4.1554	0.3954	0.6918
Convenience	29.7875	16.1578	4.0197	0.5384	0.6666
Speed	29.6703	17.4594	4.1784	0.3604	0.6975
Security	31.1444	16.9315	4.1148	0.3494	0.7009
Personalisation	29.9646	17.6840	4.2052	0.4010	0.6920
Relationship	30.1526	18.4304	4.2931	0.2352	0.7166

Table 5.28 – Users: Reliability Test

5.5.7 Questionnaire Results: Non-Users

Question 24: Mobile Commerce Services do not address any of my personal needs.

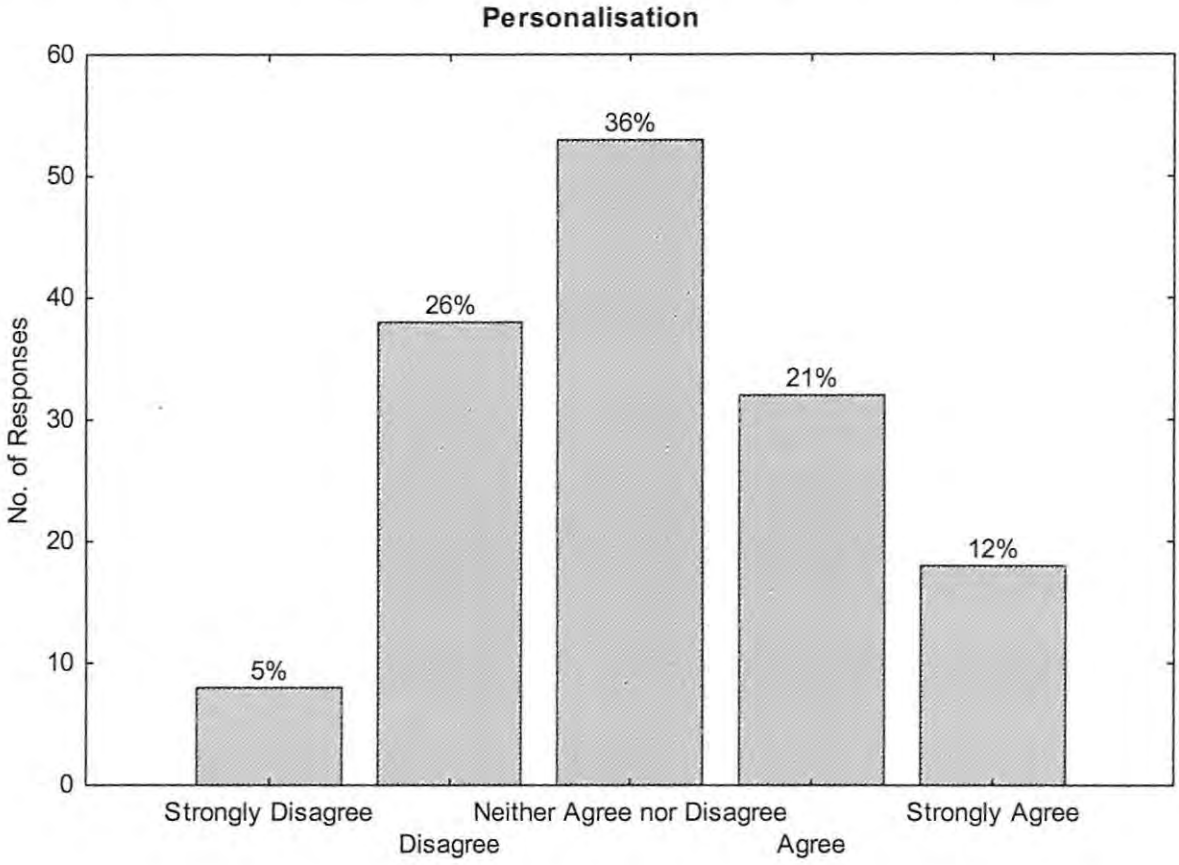

Figure 5.22 - Non-Users: Personalisation

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	8	38	53	32	18	149
%	5	26	36	21	12	100

Table 5.29 - Non-Users: Personalisation

Figure 5.22 and Table 5.29 illustrate the distribution of respondent's opinions in terms of the personalisation of MCSs. Thirty-six percent of non-users were not sure that MCSs would offer them value in terms of meeting their personal needs. This could indicate a lack of awareness of MCS. Thirty- three percent of non-users believed MCS would not meet any personal needs. This could indicate that either MCSPs do not create enough awareness about the personalisation their MCSs offer or MCSs do not offer significant personalisation. The 31% of non-users that perceived MCS to

offer personalisation could have indicated that there is another factor, like cost, that may impede their decision to use these services.

Question 25: Mobile Commerce Services are expensive.

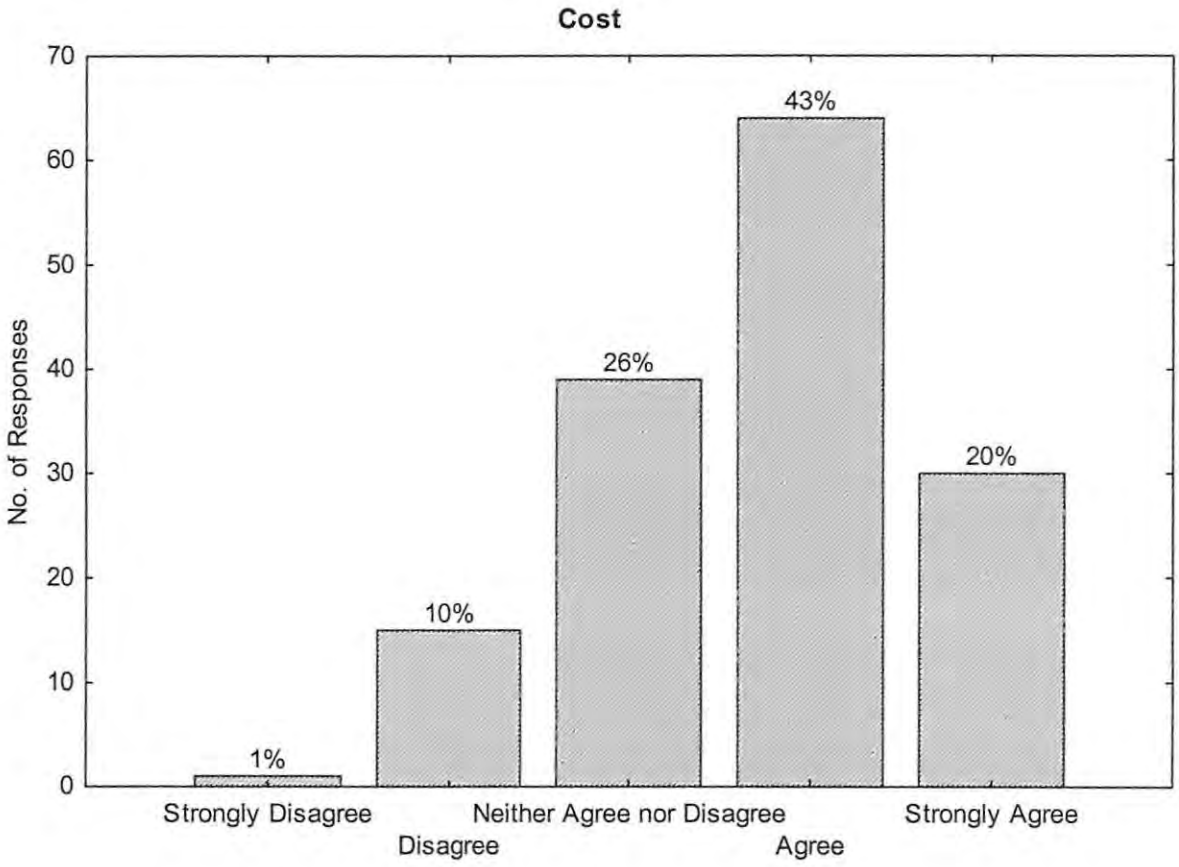

Figure 5.23 - Non-Users: Cost

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	1	15	39	64	30	149
%	1	10	26	43	20	100

Table 5.30 - Non-Users: Cost

Figure 5.23 and Table 5.30 illustrate the distribution of respondent's opinions in terms of the cost of MCSs. The majority of non-users (63%) perceive the cost of MCSs to be too high. Cross referencing Question 2, 96% of non-users use the Internet daily. In the Rhodes University context there is no direct cost for the Internet access from the computer laboratories which all students have access to. It is included in the tuition expense. It could be concluded that any non-users perceive MCSs simply as a

connection to the Internet on their mobile phone and thus any extra expense beyond their already "free" Internet access may be perceived as costly. "Because I have daily internet access, I find the Internet a safer, cheaper, more accessible method of meeting my service needs."

Question 26: Mobile Commerce Services are slow.

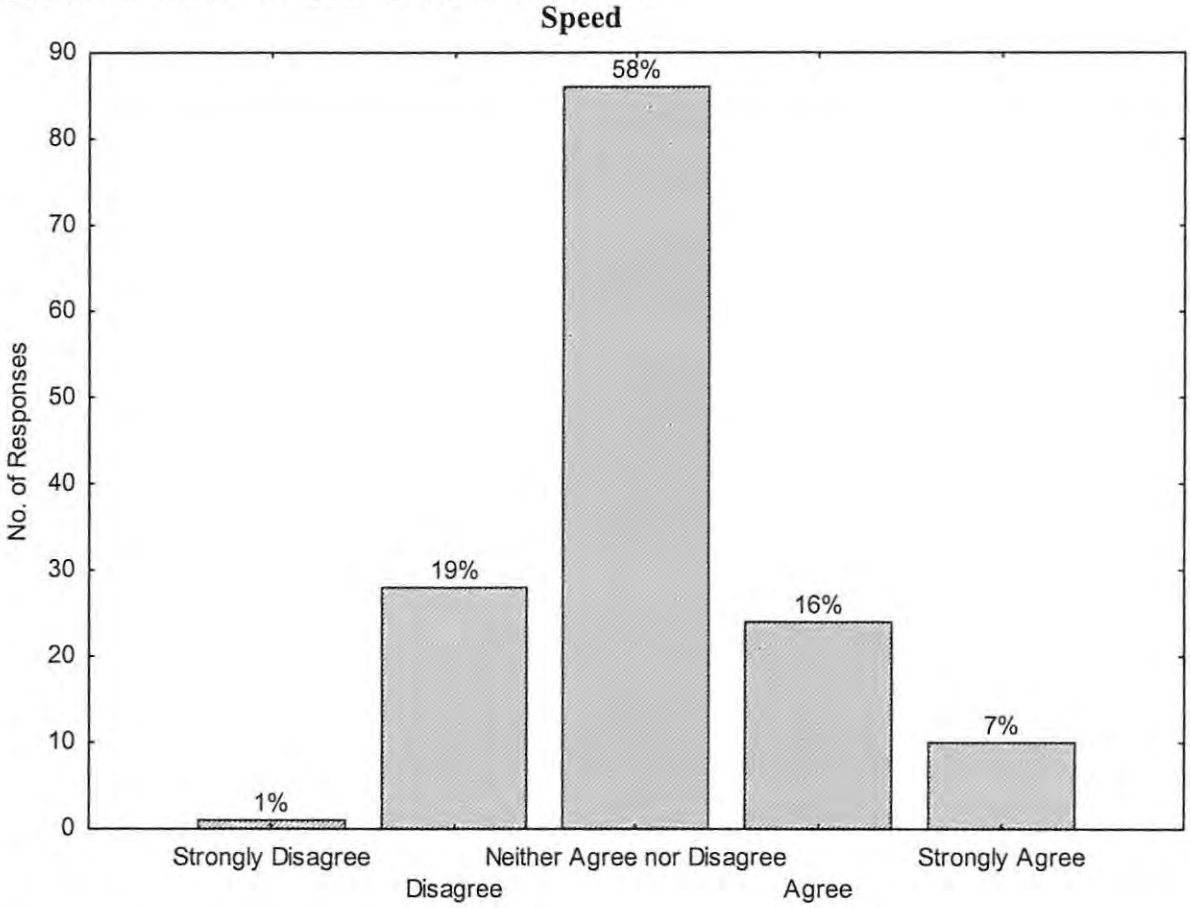

Figure 5.24 - Non-Users: Speed

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	1	28	86	24	10	149
%	1	19	58	16	7	100

Table 5.31 - Non-Users: Speed

Figure 5.24 and Table 5.31 illustrate the distribution of respondent's opinions in terms of the speed of MCSs. The majority of non-users (58%) had no opinion as to whether MCSs were slow. This could indicate a lack of awareness of MC access and general service speeds.

Question 27: Mobile Commerce Services are complicated and difficult to use.

