Factors Affecting the Adoption of Mobile Banking in New Zealand

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ABSTRACT

Mobile banking is a new banking medium by which customers can check their account balances and do transactions on-the-go. All a customer needs is a mobile device along with 3G connectivity. In most studies it has been observed that mobile banking is in the nascent stage and has yet to reach its potential of becoming the primary channel of contact for addressing the banking needs of customers.

The aim of this study was to determine the factors that influence the adoption of mobile banking in New Zealand. The research model was based on the Technology Acceptance model and tests the constructs identified through the focus group discussion. A survey was developed to obtain responses from various segments of the society who may or may not have heard of mobile banking. The findings showed that some factors pertaining to trust, usefulness and risk drive the usage of mobile banking in New Zealand. Perceived risk was identified as a major inhibitor in the adoption of mobile banking amongst the users.

Key words: mobile banking, New Zealand, technology acceptance model

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CHAPTER ONE

INTRODUCTION

Chapter Overview

This chapter provides the background of the research, research objective and its importance in the New Zealand context. Towards the end of this chapter, a brief description of chapters ahead is provided.

The banking sector has regularly undergone changes in technology, customer preferences, competition, regulatory requirements, changing demographics and social trends (Giannakoudi, 1999; Byers and Lederer, 2001).

Banking services and operations have undergone a paradigm shift especially in the past decade. The changes have been catalysed by technology advancements, global commerce, competitiveness and customer demands as the important factors. As a result, banking services have fast developed to adopt new delivery means which adapt to the changing commercial landscape. In order to meet customer expectations banks vie with each other to new and innovative services to ensure a competitive edge (Shi & Lee, 2008). The evolutionary changes have significantly impacted on the corresponding strategies that the banks have adopted as a consequence.

1.1 New Zealand banking environment

The New Zealand banking environment has undergone a gradual but deliberate change to adapt to the Internet landscape. Auckland Savings bank (ASB) was the first bank to offer Internet banking services in 1996 (ASB, 2011). Bank Direct become the first virtual bank without any physical branches and was followed by National Bank of New Zealand and Bank of New Zealand by 1999 (Parker, 1999). It is

estimated that New Zealand had four hundred and eighty thousand regular Internet banking customers by the last quarter of 2001 reflecting a 54% growth over the last quarter in the previous year (Taylor, 2002, p. 1). The growth and popularity of Internet banking in New Zealand continued and the percentage of customers that prefer using teller services today is very low. The adversity to Internet usage in New Zealand shrunk from 32% in 1998 to 11% in 2001 (Watson et al., 2002, p. 336). 65% of those who have not adopted Internet banking intended doing so shortly (Taylor, 2002, p. 1). The phenomenal growth of Internet Banking is evident with the number of customers doubling from 2005 to 2008 (Newbery, 2008). ASB has 85% customers who use online banking followed by Kiwibank (81%) and Westpac (77%) (Hudson, 2008, p. 2). The online banking use has caught on across age boundaries with 62% users above age 55 using online banking (Foley, 2005, p. 1). The ease of using banking and financial services at the convenience of time and location has been obvious drivers for this phenomenon. The offshoot of this trend is the increased efficiency and lower costs for the banks. In this win-win situation the banks have been competing with each other to provide more and better services through their online portals. However despite this unmistakable trend, New Zealand banks have historically lagged global Internet banking trends by 2-3 years (Petrova, 2004; Petrova, 2005; Petrova & Qu, 2006). Banks have now clearly recognised the importance of use of technology as a force multiplier to gain competitive edge. The risk of ignoring this is fraught with the danger of being left behind (Agrawal & Karahanna, 2000).

The growth of mobile device usage in New Zealand has been phenomenal. Currently New Zealand ranks 24th in the world with 61.45% of the population actively using mobile phones (Nationmaster, 2012, p. 1). According to Statistics NZ, more than eighty five per cent New Zealanders aged above 15 years use mobile phones in 2009. It further projects that there would be an 18.5% growth to these numbers in 2010. There are already more than 300,000 iPhones in New Zealand from the estimated 135,000 at the start of 2011 (Fugaz, 2011, p. 1). These statistics clearly illustrates that the trend of mobile device growth especially smartphones in New Zealand seems on the rise. Smartphones penetration in New Zealand is expected to grow by 14%-18% as compared to about 30% in Europe and USA (Parker, 2011, p.1). The natural

corollary to these findings is that applications based on these devices will assume importance and popularity in the coming years.