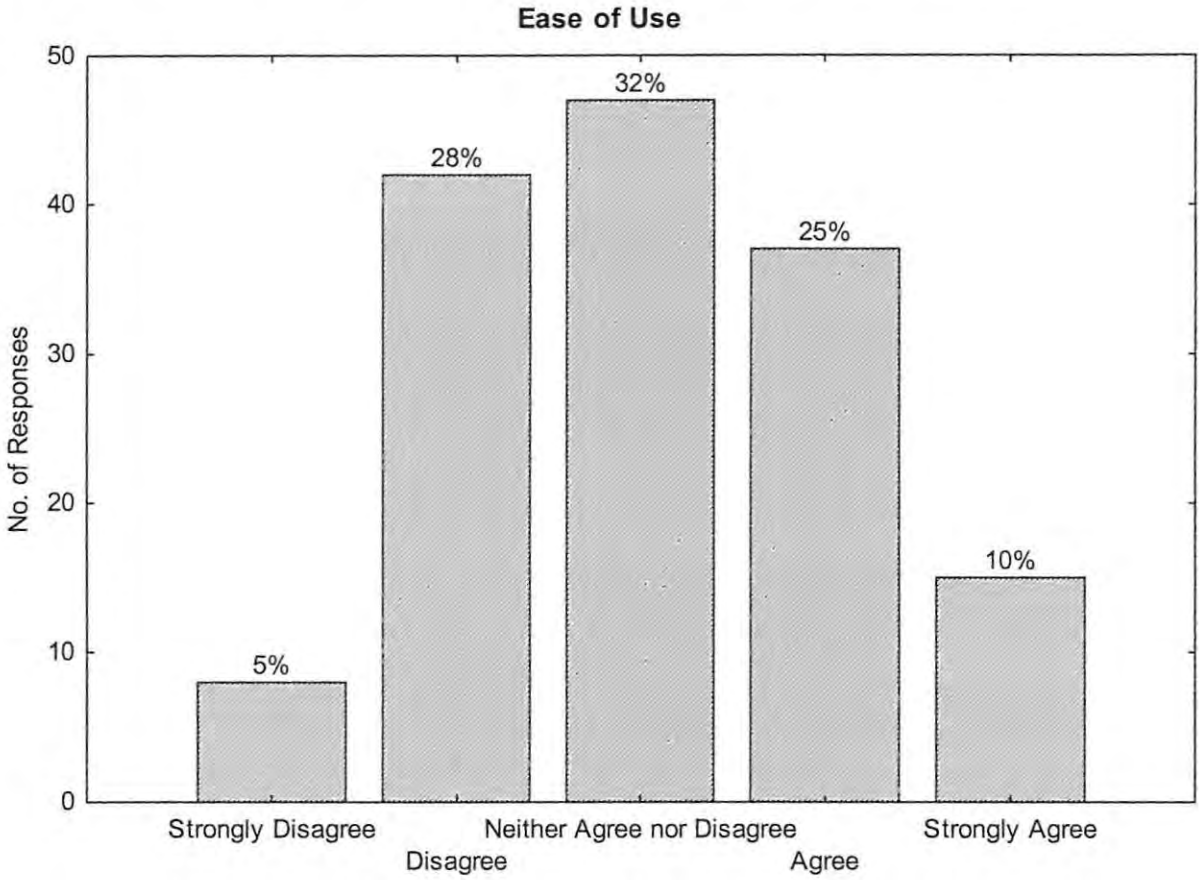

Figure 5.25 - Non-Users: Ease of Use

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	8	42	47	37	15	149
%	5	28	32	25	10	100

Table 5.32 - Non-Users: Ease of Use

Figure 5.25 and Table 5.32 illustrate the distribution of respondent's opinions in terms of the ease of use of MCSs. The biggest group (35%) of non-users perceived MCSs not to be user friendly. This could mean that there is inadequate awareness generated about how to use MCSs and non-users thus perceive it as difficult to use; or that MCSPs do not offer easy to use services. Thirty-two percent of respondents had no opinion on the ease of use of MCSs. This could again be due to a lack of awareness on how to use MCSs.

Question 28: Mobile Commerce Services expose personal information.

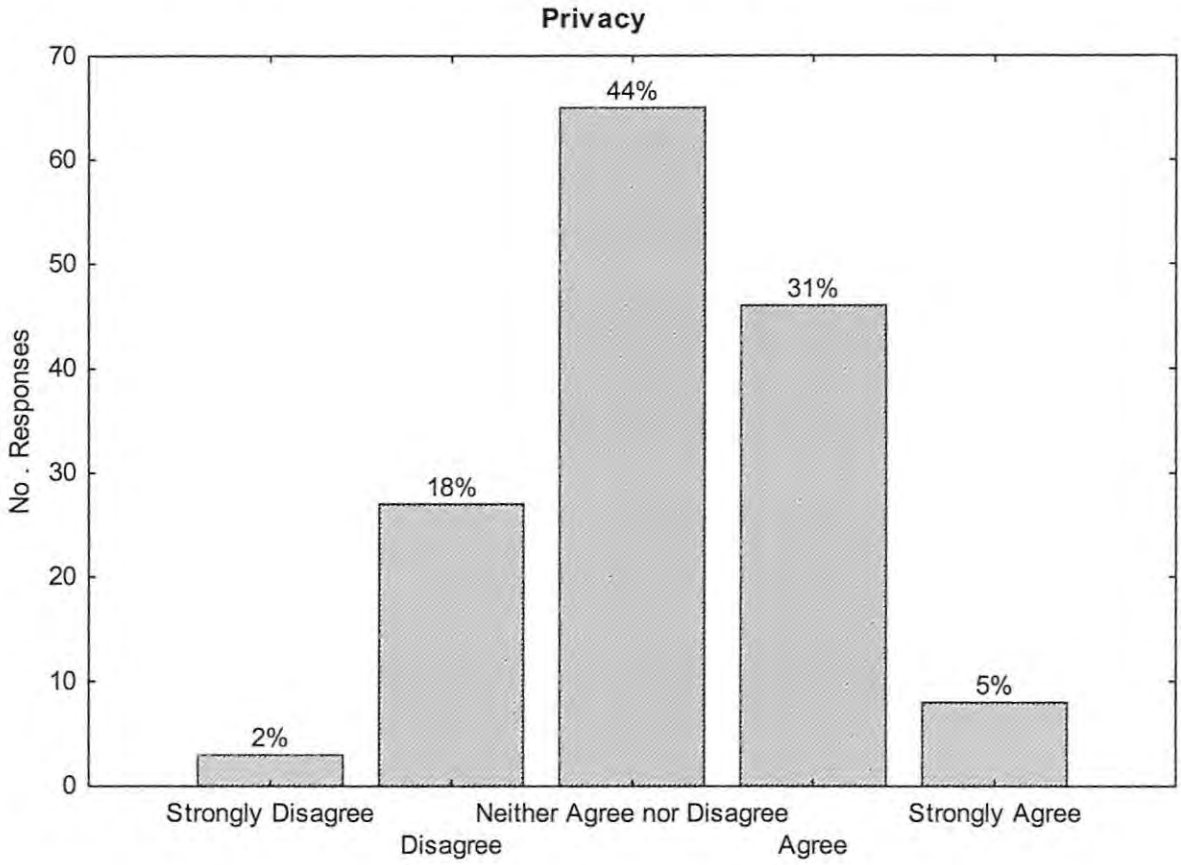

Figure 5.26 - Non-Users: Privacy

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	3	27	65	46	8	149
%	2	18	44	32	5	100

Table 5.33 - Non-Users: Privacy

Figure 5.26 and Table 5.33 illustrate the distribution of respondent's opinions in terms of the privacy of MCSs. Thirty-six percent of non-users perceived MCSs would expose their personal information. This could indicate a lack of awareness of the level of privacy and security of MCSs or that MCSs do not offer sufficient privacy and security to their users. Forty-four percent of non-users had no opinion as to whether MCSs are a privacy and security risk. This again could indicate a lack of awareness of the level of privacy and security of MCSs.

Question 29: Mobile Commerce Services are of no value to me.

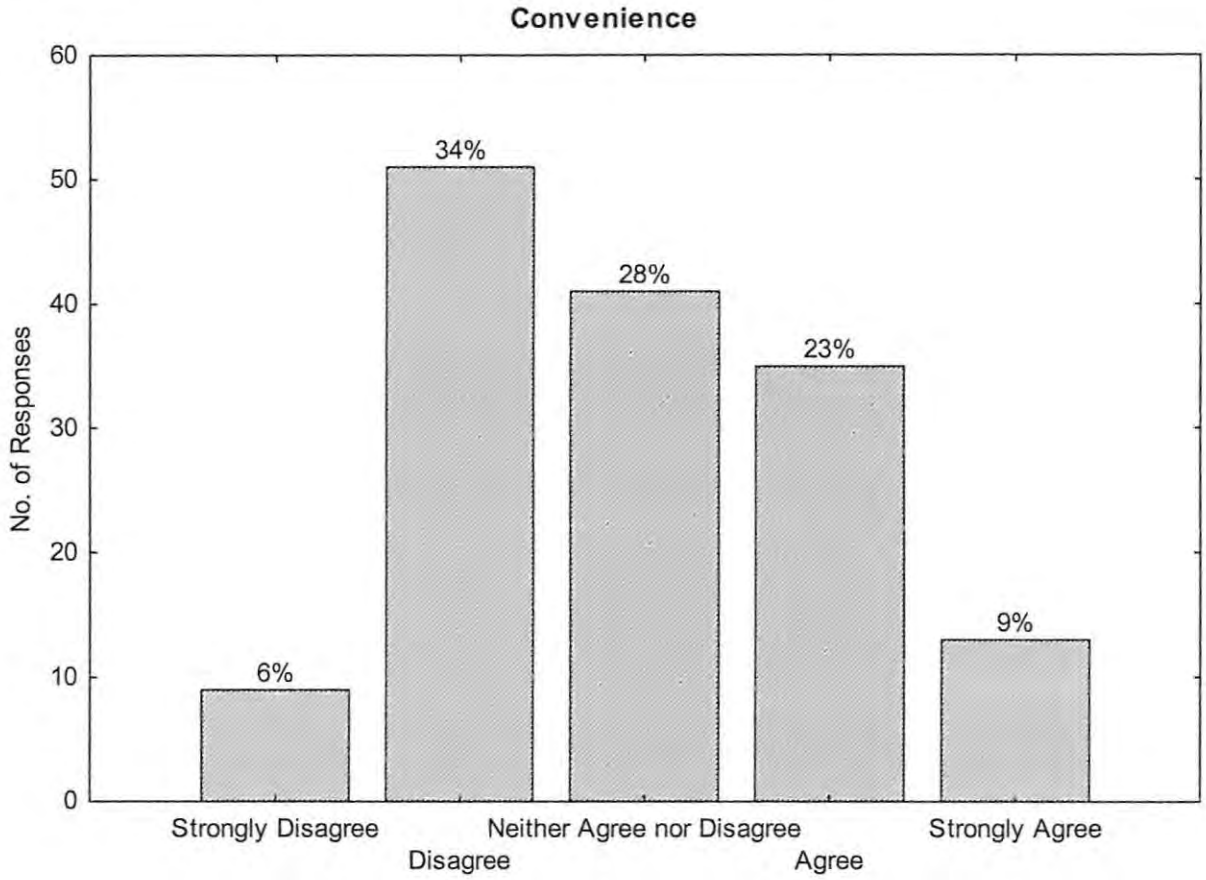

Figure 5.27 - Non-Users: Convenience

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	9	51	41	35	13	149
%	6	34	28	23	9	100

Table 5.34 - Non-Users: Convenience

Figure 5.27 and Table 5.34 illustrate the distribution of respondent's opinions in terms of the convenience of MCSs. A large group of non-users (40%) perceive MCSs to hold some value for them. This could indicate that MCS do offer sufficient convenience but because some other impeding factor, like complexity, they do not use these services.