In 2001, mobile banking was offered only by ASB in New Zealand. This offered restricted features and was limited to Telecom customers with CDMA devices only ("mobile money", 2007). The landscape has changed substantially since then and currently all major banks like Westpac, BNZ and National provide explicit mobile banking facilities targeting 'customers on the move'. Like EFTPOS in the 80s, New Zealand technology companies are fast exploiting the features of mobile devices and adding value applications for mobile banking clients. BNZ is developing an M-credit system wherein a client's credit card details are embedded in the mobile device and automated authentication can ensue for retail transactions. Similarly Westpac offers special 'bank anywhere' facilities to its mobile clients while ASB has developed electronic wallets and Fastnet classic apps for smartphones ("mobile money", 2007).

1.2 Evolution and adoption of technology in banking

The use of technology in the banking sector is by no means new. Humphrey, et al. (2000) mention the use of Information Technology and computerisation in banks in the 1960s and 70s which enhanced efficiencies and reduced staffing needs. The functions that were touched upon were mostly restricted to withdrawals, deposits, balancing and other internal operations. This resulted in a very conspicuous positive impact on the ease of customer banking while lowering operational costs. These were described by Humphrey et al. (2000) as the internal technological wave. This led to an external technological wave in the subsequent decades. It involves the reduction in the 'face-to-face' interactions and exploited the use of the rapidly proliferating electronic delivery means. The use of ATMs, Internet banking, wire transfers; EFTPOS and credit cards have shrunk the conventional wallet. According to Gerdes and Walton (2002, p. 361) the value of paper checks transacted in USA fell from $49 billion in 1995 to $42 billion in 2002. These rapid changes brought with them the

inevitable security issues manifesting in the form of scams and resulting consumer concerns. The major challenge today which accompanies the embracement of technology by financial institutions is the need for matching security and regulatory processes.

Mobile communications like other fields of information communications technology have developed due to pressing needs for humans in the contemporary era. The success of mobile technology and its spiral growth in recent times needs no emphasis. While cell phone in its primitive forms was introduced in the 1940s, the first serious mobile phone developed by Motorola in 1983 as an analog device ("changes to mobile phone history", 2011). The 1990s saw the switchover to the second generation or 2G technology to the digital era for mobile devices. The digital devices were a quantum leap over the anolog systems as they increased efficiency manifold, while reducing size and dimensions. The reasonably rapid advent of 2G to 2.5G and now the 3G mobile communication networks indicates that there is a lot yet to be uncovered in the technological domain. A 3G mobile device would have features far in excess of those available in computing systems in the 1990s (Petrova, 2007). The thrust of 3G technology is geared towards an ability to handle much larger volumes of data in conjunction with sophisticated applications. 3G networks facilitate adaptation to the functionalities of the current age powerful smartphones and are poised to make this technology more popular for future users. Researchers are busy working out standards for fourth generation or 4G technologies which are likely to handle much larger bandwidth of data and enhanced security features in mobile devices, akin to those available in advanced computers today (Ghadialy, 2006). These sophisticated networks augurs immense potential towards convenient, anytime and anywhere banking for customers in the future.

1.3 Understanding mobile banking and related terms

Karjaluoto et al. (2003) define four primary banking channels that exist today: counter services, telebanking, online banking, mobile banking and counter services