Question 30: Mobile Commerce Services are not based on the recipient's permission i.e. they are invasive

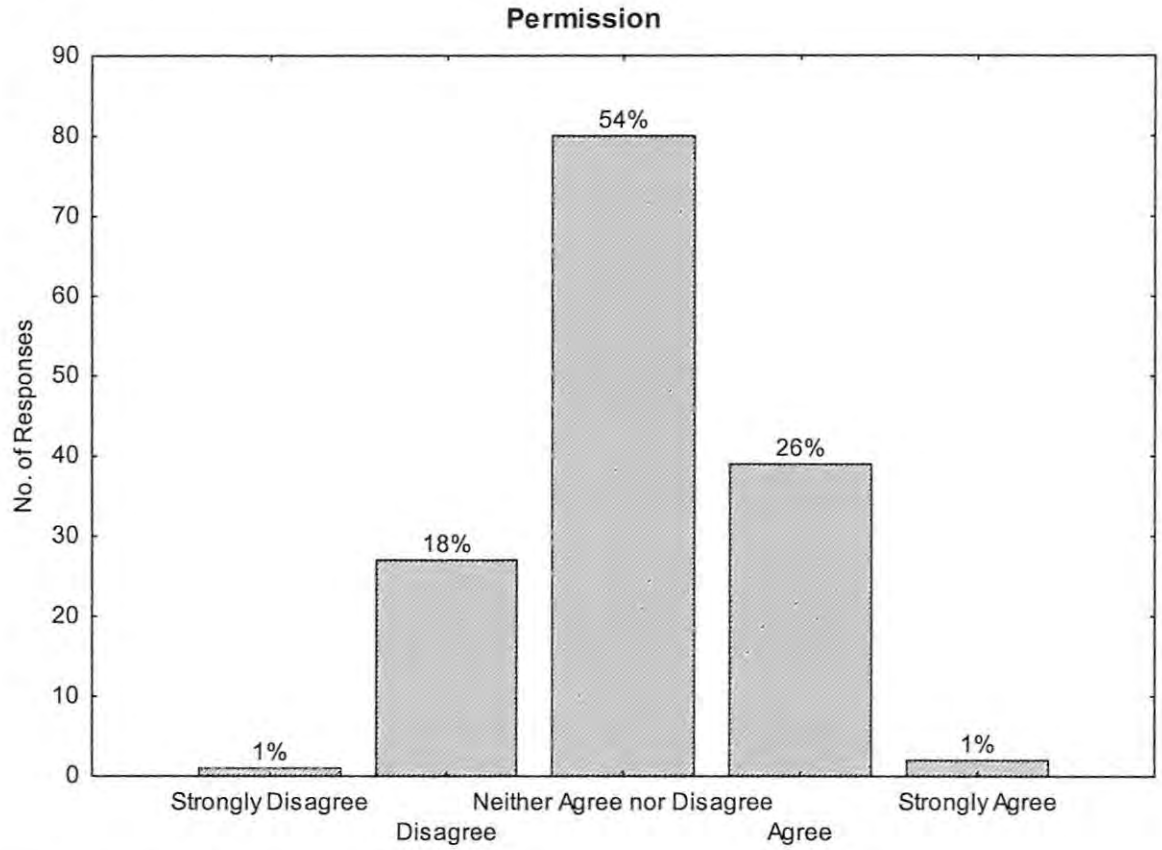

Figure 5.28 - Non-Users: Permission

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	1	27	80	39	2	149
%	1	18	54	26	1	100

Table 5.35 - Non-Users: Permission

Figure 5.28 and Table 5.35 illustrate the distribution of respondent's opinions in terms of the personalisation of MCSs. The majority of non-users (54%) are neutral and potentially unsure of the state of permission based services. This could indicate a lack of awareness on whether services are permission based.

Question 31: I do not know how to begin using Mobile Commerce Services.

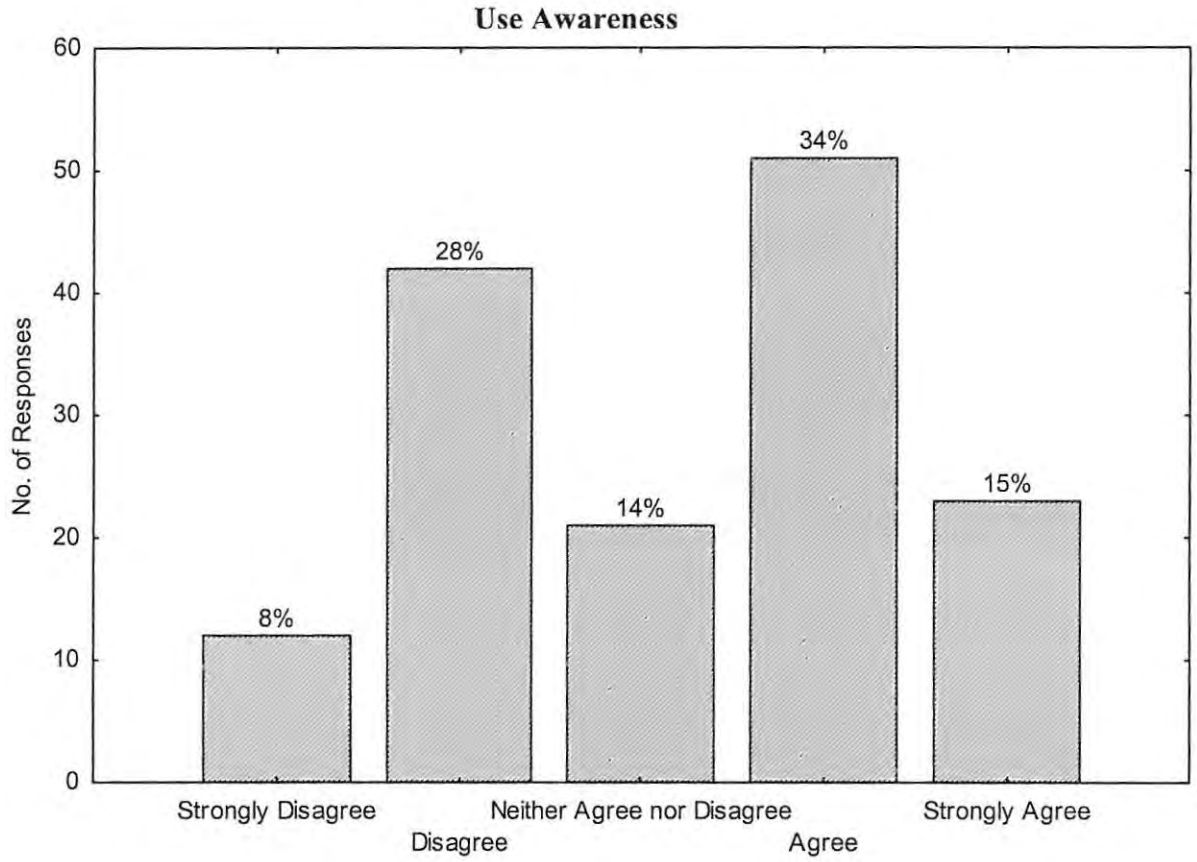

Figure 5.29 - Non-Users: Awareness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	12	42	21	51	23	149
%	8	28	14	34	15	100

Table 5.36 - Non-Users: Awareness

Figure 5.29 and Table 5.36 illustrate the distribution of respondent's opinions in terms of their awareness of beginning to use MCSs. Forty-nine percent of non-users were unaware of how to begin using MCS. This could indicate that MCSPs do create enough awareness about how to use their services.

Question 32: I'm not sure what Mobile Commerce Services are available in South Africa.

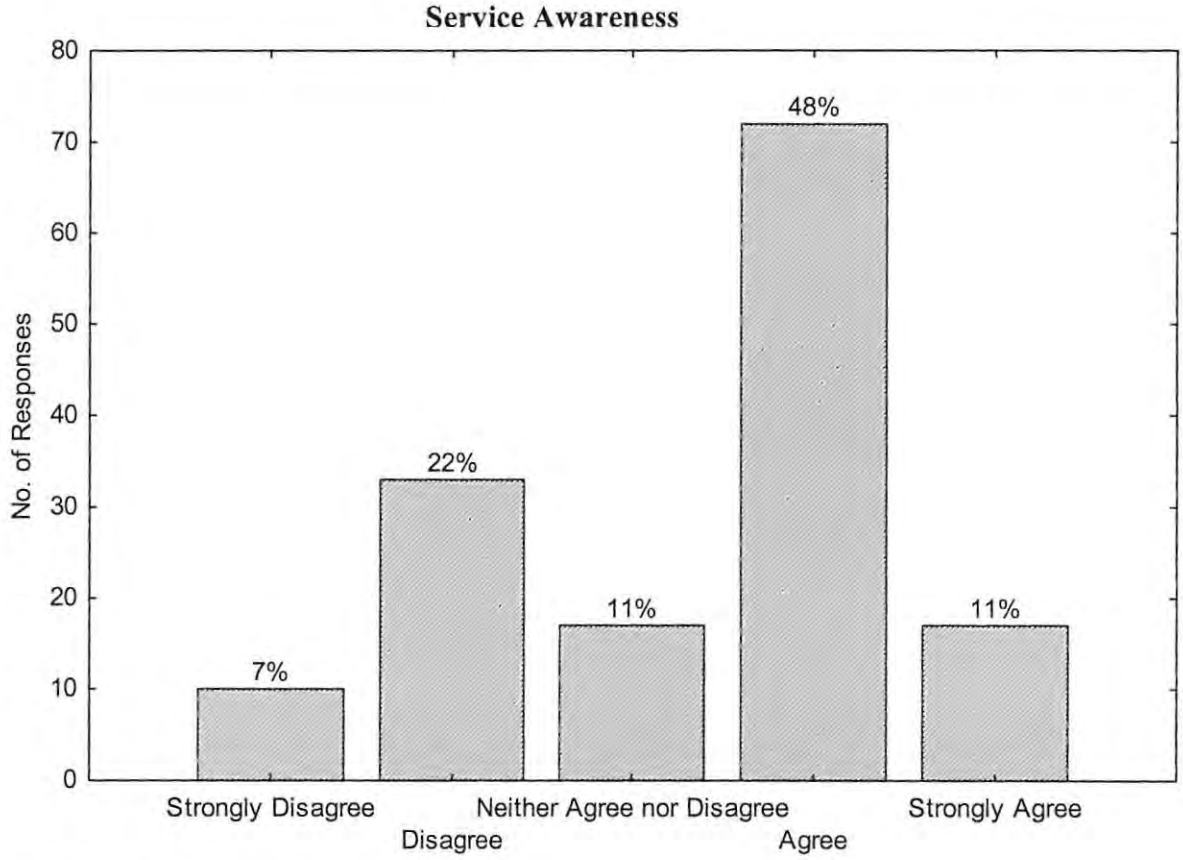

Figure 5.30 - Non-Users: Service Awareness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	10	33	17	72	17	149
%	7	22	11	48	11	100

Table 5.37 - Non-Users: Service Awareness

Figure 5.30 and Table 5.37 illustrate the distribution of respondent's opinions in terms of their awareness of MCSs in South Africa. The majority of non-users (59%) did not know what MCSs were available for them to use. This could indicate that MCSPs do create enough awareness about their services.

Question 33: None of the companies I currently buy goods and services from offer Mobile Commerce Services.

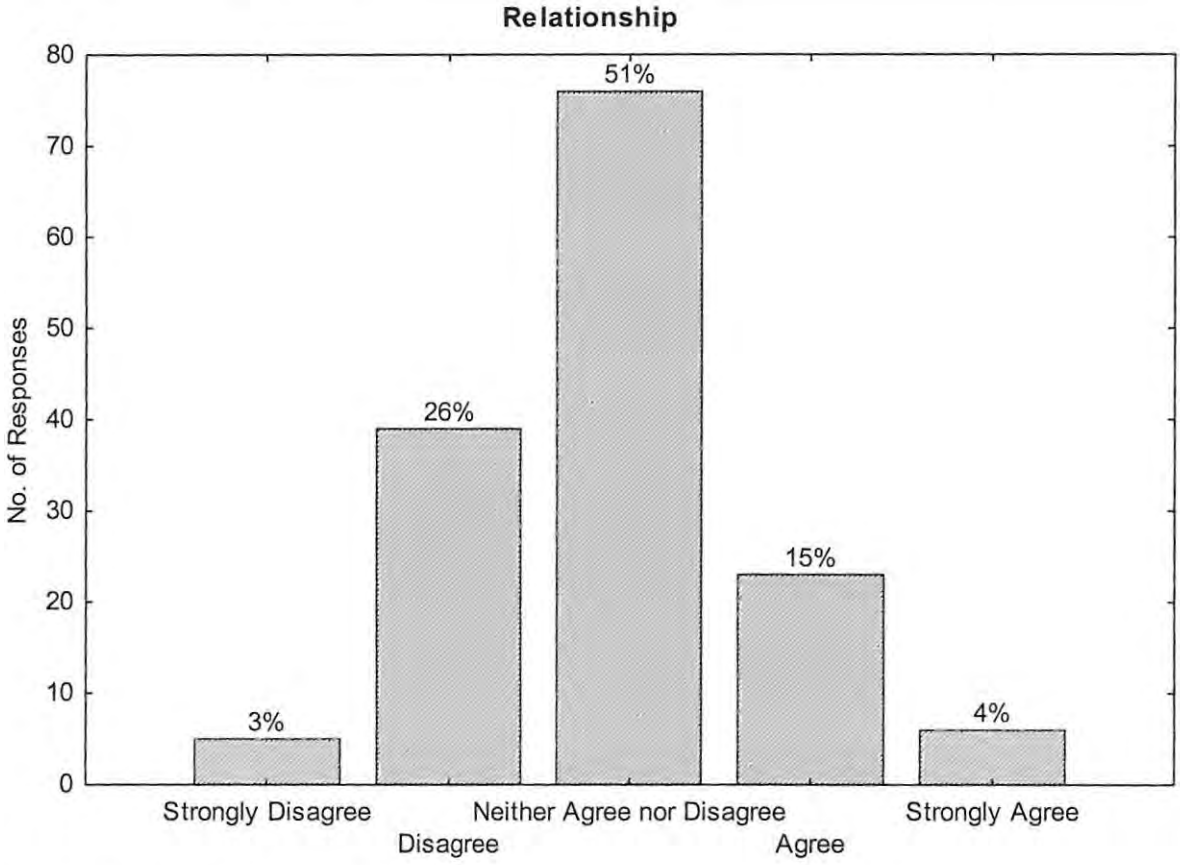

Figure 5.31 - Non-Users: Relationship

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	5	39	76	23	6	149
%	3	26	51	15	4	100

Table 5.38 - Non-Users: Relationship

Figure 5.31 and Table 5.38 illustrate the distribution of respondent's opinions in terms of whether their current goods and service providers offer any MCSs. Fifty-one percent of non-users were unaware of whether their current goods and services suppliers offered MCSs. This could indicate that either MCSPs do create enough awareness of their services or that very few companies, if any, offer MCSs.

Question 34: I am planning on using Mobile Commerce Services in the future.

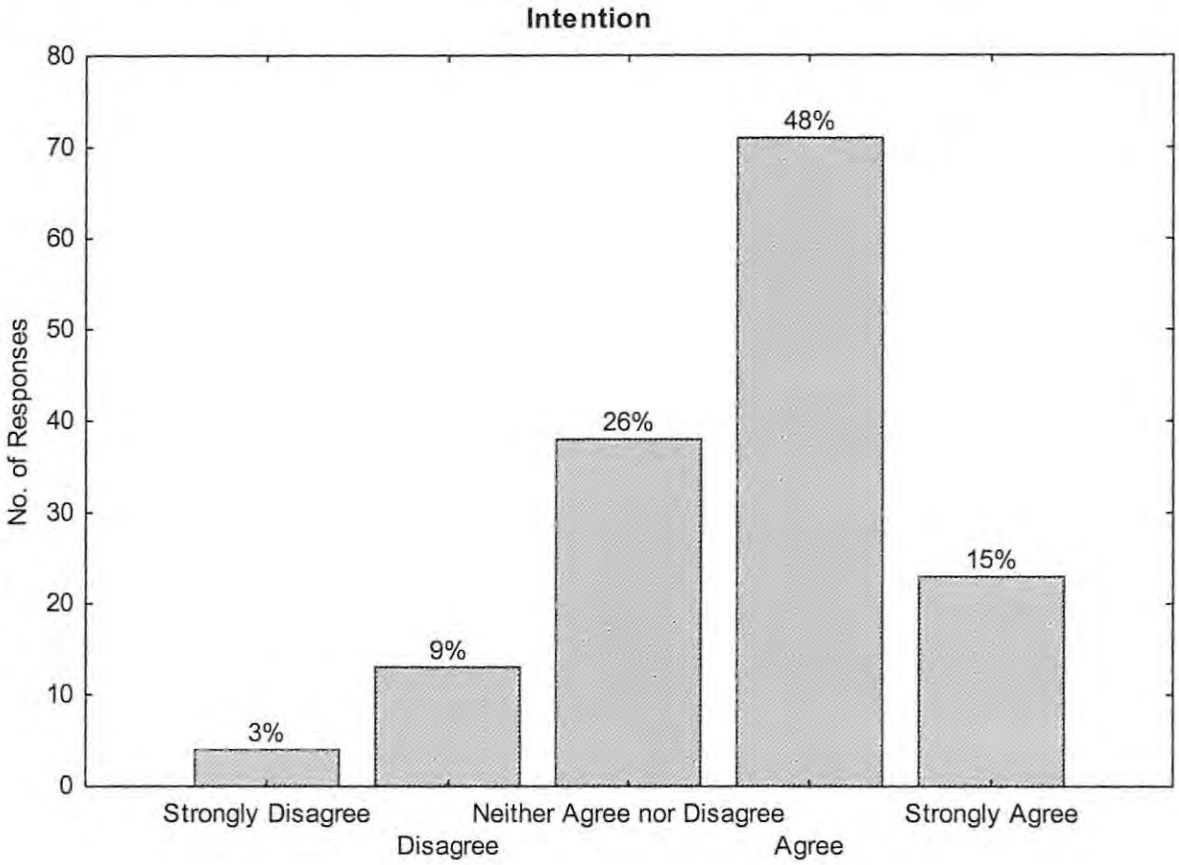

Figure 5.32 - Non-Users: Intention to Use

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	4	13	38	71	23	149
%	3	9	26	48	15	100

Table 5.39 - Non-Users: Intention to Use

Figure 5.32 and Table 5.39 illustrate the distribution of respondent's opinions in terms of their intention to use MCSs in the future. The majority of non-users (63%) indicated that they would use MCSs in the future. This is an interesting result given some of the results to previous questions in the questionnaire. Two possible conclusions could be drawn from these results: 1) non-users of MC are in an environment where the majority of their peers utilise MC and are thus intending to be a part of that culture; and/or 2) the fact that non-users are proficient and reliant on other technologies i.e. computer and Internet, they are more open to new related technologies such as MC.

Question 35: I am still not sure what Mobile Commerce is.

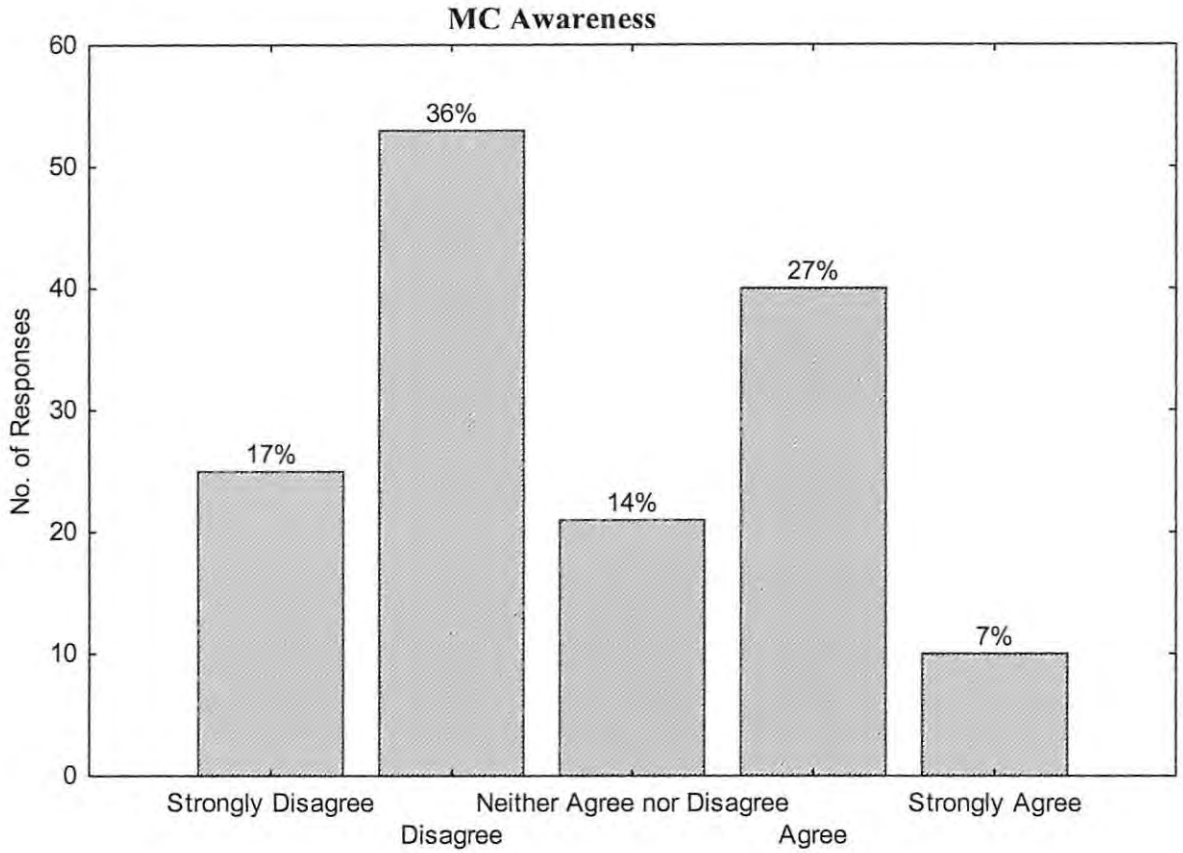

Figure 5.34 - Non-Users: MC Awareness

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree	TOTAL
Count	25	53	21	40	10	149
%	17	36	14	27	7	100

Table 5.40 - Non-Users: MC Awareness

Figure 5.33 and Table 5.40 illustrate the distribution of respondent's opinions in terms of their awareness of MC. Fifty-three percent of non-users indicated knowing what MC was. This could indicate that even though non-users believe they know what MC is, that not enough awareness is generated regarding the benefits of MC.

5.5.8 Hypothesis Tests: Non-Users

Twelve (12) hypotheses were developed and described in Chapter 4. Each hypothesis was statistically tested using the Chi-Square test statistic.

The dependent variable in the non-user part of the questionnaire is the non-user's intention to use. Given that non-users have yet to use a product or service, user satisfaction is not a valid measure of successful adoption. However as mentioned in Chapter 3, non-users intention to use a service can be a significant measure. Non-user intention to use a service is hypothesised to be impacted by the following factors:

- Personalisation
- Cost
- Speed
- Ease of Use
- Privacy and Security
- Convenience
- Permission
- Awareness
- Relationship with the supplier

In the following tests it is noted that "awareness" is represented by Question 31 (Use Awareness), Question 32 (Service Awareness) and Question 35 (MC Awareness). The question results were combined and their average score used to create the variable "Awareness". The statistical tests that follow use only the "awareness" variable to test the relevant hypothesis. To further validate this, the same statistical tests were run using use awareness, service awareness and MC awareness separately against intention to use and the individual results were the same (i.e. null hypothesis rejected) as when awareness was tested against user satisfaction.

The hypothesis tests are used to establish whether a relationship exists between the factors identified in Chapter 4 and intention to use. For the Chi-Square test, a confidence level of 95% was set as $P<0.05$ indicates a statistically significant relationship. The hypothesis test results are as follows:

Hypothesis 12: Ease of Use

H0: There is no relationship between the perceived ease of use of MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived ease of use of MCSs and a non-user's intention to use the service MCSs.

Result: Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis is rejected.

Hypothesis 13: Cost

H0: There is no relationship between the perceived cost of using MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived cost of using MCSs and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p>0.05$ was produced. Thus the null hypothesis is accepted.

Hypothesis 14: Awareness

H0: There is no relationship between the awareness of MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the awareness of MCSs and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis is rejected.

Hypothesis 15: Privacy

H0: There is no relationship between the perceived privacy of MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived privacy of MCSs and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis is rejected.

Hypothesis 16: Convenience

H0: There is no relationship between the perceived convenience of MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived convenience of MCSs and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p<0.0005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 17: Speed

H0: There is no relationship between the perceived speed with which MCSs are executed and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived speed with which MCSs are executed and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p>0.05$ was produced. Thus the null hypothesis is accepted.

Hypothesis 18: Permission

H0: There is no relationship between MCSs that are permission based and a non-user's intention to use MCSs.

H1: There is a relationship between MCSs that are permission based and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p>0.05$ was produced. Thus the null hypothesis is accepted.

Hypothesis 19: Personalisation

H0: There is no relationship between the perceived personalisation of MCSs and a non-user's intention to use MCSs.

H1: There is a relationship between the perceived personalisation of MCSs and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p<0.005$ was produced. Thus the null hypothesis is rejected.

Hypothesis 20: Relationship

H0: There is no relationship between the extent of the relationship between a MCSP and a non-user's intention to use MCSs.

H1: There is a relationship between the extent of the relationship between a MCSP and a non-user's intention to use MCSs.

Result: Pearson Chi-Square test score of $p<0.05$ was produced. Thus the null hypothesis is rejected.

Intention to Use	**$p < 0.05$**
Personalisation	Rejected
Cost	Accepted
Speed	Accepted
Ease of Use	Rejected
Privacy	Rejected
Security	Rejected
Convenience	Rejected
Permission	Accepted
Awareness	Rejected
Relationship	Rejected

Table 5.41 - Non-Users: Hypothesis Test Results

Table 5.41 summarises the hypothesis test results.

5.5.9 Reliability Test: Non-Users

In order to asses the reliability of the measures used to asses the factors that were hypothesised to impact a non-user's intention to use, the Cronbach Alpha coefficient was calculated on the independent variables. The Cronbach Alpha Coefficient was calculated as 0.699981 which can be rounded to 0.70. Leech *et al* (2005) note that values above 0.60 are acceptable. Therefore it is concluded that the research instrument is reliable. Table 5.42 shows the calculations relevant to the Cronbach Alpha.