(p. 81). There are various definitions and meanings associated with the terms mobile banking, m-banking, online banking, telebanking, mobile payments and m-commerce. These terms are at times related and often overlap in context. "Mobile banking may be viewed as a subset of electronic banking, with users connecting to their bank via a mobile device such as a mobile phone. Mobile banking transactions may include operations such as account balance checking, fund transfer, paying for goods and other services predominantly by data transactions " (Petrova & Yu, 2010, p. 19). Mobile banking provides customers the flexibility to conduct their financial transaction 24 hours a day through Short Messaging Service (SMS) or Wireless Access Protocol (WAP) (Crabbe, Standing & Standing, 2009). However, the definition of mobile banking has been changing dramatically with the advent of technology. Till recent times, mobile banking was performed mostly using SMS. This has changed and today the term encompasses the use of a regular Internet browser and also specially designed mobile applications to perform the banking functionalities. Mobile banking is distinct from online banking because of features such as the availability of alert features through SMS, convenience to use almost anywhere and anytime and unique wireless security implications (van Rensburg, 2007). The mobile banking format is designed a bit different to online banking, being simple and easy to use on a mobile device (Macarthur credit union, 2010). About ninety percent of the world's population today lives in areas of mobile phone coverage (Kenny & Keremane, 2007, p. 155). A big advantage of mobile banking is its accessibility to a large segment of the world population which would have wireless connectivity but no Internet access.

Telebanking is defined as "conduct of specified banking operations in which computer-utilizing agents receive inbound or make outbound telephone calls" (Faia-Correia et al.. 1999, p. 143). Telebanking depends mostly on personal voice interaction for the conduct of banking operations. In strict terms mobile banking is distinct from telebanking. Mobile banking can be categorized as a data 'push or pull' service. For example, a payment alert can be pushed into a mobile device or a transaction report can be pulled out from a bank server (Dasgupta, 2011). Mobile payment is another term which is confused with mobile banking. Mobile payment is a

payment conducted using a securely generated token to a Point of Sale (POS) terminal (Dewan & Chen, 2005). Mobile payments are linked to an individual's bank account and function similar to a credit or EFTPOS card. M-commerce involves the use of mobile devices to conduct financial or promotional commercial transactions. Mobile banking can be considered an extension to m-commerce. Other examples of m-commerce include commercial purchases, mobile stock trading, and mobile ticketing (Nah, Siau & Sheng, 2005). However, the rapidly changing technical landscape is blurring the boundaries between the terms related to mobile banking, which could lead to redefinitions in the future.

1.4 Mobile banking in New Zealand

SMS is one of the main medium through which people in New Zealand prefer to do mobile banking (Petrova & Yu, 2010). Saving time and convenience are the two most frequent reasons given for using SMS mobile banking (Venkatesh, Ramesh & Massey, 2003). VeriSign conducted a survey whereby they asked participants apart from voice calls which was the most important feature of their cell phone. 52% participants responded with text messaging (VeriSign mobile banking survey, 2009, p. 2).

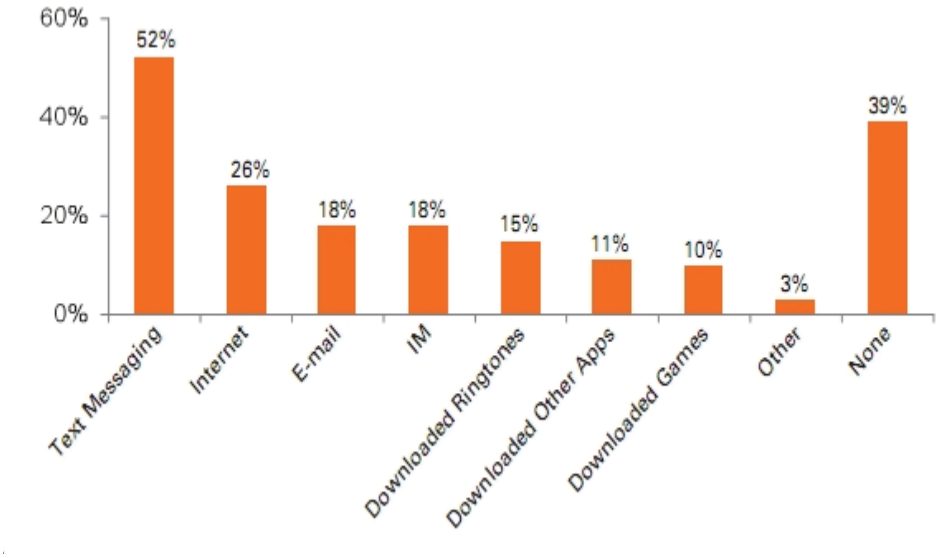

Figure 1.1 Rank the most important feature of your cell phone

Source: VeriSign mobile banking survey, 2009, p. 2

Although many leading banks like ANZ (ANZ, 2011) have come up with iPhone Apps (e.g. ANZ Go Money) that support mobile banking; these applications are restricted to users who have a high-end phone. In New Zealand, 16% users have smartphones while 6% have high-end phones like Android and iPhone (VeriSign mobile banking survey, 2009, p. 4).