	Summary for scale: Mean=22.9195 Std.Dv.=4.35815 Valid N:149 (Non-Users) Cronbach alpha: .699981 Standardized alpha: .690277 Average inter-item corr.: .173967				
variable	Mean if deleted	Var. if deleted	StDv. if deleted	Itm-Totl Correl.	Alpha if deleted
PERSONAL	20.893	16.968	4.1193	0.1897	0.7040
COST	20.396	16.830	4.1024	0.2812	0.6888
SPEED	20.886	17.000	4.1232	0.2696	0.6903
EASEOFUS	20.906	14.246	3.7744	0.6302	0.6294
PRIVACY	20.758	16.210	4.0262	0.3587	0.6777
CONVENIE	21.000	16.215	4.0268	0.2832	0.6902
PERMISSI	20.832	17.603	4.1956	0.1426	0.7068
USEAWARE	20.785	14.947	3.8662	0.4340	0.6636
SERVICEA	20.611	15.338	3.9164	0.3930	0.6714
RELATION	21.020	16.932	4.1149	0.2550	0.6924
MCAWAREN	21.107	14.364	3.7900	0.5346	0.6441

Table 5.42 - Non-Users: Reliability Test

5.2 Conclusion

Chapter 2 and 3 provided the research on which the proposed list of factors, in Chapter 4, were based. These factors are believed to influence the successful adoption of MCSs. A questionnaire was constructed to test the validity of the identified success factors. The questionnaire was divided into two groups: users and non-users. MCS success was measured with user satisfaction and non-user success was measure with intention to use. Forty-three percent non-users viewed MCSs as convenient, which could indicate that there is another factor that is impeding their use of MCS. Sixty-three percent of non-users indicated an interest in using MCS in the future. The questions answered by the user and non-user groups both returned Cronbach Alpha coefficients of more that 0.7 making the measures reliable Leech *et al.* (2005). The following chapter provides an analysis of the result obtained in this chapter.

CHAPTER 6: ANALYSIS OF RESULTS

The previous Chapter presented the design and results of the questionnaire used to test the proposed model hypotheses. This Chapter provides an analysis of the results commenting on the tested hypothesis and any other noteworthy findings. The purpose being to refine the proposed model derived in Chapter 4.

6.1 Introduction

Chapter 2 introduced MC by discussing its history, characteristics, adoption and limitations. Chapter 3 identified various models that discussed aspects of MC adoption. Chapter 4 derived a proposed model of factors to that influence the adoption of MCSs. Chapter 5 presented the questionnaire used and the results, which included the Chi-Square test results for each hypothesis. Chapter 6 analyses the questionnaire results with reference to the proposed model and hypotheses tested while highlighting any other significant findings.

6.2 Demographics

The sample consisted of 516 students out of 6144 registered students, representing 8.4% of the population. The student population of Rhodes University consists of 59% female and 41% male, while 75% are South African and 25% Foreign. The population of the questionnaire sample consists of 57% female and 43% male while 70% are South African and 30% Foreign. The questionnaire sample can be said to closely represent the Rhodes University student population.

The questionnaire result showed that 55.6% of the sample used VODACOM, 29.1% used MTN, 15.1% used CELLC, while 0.2% used Virgin Mobile. These statistics represent the South African population with a maximum difference of 3% exhibited. VODACOM is estimated to have 58% market share (VODACOM, 2006), MTN is estimated to have 30% (MTN, 2006) and CELLC is estimated to have 12% (Hogg, 2006).

6.3 Users

6.3.1 Analysis of Factors Affecting User Satisfaction

For the purpose of statistical analysis, responses were collapsed (Nardi, 2003) into three groups: agree, neither agree nor disagree and disagree and are discussed as such. The Pearson Chi-Square statistic was used in Chapter 6 to test the significance of the relationships between user satisfaction and the following factors:

1. Ease of Use

Seventy-three percent of the users perceived MCSs as easy to use. Various factors could have contributed to this large majority of users perceiving MCSs as easy to use. Eighty-seven percent of users surveyed indicated using their mobile devices daily for communicating, this included instant messaging. Fifty-two percent of users indicated using instant messaging on a daily basis. One could conclude that the regular use of this service made it easy for users to utilise, creating the perception that MCSs are easy to use.

Another reason for user perception of easy to use MCSs could be that 71% of users indicated to have downloaded ringtones, picture or wallpapers. These low-level MCSs are accessed by typing in a certain sequence of characters in an SMS (often relating to the item to be downloaded, to make it easy to remember e.g. typing in the name of a song you want downloaded as a ringtone) then sending it to a 5 digit number, like 35050, which is relatively easier to remember than an entire 10 digit mobile number used to makes phone calls or send SMS's.

The results of the questionnaire confirm that the ease with which a MCS is used contributes to user satisfaction. It is concluded that in order for MCSPs to increase the probability of the success of a MCSs, MCSs should be designed in a manner that is easy and intuitive for people to use.

2. Cost

The distribution of user responses to cost across the 3 categories was: 36% agreed, 27% neither agreed nor disagreed and 37% disagreed.

Looking at the type of services mostly used like instant messaging (52%), which costs 2c per message versus about 65c for an SMS, it is understandable that 36% of respondents perceived prices as reasonable. According to the official South African 35050 website, as at 30 November 2006, downloading ringtones cost up to R15 and video clips and games up to R30 each, which could be the reason 37% of users view MCSs as costly (35050, 2006).

The 27% of users that indicated "neither agree nor disagree" could be due to the fact that 40% of users indicated that they were not responsible for their mobile phone accounts. Thus they could either not be aware of the costs involved or were indifferent as they were not personally affected by the cost.

These results confirm that the cost associated with using a MCS contributes to user satisfaction. In this regard it is noted that cost and user satisfaction are negatively related. Thus a lower cost can contribute to increasing user satisfaction.
It is thus concluded that the cost of using a MC can negatively affect user satisfaction. It is recommended that MCSPs focus on low cost services.

3. Privacy

Forty-six percent of users agreed that their personal details were kept private. Taking account of the services that most of the users had used, such as ringtone downloads, which require very little or no personal information and instant messaging, where the user specifies the amount of personal information available, could give an explanation.

Even though ringtone and wallpaper downloads are seen as entry-level MCSs, they serve as good introductions to the broader arena on MC. As mentioned in Chapter 2, MC generally experiences a staged adoption, so these basic services could make users familiar with MC and comfortable with the idea of using MCSs.

Forty-three percent of users were unsure about the privacy level of the services they had used. This could be an indication of one of the following options:

1. either MCSPs do not have a clear privacy policy available,
2. users are unaware of the existence of a privacy policy, or
3. the service provider has a privacy policy that users are unaware of and/or is not easily accessible

The results of the questionnaire confirm that the privacy a MC offers does contribute to user satisfaction. It is thus concluded that the level of privacy a service offers can contribute to user satisfaction. It is advised that MCSPs draw up a privacy policy that is easily accessed by users.

4. Convenience

One of the main motivations for the adoption of new technologies (as noted in Chapter 3) is the perception of added convenience. It stands to reason that the majority (64%) of users found MCSs to add convenience or value. However, the 36% that were either unsure or disagreed with this statement showed a significant lack of services that catered to user needs in terms of complementing their lifestyles.

The results of the questionnaire confirm that the convenience a MCS offers can contribute to user satisfaction. MCSPs are thus advised to ensure that services are aimed at offering a high level of convenience to users. MCSs providers are also advised, that in this regard, to remember the primary characteristics of the mobile phone i.e. anytime-anywhere access.

5. Speed

Seventy-two percent of users agreed that the MCSs they used were fast. Cross referencing Question 7's responses, downloading ringtones can be done via SMS or the internet and are often received within seconds. The nature of instant messaging is that messages are sent immediately without delay. This could be an explanation for at least 70% of participants perceiving MCSs to be fast.

The results of the questionnaire confirm that the speed with which a MCS is executed can contribute to user satisfaction. It is concluded that the speed with which a MCS is executed and accessed can contribute towards user satisfaction.

As mentioned in Chapter 3 slow access has been seen as a barrier to adoption as it may cause user frustration. Even though there is little that MCSPs can do to increase network connection speeds they can still provide services that provide users with what they want. For example, where slow network speeds are experienced, MCSPs that have a mobile web site can design them in such a way that there is only the necessary content available without unnecessary graphics and thus best utilise the available bandwidth.

6. Security

Sixty-two percent of users felt that MCSs were a security risk, 24% were unsure and 14% felt it was safe enough to make credit card purchases with MCSs. This indicates either a serious lack in the security development of MCSs or badly communicated security protocols of MCSs to users. This could also be the reason as to why in Question 7, only 1% of users shopped through their mobile phone and why only 19% have tried mobile banking.

One could argue that the reason that this hypothesis test failed is that security only becomes a concern where more complex and higher level services are utilised, which require a user's personal and transaction information. In other words if users are evaluating MCSs such as ringtone downloads and instant messaging where very little personal information is required, security may not be a concern and could thus have very little bearing on user satisfaction.

The results of the questionnaire did not confirm that the security of a MCS contributed to user satisfaction. Even though the significance of the relationship between the security of a MCS and user satisfaction was not significant, results from this question showed that the majority of users felt MCSs were unsafe. MCSPs are recommended to provide users with the level of security they would need to make them feel safe, based on the degree of personal information the service requires.

7. Personalisation

Fifty-six percent of users believed that MCSs offered them a personalised service. Cross referencing this with Question 7 results where 71% of users used their phones to download ringtones etc., this is supported by the literature, that users seek personalised services (Hong *et al.*, 2006).

The results of the questionnaire confirm that the personalisation a MCS offers can contribute to user satisfaction. It is concluded that the personalisation of MCSs contributes to user satisfaction. It is recommended that MCSPs provide services that cater to people's needs and wants. MCSPs must understand their markets needs and requirements.

8. Permission

Permission was measured using two variables. Variable 1 (Question 17) measured permission to begin the service, for example, not just spamming people with news or adverts. Variable 2 (Question 18) measured whether users were able to end a service once it was started, for example the ability of the user to cancel weekly news headlines sent via SMS that they had signed up for.

The results of Variable 1 showed that the majority (79%) of users indicated that they had to initiate the service. Looking at the major MCSs used i.e. ringtone downloads etc, instant messaging, connecting to the mobile Internet, all required the user's initiation and could account for these responses.

The results to Variable 2 showed 51% percent of users said that they could cancel their MCSs when they chose. This could be due to services such as ringtone downloads, Internet connections and instant messaging where the user can terminate the service instantly if desired.

Like the security aspect, permission may only be a serious issue with more advanced MCSs where people may feel services to be intrusive if permission is not obtained first.

The results of the questionnaire confirm that a permission based MCS can contribute to user satisfaction. It is concluded that MCSs that are permission based can contribute to user satisfaction. It is recommended that MCSPs ensure that user permission is obtained, where necessary, to gain user trust and increase satisfaction.

9. Relationship

Forty-seven percent of users said they had previous relationships with the suppliers of the MCSs regarding non-mobile related goods and/or services. Institutions like banks that are simply providing the same services through a new medium with mobile banking, have established previous relationships with their consumers. However, this is sometimes not enough as noted by the security factor.

Another point to note is that due to the nature of MCSs, users rarely need to come into contact with the physical organisation and may at times not know where their offices are located. In this case a relationship with the user may be even more important as the tangibility of the relationship is reduced. In MC a strong relationship is also noted to increase the likelihood of re-use and loyalty (Siau and Shen, 2003).

The results of the questionnaire confirm that the extent of the relationship between the MCSP and the user can contribute to user satisfaction. It is concluded that a positive relationship between the MCSP and the user can contribute to user satisfaction. Based on this MCSPs are advised to create a closer relationship with users.

10. Awareness

Awareness was measured using two variables, Variable 1 (Question 10) and Variable 2 (Question 11). Variable 1 measured the awareness that was generated about MCSs and Variable 2 measured awareness of the costs associated with using MCSs. Even though they were both determined to have a significant relationship with user satisfaction their results varied.

With regard to service awareness, 63% of users indicated that there was sufficient awareness created about MCSs through advertising. Providers of basic MCSs, such as

ringtones, logo's, wallpapers etc., have done well to advertise their offerings. They have extended their marketing reach through TV, radio, magazines and booklets. Given that 71% of users (Table 5.12) have used downloaded ringtones, truetones, pictures, wallpapers etc., it could be concluded that service awareness has played a significant role in user satisfaction. This could be because through advertising users are able to identify a MCS that would add value to their lives or meet some personal need and increase their level of satisfaction.

Simmons (2006) noted that confusion about the exact prices of MCS was a deterrent to current and potential users. Sixty-three percent of users indicated that they were uncertain of the costs involved in using MCS. Forty percent of users were not personally responsible for their mobile phone accounts which could account for the majority of the 63% being unaware of the costs.

The results of the survey does not confirm whether the awareness of a MCS contributes to user satisfaction. It is concluded that the level of awareness about a MCS can however contribute to user satisfaction. Based on this MCSPs are advised to create as much publicity and awareness about their services specifically in terms of their benefits, e.g. personalisation, convenience, ease of use, and their costs.

6.3.2 Analysis of Satisfaction and Intention to Use

1. Intention

Eighty-seven percent of users indicated that they would use MCSs again in the future. The question related to MCSs in general and not just the services they had used before. The high response rate to re-use MCSs is a positive sign for the mobile industry, possibly indicating a willingness of people to try new applications and services. Intentions to re-use could also indicate user's loyalty towards the services they use. For example one of the users is quoted as saying: "MXiT is cheap because I communicate with my boyfriend daily". This comment shows that the user is loyal to MXiT as it connects her on a daily basis with those important to her.

The results of the survey confirm that user satisfaction can contribute to a user's intention to use MCSs again.

6.4 Non-Users

6.4.1 Analysis of Satisfaction Factors

The following factors were hypothesised to contribute to non-user's intention to use MCSs.

1. Personalisation

Sixty-seven percent of non-users either perceived MCSs to offer no personal value or were unsure as to whether they would offer personal value. Some of the quotes students wrote were: "don't see the point", "I've personally not had the need for it" and "because I do not want to receive SMSs everyday reminding me of things that do not concern me". This could indicate that current MCSPs either do not cater to user needs but rather institute services they think users should have or they do not effectively communicate service benefits in terms of personalisation.

The results of the questionnaire confirm that the personalisation MCSs offer can contribute to a non-user's intention to use MCSs. It is thus concluded that the personalisation a service offers can positively affect a non-user's intention to use MCSs. It is recommended that MCSPs get a good understanding of their target market's needs and cater to these needs. The more personalised a service, the more value it would have and more appeal.

2. Cost

The failure of this relationship test could be in the measure of intention. Even though 63% of non-users viewed MCSs as expensive, 63% also indicated an intention to use MCSs in the future. Because intention to use indicates a future possibility without time constraint, it is plausible that non-users may expect the cost of using MCSs to decrease in the future.

The vast majority of non-users (63%) agreed that MCSs are too expensive. Some non-users mentioned that they had regular Internet access that they did not need to pay extra for and perceived MCSs to be costly or a "rip-off". MCSPs are either charging too much for the use of MCSs or they do not effectively communicate costs to potential users.

The results of the survey did not confirm whether the cost of using MCSs can affect a non-user's intention to use MCSs. Statistically, it is concluded that the cost of using a MCS does not use affect a non-user's intention to use the service.

However, with non-user statements such as "I think it is very expensive and as a student I can't afford to use these services" and "I worry about the price as I usually don't have extra cash on my cell phone contract" it is concluded that cost does have a significant impact on intention to use. Perhaps the impact should rather refer to the time frame within which the non-user intends to use a MCS. Perhaps the non-user indicated to wanting to use MCSs in the future with the expectation of a decrease in costs. Perhaps other factors such as the perceived convenience and personalisation of MCSs would be more important to non-users.

Furthermore as mentioned in the SMART case study (Appendix A), a key element of their success was that transaction costs were very small. It is recommended that MCSPs focus on low cost high volume transactions. As noted in Sarker and Wells (2003) people are not usually willing to pay much more than their regular monthly mobile phone expenses. MCSPs should thus focus on creating loyalty or a habit of use. With regard to users, cost impacted on user satisfaction significantly and users generally did not perceive MCSs to be costly. This could indicate that as people begin to use MCSs the value derived could reduce the perception of high cost.

3. Speed

The failure of this test is evident in the fact that 58% of non-users were unsure of whether MCSs were slow. The fact that speed proved to be a significant factor of user satisfaction may mean that speed is mainly a consideration after use of the service.

The results of the questionnaire did not confirm whether the speed of using MCSs can affect a non-user's intention to use MCSs. It is concluded that the speed of MCSs does not contribute to a non-user's intention.

4. Ease of Use

Sixty-seven percent of non-users either perceived MCSs to be difficult to use or were unsure. Given the numerous limitations associated with portable devices like mobile phones (such as a small screen) the ease of using MCSs becomes vital in user adoption. Many users commented that MCSs were highly technical making them difficult and time-consuming to set up.

The results of the questionnaire confirm that the ease of using MCSs can contribute to a non-user's intention to use MCSs. It is concluded that the ease of using MCSs can positively affect a non-user's intention to use MCSs. MCSPs are recommended to provide services that are intuitive to users with basic interfaces that cater for mobile device limitations.

5. Privacy and Security

The 36% of non-users that believed MCSs would expose their personal information shows that non-users associate a high risk to their privacy and security in using these services, which could explain their non-use of the services. The 44% of non-users that were unsure of the privacy and security level of MCSs could be an indication that there is not enough awareness generated about the risks involved in various services related to privacy and security.

The results of the questionnaire confirm that the level of privacy and security MCSs offers can contribute to a non-user's intention to use MCSs. It is concluded that the

level of privacy and security MCSs offer, can positively affect a non-user's intention to use MCSs. MCSPs are recommended to provide clear and easily accessible privacy and security policies for people to view as well as ensuring that services have the level of privacy matched to the service. MCSPs are further advised to ensure the security of every transaction with users.

6. Convenience

Looking at some of the non-user comments given in Question 36, as to why they do not use MCSs: "can't be bothered. It is not of importance at this time of my life"; "no need... they are pointless to me"; "perceived large amount of effort to begin using the services", it can be seen that non-users view MC as not being able to add value to their life and some view it as more of an inconvenience. Others indicated to not being aware of any benefits of using MCSs.

The results of the questionnaire confirm that the convenience MCSs offers can contribute to a non-user's intention to use MCSs. However, 40% of non-users believed that MC did hold some value to them. As noted by various non-user comments, they are interested but because of some perceived barrier such as cost or complexity, non-users have not used these services.

It is concluded that the convenience a MCS offers can positively affect a non-user's intention to use the service. MCSPs are firstly advised to provide services that will add convenience and value to the lives of users and secondly to make these benefits known to potential users.

7. Permission

Due to the fact that the majority non-users (54%) were unsure of whether MCSs were permission based, could mean that not enough statistical validity could be found from these results. However, 27% of the non-users perceived MCSs to be invasive. It could thus be concluded, that even though these figures did not impact on many of the non-user's intention to use MCSs, non-users do have an interest in MC but see a high risk

of SPAM SMSs and emails sent to their phone or are perhaps afraid of being locked in by services.

The results of the survey did not confirm that MCSs that are permission based can contribute to a non-user's intention to use MCSs. It is concluded that MCSs that are permission based do not contribute to a non-user's intention to use MCSs. However, it should be noted that there is a difference between intention and actual usage. On further analysis, even though permission is a factor that does not significantly impact directly on intention it does significantly affect privacy. MCSPs are advised to obtain permission of users as much as possible and also allow for users to cancel service subscriptions, where applicable, in order to safeguard a user's privacy.

8. Awareness

Awareness was measured over Question 31, 32 and 35. Question 31 measured the awareness on how to use MCSs, Question 32 measured the awareness of what MCSs were available and Question 35 measured general MC awareness.

Fifty percent of non-users said they did not know how to begin using MCSs. This could be an indication that there is insufficient awareness generated about how to setup or use existing MCSs. Non-users generally perceived MC to be difficult or complicated to set-up and use. Awareness should be generated in terms of the simplicity of using MCSs.

Sixty percent of non-users said that they were unaware of what MCSs were available in South Africa. This could indicate that not enough awareness is generated about the existing MCSs that are available in South Africa. Awareness should be generated by current MCSPs about the services they offer.

Forty-eight percent of non-users indicated that they were uncertain of what MC was. This could indicate a starting point in terms of generating awareness. Perhaps one could conclude that people do not know about the benefits related to MC and the convenience it could offer.

The results of the questionnaire confirm that the level of awareness generated about MCSs can contribute to a non-user's intention to use MCSs. It is concluded that the awareness generated about MCSs can contribute towards non-users intention to use these services. MCSPs are recommended to generate as much information about their services as possible. In other words MCSPs should inform people of the costs involved, how to set up the service, the benefits of the service, the security of the service and any other information about the service that people would find useful. It can be argued that awareness of MCSs is one of the greatest factors that contribute to non-users intention to use MC as non-users perceptions are based on what they know.

9. Relationship

Fifty-one percent of non-users indicated that they did not know of whether their current suppliers offered any MCSs. this could indicate either that many of non-user's suppliers did not offer MCSs or that they did not generate sufficient awareness about these services.

The results of the questionnaire confirm that the relationship between a MCSP and non-user can contribute to a non-user's intention to use a MCS. It is concluded that the extent of the relationship between a MCSP and a non-user can contribute to a non-user's intention to use MCSs. Organisations that are interested in providing MCSs are advised to leverage their existing business relationships to introduce these services. MCSPs are also to create awareness with existing customers about new MCSs they wish to introduce in order to positively affect a non-users intention to use.

6.5 User vs Non-User

Table 6.1 summarises the factors that were shown to be significant in determining the success of MCSs with users and non-users. Four factors were shown to be of difference between the two groups, cost, permission, awareness and speed.

Factors of Importance	Users	Non-Users
Ease of Use	Yes	Yes
Cost	Yes	No
Privacy	Yes	Yes
Convenience	Yes	Yes
Security	No	Yes
Personalisation	Yes	Yes
Relationship	Yes	Yes
Permission	Yes	No
Awareness	No	Yes
Speed	Yes	No

Table 6.1 - Factors: Users vs Non-Users

The study confirmed that there is a need to distinguish between users and non-users and focus on their differing needs, from marketing to the provision of services, so as to maximise success in both groups.

Figure 6.1 presents the revised model for user satisfaction of MCSs. Ease of use, cost convenience, privacy, speed, permission, personalisation and relationship were all proven to have a significant impact on user satisfaction. This model can be used by any MCSP who wants to increase the success of their current MCS offering by considering each of the factors that impact on user satisfaction.

Figure 6.2 presents the revised model for intention to use MCSs. Ease of use, convenience, privacy, security, personalisation, relationship, awareness were all proven to have a significant impact on intention to use MCSs. This model can be used by any MCSP who wants to increase the success of their current MCS offering by considering each of the factors that impact a non-user's intention to use MCSs.

Comparing Figure 6.1 and 6.2 with Figure 4.3, in Chapter 4, it can be seen that to holistically affect the success of MCS adoption both the initial intention to use and user satisfaction should be targeted by MCSPs. As mentioned user satisfaction is a proven determinant of intention to use MCSs again.

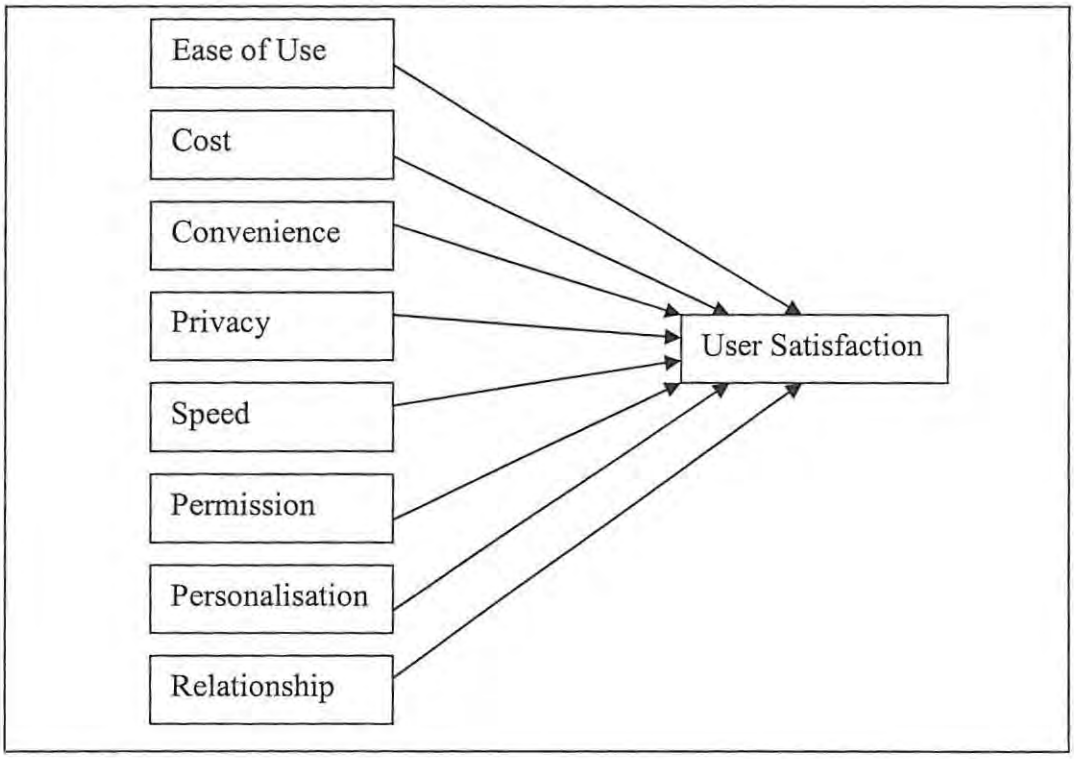

Figure 6.1 - User Satisfaction Factors

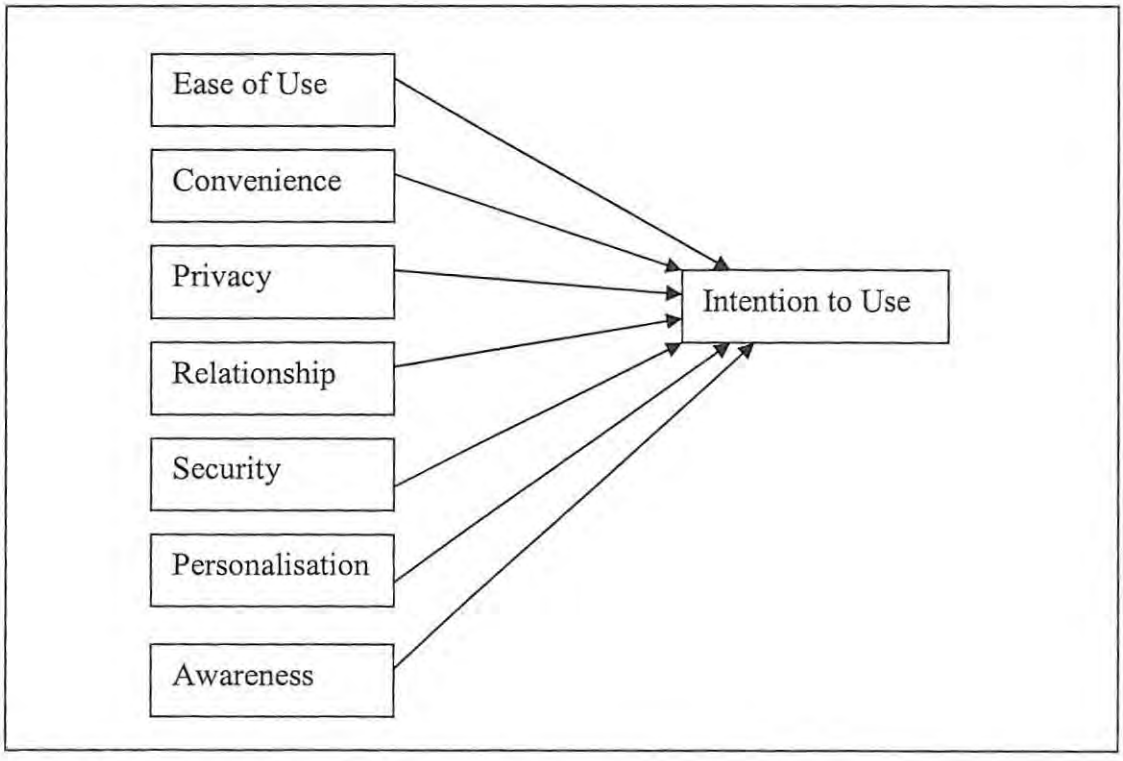

Figure 6.2 - Intention to Use Factors

6.6 Conclusion

This chapter analysed and discussed the results from Chapter 5. As a result the proposed model in Chapter 4 was revised. As noted by Malhotra and Segars (2005) there is a distinction between users and non-users. This is supported by the findings within this research. Of the ten successes factor identified in Chapter 4 four factors showed resulted in the differentiation between the two i.e. groups, cost, permission, awareness and speed.

Table 6.1 shows the difference in the significance of factors between users and non-users while Figures 6.1 and 6.2 present the new models for each group with their relevant success factors. The following chapter concludes this research by discussing its main contributions, resulting recommendations and potential for future research.

CHAPTER 7: CONCLUSIONS AND FUTURE RESEARCH

This chapter summarises the key findings of the research and concludes with possibilities for future research.

7.1 Introduction

The rapid development and adoption of mobile technology is best represented by mobile phones which have experienced an extensive global penetration (Wallace, 2006). Based on this fact, since the turn of the century, the MC industry has been very successful in advertising the vast benefits and potential of the MCSs associated with using this technology (Urbaczewski *et al.*, 2003). However, very few of these benefits and potential have been realised by mobile users (Urbaczewski *et al.*, 2003). Looking at the available infrastructure in terms of networks and the mobile phone adoption in South Africa, the factors influencing adoption of MCSs was initially not apparent.

Providing these MCSs is the responsibility of the MCSPs. The MCSP is also the link between the end-user and the application developer and is responsible for communicating the needs and requirements of the end-user. Besides the MC infrastructure, the success of MC will ultimately lie in the MCS and how well they are adopted by users and potential users (Wang and Liao, 2007; Hong *et al.*, 2006). Therefore MCS need to be cognisant of these needs. This research sought to discover the factors that influence the success of MCSs. The identified factors can be used by MCSPs to increase the chance of successful adoption by users and potential users. This chapter outlines the main contributions and findings of the research and proposes recommendations for future research.

7.2 Contributions of the research

Chapter 2 and 3 of this research found that the successful adoption of MC begins with initial adoption and carries through to user satisfaction. Two groups of people were identified through this research, users and non-users. In targeting users to successfully adopt MCS and re-use the services, user satisfaction could be influenced.

The research found that the following factors influenced user satisfaction:

- Ease of Use
- Cost
- Privacy
- Convenience
- Speed
- Permission
- Personalisation
- Relationship

In targeting non-users to adopt MCS their intention to use the services could be influenced. The research found that the following factors influenced non-user's intention to use:

- Ease of Use
- Privacy
- Convenience
- Security
- Personalisation
- Relationship
- Awareness

The research found that a key element of non-user adoption is awareness. Many non-users indicated to being unaware of MCSs that are available, which included their benefits, their costs and how to access these services. From the research it is proposed that once ensuring that the factors (i.e. ease of use, privacy, convenience, security, personalisation and relationship) are evident in a MCS, the next phase would be to create awareness about the service portraying the factors mentioned.

7.3 Recommendations

Based on the results of this research, the following recommendations are provided in order to increase user satisfaction and thus the probability of successful adoption of MCSs:

- MCSs should be designed in a manner that is easy and intuitive for people to use
- MCSPs should focus on providing low cost services
- MCSPs should draw up a privacy policy that can be easily accessed by users
- MCSPs should ensure that services offer a high level of convenience to users by taking into account that the anywhere, anytime aspect of MC
- MCSPs should design their mobile websites in such a way that only the necessary content is available without unnecessary graphics and thus best utilise the available bandwidth
- MCSPs should provide users with the level of security they would need to make them feel safe based on the degree of personal information the service requires
- MCSPs should provide services that cater to people's needs and wants. MCSPs are thus required to understand their market's needs and requirements.
- MCSPs should ensure that user's permission are obtained, where necessary, to gain user trust and increase satisfaction
- MCSPs should develop good relationships with users
- MCSPs should create as much publicity and awareness about their services, specifically in terms of their benefits, e.g. personalisation, convenience, ease of use, and their costs.

Based on the results of this research, the following recommendations are given in order to influence non-users intention to use MCSs and thus increase the probability of the successful adoption of MCSs:

- MCSPs should obtain a good understanding of their target market's needs and cater to these needs. The more personalised a service, the more value it would have and more appeal.
- MCSPs should focus on low cost, high volume transactions

- MCSPs should provide services that are intuitive to users, with basic interfaces that cater for mobile device limitations
- MCSPs should provide clear and easily accessible privacy and security policies for people to view as well as ensuring that services have the level of privacy matched to the service. MCSPs are further advised to ensure the security of every transaction with users.
- MCSPs should provide services that will most add convenience and value to the lives of users
- MCSPs should obtain permissions of non-users as much as possible and also allow for non-users to cancel service subscriptions, where applicable, in order to safeguard a user's privacy
- MCSPs should generate as much information about their services as possible. In other words MCSPs should inform people of the costs involved, how to set up the service, the benefits of the service, the security of the service and any other information about the service that people would find useful. It can be argued that awareness of MCSs is one of the greatest factors that contribute to non-users intention to use MC as non-users perceptions are based on what they know.
- Organisations that are interested in providing MCSs are advised to leverage their existing business relationships to introduce these services. MCSPs must also to create awareness with existing customers about new MCSs they wish to introduce in order to positively affect a non-users intention to use.

7.4 Future Research

- **Small to Medium Enterprises (SME) as MCSPs**

  In promoting MC, in order to increase widespread adoption, more services and service options are required to realise the potential MC (Sarker and Wells, 2003). It is concluded that more MCSPs are needed. SMEs make up the majority of registered businesses as well as making up more than 50% of South Africa's GDP and providing more than 60% employment (Falkena *et al.*, 2001). SME's would also greatly benefit from MC. A study is thus

proposed into SMEs as MCSPs which would outline the benefits to SMEs of using MC as well as the benefits to MC adoption in increasing the number of MCSPs and MCSs.

- **Implementation framework for MCSPs**
  There is still resistance from various organisations, such as SMEs, in utilising MC. One of the reasons being that SMEs generally only invest in "proven" technologies. Given that MC is still considered by many to be in its early stages, SMEs lack confidence to invest in it. A study is proposed that would create a MC implementation framework for SMEs. The result would be an output that SMEs could utilise in the form of a handbook that would detail the basics of MC, provide a step by step process outlining how to implement MC with respect to various groups of applications and the associated benefits and costs

7.5 Conclusion

The success of MCSs is determined ultimately by its adoption among users and non-users. MCS adoption can be measured by two factors, user satisfaction (users) and intention to use (non-users). MCSPs thus need to acknowledge these two groups and their deferring needs. MCSPs are responsible for utilising current mobile technology and providing services that meet user needs. The factors identified in this research provide MCSPs with tools that could be used to influence the successful adoption of MCSs. Finally the research confirms Anckar and D'Incau's (2002) statement: "the success of MC will strongly be affected by the ability of businesses to offer, already at an early stage, the right products and services to consumers."

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Appendix A: Case Study

Philippines - SMART Communications

This case study was chosen for several reasons. Firstly, the Philippines represent an economy similar to that of South Africa in terms of the fact that it is a developing country with a large portion of its population lying beneath the poverty line (South Africa - 50%; Philippines - 40%) (NationMaster.com, 2005; Smith, 2004). Secondly, this case study illustrates the value of implementing various factors identified in this research. Thirdly, the SMART case study serve as an example of a successful MCSP that used some of the success factors identified in this research. The following comments are based on information from Smith (2004).

SMART, a subsidiary of the Philippines Long Distance Telephone company (PLDT), is a telecommunications service provider with three main divisions: 1) fixed line, 2) wireless, and 3) information and communications technology. SMART supplies the wireless segment of the PDLT's total offerings. SMART has experienced significant growth in its mobile consumer base. From June 2003 to June 2004 its consumer base grew by 53% with a revenue increase of 40% to P30.9 billion (R3.8 billion). The majority of PLDTs overall growth is attributed to the growth of SMART. SMART was also awarded the Best Mobile Application or Service for the Consumer Market at the sixth GSM Congress in France in February 2004 for its SMART LOAD innovation.

SMART identified their target market as those at the Base of the Economic Pyramid (BOP). The BOP represents the lower-middle class, lower class, and those below the poverty line. Since 2000, with the introduction of SMART Buddy, SMART has continually been developing services to cater for the BOP.

SMART Buddy is the name of the firm's GSM prepaid SIM card product on which all succeeding products and services are based. The card came loaded with P100 (R12.13) prepaid call time which could then be recharged by purchasing call and text cards in various increments: P300 (R36.09), P500 (R60.15) and P1000 (R120.3).

SMART then found that many people were leaving their system, mainly as they could not afford the high increments of the recharge cards.

Towards the end of 2002 SMART introduced PureTxt 100. This is a pre-paid text-only reload card sold in P100 (R12.03) increments. PureTxt 100 made it more affordable for users to stay in the system due to **lowering the costs** of recharge cards – even though it was only for texting purposes. Furthermore, SMART charged relatively **low costs**, compared to South African cellular service providers, for their call and text services i.e. P1 (R0.12) per text message and P8 (R0.96) per minute for making a call during peak hours.

SMART Money is a product that allowed user to use a SMART Money card like a debit card. SMART collaborated with MasterCard to create a solution known as SMART Money. SMART Money was introduced as a result of SMART's interest in MC. Users were required to transfer money from a bank account to a SMART Money account. The SMART Money card could then be used to purchase goods and services from participating retailers. Users were able to reduce the cash they carried and **simply** use a card to make purchases. The mobile component of this product allows as the user to **conveniently** transfer money between different SMART Money cards through SMS.

SMART realised that there were still limitations imposed on the lower income brackets they were trying to reach due to the requirement of bank account (due to their close **relationship** with their customer market). In 2003 SMART introduced SMART Load. SMART Load is a service based on SMART Buddy allowing users to transfer airtime using SMS. With SMART Load retailers of pre-paid airtime could transfer airtime to clients via SMS removing the need for users to purchase cards (increasing **convenience**). Users were not required to have a bank account, increasing the **simplicity** and **convenience** of using this service compared to SMART Money.

Simultaneously SMART reduced the increments of recharges to P30 (R3.61), P60 (R7.22), P115 (R13.83) and P200 (R24.06). Smith (2004) notes that these smaller increments appealed to the low income segment that SMART was targeting. SMART realised that low income households in the Phillipines preferred to buy goods in small

"sachets" that suited their day-to-day living. SMART understood their consumer's needs and shopping habits and designed these smaller increments accordingly. In 2003 SMART further reduced the denominations (**lowering costs**) available for recharge to P2 (R0.24), P5 (R0.60), P10 (R1.20) and P15 (R1.80).

Smith (2004) further notes that SMART exploited the **relationship** aspect of the Filipino culture. In the Philippines low-income community merchants tend to have close relationships with their customers and often provide them with credit purchases. With SMART Load, SMART has been able to extend their distribution network by not only including various merchant stores but also to housewives, students, and other roaming agents. Smith (2004) stated that SMART had 500 000 retail agents from 50 000 since the introduction of SMART Load. SMART produced retailer SIM cards for retailers which gave them access to a specialized menu. SMITH (2004) reports that the retailer interface is **easy to use** and compliments the **personal** fashion with which Filipino merchants operate.

In conclusion, Smith (2004) rates SMART as the Philippines leading wireless operator. SMART is continually adding to their products and services portfolio. SMART is now offering over 23 different categories of products and services that cater to a variety of user needs (SMART, 2006).

By focusing on the BOP SMART has greatly aided in closing the digital divide in terms of telecommunications by offering services that would usually be too expensive for the majority (i.e. those living on less than P15 a day) of the population. They have also created numerous job opportunities and new revenue streams for the local low-income population.

Conclusion

SMART provided further support some o the factors proposes i.e. ease of use, convenience, personalization, relationship and cost . SMART demonstrated how understanding ones target market and focusing on adding value to their life-styles can increase intention to use (shown by the rapid growth of users and revenue increase) and user satisfaction (shown by the loyalty of their users and their increased

spending). This was achieved by keeping a close relationship with their target market and keeping communications open. In SMART's case this has lead to growth in their organizational revenues as well as facilitating socio-economic development.

Appendix B: Questionnaire

RHODES UNIVERSITY

Where leaders learn

Dear Rhodes Student

An investigation into the factors affecting the adoption of Mobile Commerce by Rhodes university students

You can win a 1GB Flash Stick or 2 x R 100 Prizes!!!!

This questionnaire is part of a master's thesis project done through the Information Systems department at Rhodes University. The purpose of this questionnaire is to observe the attitude and behaviour of Rhodes University students towards Mobile Commerce. Mobile Commerce is defined as the use of wireless devices such as cellphones, PDA's (Personal Digital Assistant) and laptops to engage in commercial transactions.

Your response to this questionnaire is of great value as university students are generally acknowledged to be the future decision makers of a country. The results will be used to help organisations in the mobile services industry better understand the factors that aid in the successful adoption of Mobile Commerce. All students between 17 and 25 are invited to fill in

this questionnaire. No prior knowledge in this area is required. The questionnaire takes approximately 5 minutes to fill in.

Completed questionnaires **submitted by Tuesday, 31 October 2006 at 22:00** will automatically be entered in a **lucky draw for a 1GB Flash Stick and 2 x R100 cash prizes.** Participating in this questionnaire is entirely voluntary and anonymous. The only personal information requested is your cellphone number, which is used to contact you if you are a winner. This however is optional.

Thank you for taking the time to fill in this questionnaire. If you have any queries please do not hesitate to contact me.

Kind regards

Sergio de Sousa

Office Tel: (046) 603 8639
E-mail: g00d1502@campus.ru.ac.za

1. # Section 1: Computer and Internet Usage

How often do you use a laptop or desktop computer?

- Daily
- Weekly
- Monthly
- Yearly
- Never

2. **How often do you access the Internet?**

- Daily
- Weekly
- Monthly
- Yearly
- Never

3. # Section 2: Mobile Commerce Usage

Please indicate how often you use your current cellphone for ENTERTAINMENT, for example, downloading ringtones, pictures, screensaers, audio and video clips, watching streaming TV, gaming, horoscopes etc.

- Daily
- Weekly
- Monthly
- Yearly
- Never

4. **Please indicate how often you use your current cellphone to retrieve INFORMATION, for example; weather updates, news headlines, stock updates, flight information etc.**

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Yearly
- ○ Never

5. **Please indicate how often you use your current cellphone for TRANSACTIONS, for example; bank account updates, requesting bank statements, money transfers, ticket reservations, shopping etc.**

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Yearly
- ○ Never

6. **Please indicate how often you use your current cellphone to COMMUNICATE with other people e.g. instant messaging, emailing etc.**

- ○ Daily
- ○ Weekly
- ○ Monthly
- ○ Yearly
- ○ Never

7. **In South Africa, which of the following functions have you used your CELLPHONE for other than voice phone calls, SMS, MMS? (Please tick the relevant boxes)**

- ☐ Downloading ringtones, truetones, pictures, wallpapers
- ☐ Downloading games, playing online games
- ☐ Downloading movie clips, watching streaming TV
- ☐ Downloading music
- ☐ News updates, weather updates, stock updates, account updates and queries, location information, movie information etc
- ☐ Accessing the Internet
- ☐ Receiving marketing information via SMS/MMS e.g. club/pub promotions and events, clothing store sales etc.
- ☐ Instant messaging e.g. MSN, MXiT
- ☐ E-mailing
- ☐ Online Banking
- ☐ Booking tickets online
- ☐ Online Shopping

8. **IF YOU DID NOT TICK ANY OF THE BOXES IN QUESTION 7 THEN PLEASE PROCEED TO QUESTION 24.**

Based on the services you have indicated to have used in Question 7, What are your views on Mobile Commerce services? Please indicate the extent to which you agree with the following statements.

Mobile Commerce services are easy to access and use.

- ○ Strongly Agree
- ○ Agree
- ○ Neither Agree nor Disagree
- ○ Disagree
- ○ Strongly Disagree

9. **Mobile Commerce services are reasonably priced.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

10. **Mobile Commerce services are well advertised.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

11. **The cost structures of Mobile Commerce services are clearly stated i.e. I know how much each service costs to use.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

12. **My personal details are kept private.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

13. **Mobile Commerce services generally offer me convenience and add value to my lifestyle.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

14. **Mobile Commerce services are fast/quick.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

15. **Mobile Commerce services are secure and safe to use e.g. I would feel comfortable giving my credit card details to make a purchase via Mobile Commerce services.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

16. **Mobile Commerce services are or can be customised to suite my personal needs/wants.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

17. **Mobile Commerce services generally require my permission before being activated.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

18. **Mobile Commerce services give me the option to cancel my subscription whenever I choose.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

19. **Mobile Commerce services are made available to me by companies I have used previously for other products and services.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

20. **On the whole, I am satisfied with the Mobile Commerce services I have used i.e. indicated in Question 7.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

21. **I will use Mobile Commerce services again in the future.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

22. **Please state any other reason that you may have for using or wanting to use Mobile Commerce services.**

PLEASE PROCEED TO QUESTION 40!

24.

Section 3: Mobile Commerce Perceptions

The following questions are meant to evaluate your general perceptions on Mobile Commerce. Please indicate the extent to which you agree or disagree with each of the following statements.

Mobile Commerce services do not address any of my personal needs.

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

25. **Mobile Commerce services are expensive.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

26. **Mobile Commerce services are slow.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

27. **Mobile Commerce services are complicated and difficult to use.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

28. **Mobile Commerce services expose personal information.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

29. **Mobile Commerce services are of no value to me.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

30. **Mobile Commerce services are not based on the recipients permission i.e. invasive**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

31. **I do not know how to begin using Mobile Commerce services.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

32. **I'm not sure what Mobile Commerce services are available in South Africa.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

33. **None of the companies I currently buy goods and services from offer Mobile Commerce services.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

34. **I am planning on using the Mobile Commerce services in the future.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

35. **I am still not sure what Mobile Commerce is.**

- Strongly Agree
- Agree
- Neither Agree nor Disagree
- Disagree
- Strongly Disagree

36. **Please state any other reason that you may have for NOT using or wanting to use Mobile Commerce services.**

37. **Do you know what Mobile Number Portability (MNP) is?**

○ Yes ○ No

38. **If Yes, are you planning to change your network provider once MNP is available**

○ Yes ○ No

39. **Before Answering this questionnaire, how would you have classified your knowledge on Mobile Commerce?**

○ Expert
○ Above Average
○ Average
○ Very Little
○ None

40. # Section 4: Demographic Information

Age:

41. **Gender:**

○ Female
○ Male

42. **Nationality:**

43. **Current Degree you are studying for:**

44. **Which South African Province have you lived in for the longest period?**

- Eastern Cape
- Free State
- Gauteng
- Kwa-Zulu Natal
- Limpopo
- Mpumalanga
- North West
- Nothern Cape
- Western Cape

45. **Approximately how many MONTHS have you been using your current cellphone? (number of months)**

46. **What brand of cellphone do you use (Make and model if known)? e.g. Nokia 6110, Samsung**

47. **Who is your current Mobile network provider?**

- VODACOM
- MTN
- CELLC
- Virgin Mobile

48. **Approximately how how many MONTHS have you been using this network provider?**

49. **Are you personally responsible for your cellphone account?**

Yes No

50. **If 'No', please state who pays for your account:**

51. **What payment option do you use?**

- Pre-Paid (i.e. you use recharge cards for your cellphone)
- Contract (i.e. you receive a monthly bill from your network provider

52. **OPTIONAL - Please enter your cellphone number (strictly for prize collection purposes) e.g. 0737824883:**

Glossary

2.5G	Second-generation enhanced. Name given to enhanced 2G networks, for example GPRS and cdmaOne.
3G	Third-generation mobile network or service. Generic name for third-generation networks or services under the IMT-2000 banner, for example W-CDMA.
Analogue	Transmission of voice and images using electrical signals. Analogue mobile cellular systems include AMPS, NMT and TACS.
Bandwidth	The range of frequencies available to be occupied by signals. In analogue systems, it is measured in terms of Hertz (Hz) and in digital systems in bit/s per second (bit/s). The higher the bandwidth, the greater the amount of information that can be transmitted in a given time. High bandwidth channels are referred to as broadband which typically means 1.5/2.0 Mbit/s or higher.
Bluetooth	A radio technology that enables the transmission of signals over short distances between mobile phones, computers and other devices.
E-Commerce	Electronic commerce. Term used to describe transactions that take place online where the buyer and seller are remote from each other.
End-user	The individual or organization that is the final recipient of information carried over a network (i.e. the consumer).
GPRS	General Packet Radio Service. It refers to a standard for wireless communications that supports a wide range of

	bandwidths. It runs at speeds of up to 115 kilobits per second and is particularly suited for sending and receiving small bursts of data, such as e-mail and Web browsing, as well as large volumes of data.
GPS	Global positioning system. Refers to a "constellation" of 24 "Navstar" satellites launched initially by the United States Department of Defense, that orbit the Earth and make it possible for people with ground receivers to pinpoint their geographic location. The location accuracy ranges from 10 to 100 metres for most equipment. A Russian system, GLONASS, is also available, and a European system, Galileo, is under development.
GSM	Global System for Mobile communications. Digital mobile standard developed in Europe, and currently the most widespread 2G digital mobile cellular standard. GSM is available in over 170 countries worldwide. For more information, see the website of the GSM Association at: http://www.gsmworld.com/index.html.
MC	Mobile Commerce.
MCS	Mobile Commerce Service.
MCSP	Mobile Commerce Service Provider.
MCUS	Mobile Commerce User Satisfaction.
MMS	Multimedia Message Service. MMS will provide more sophisticated mobile messaging than SMS or EMS. A global standard for messaging, MMS will enable users to send and receive messages with formatted text, graphics, audio and video clips. Unlike SMS and most EMS, it will

	not be limited to 160-characters per message.
MXiT	An instant messaging application designed specifically for mobile phone usage which has become very popular among South African youths.
PDA	Personal digital assistant. A generic term for handheld devices that combine computing and possibly communication functions.
PLDT	Philippines Long Distance Telephone company.
SIM	Subscriber identity module (card). A small printed circuit board inserted into a GSM-based mobile phone. It includes subscriber details, security information and a memory for a personal directory of numbers. This information can be retained by subscribers when changing handsets.
SMS	Short Message Service. A service available on digital networks, typically enabling messages with up to 160 characters to be sent or received via the message centre of a network operator to a subscriber's mobile phone.
Wi-Fi	Wireless fidelity. A mark of interoperability among devices adhering to the 802.11b specification for Wireless LANs from the Institute of Electrical and Electronics Engineers (IEEE). However, the term Wi-Fi is sometimes mistakenly used as a generic term for wireless LAN.

List of Abbreviations and Acronyms

EDGE	Enhanced Data Rates for GSM Evolution
FAQ	Frequently Asked Questions
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HSCSD	High-Speed Circuit-Switched Data
MHz	MegaHertz
MMS	Multimedia Message Service
MC	Mobile Commerce
MCS	Mobile Commerce Service
MCSP	Mobile Commerce Service Provider
MCUS	Mobile Commerce User Satisfaction
PLDT	Philippines Long Distance Telephone company
SIM	Subscriber Identity Module (card).