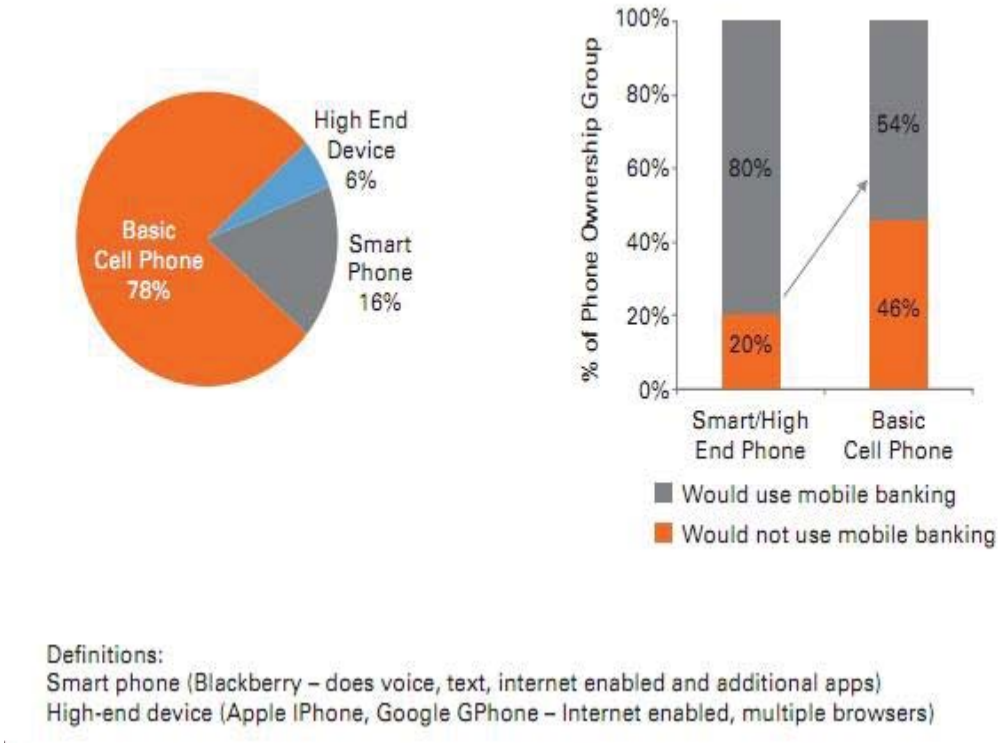

Figure 1.2 Population of customers who would use mobile banking

Source: VeriSign mobile banking survey, 2009, p. 4

The chart in Figure 1.2 above depicts a higher percentage of smartphone owner's use mobile banking as compared to basic cell phone users. Smartphones are characterised by sophisticated data applications and Internet usability, making it a more popular device for mobile banking adoption. This also points towards the reliance of data rather than voice in mobile banking usage. The area of focus for this study is on data (SMS and Internet applications) in mobile banking, as covered in section 1.6.

1.5 Research objective

This research aims to look at the reasons that currently impact the growth of mobile banking in New Zealand. Hence, the research question is as follows:

What are the factors influencing the adoption of mobile banking in New Zealand?

1.6 Importance of this research

This study could be of special interest and value to the banking sector and other commercial sectors linked to banking. The findings and recommendations to banks could help them to analyse and restructure their strategy to attract customers. The banking industry can attract potential customers towards mobile banking by taking into account the factors influencing user decisions or preferences. Researchers and allied industries may use the results by analysing the behaviour and resistance patterns of customers leading to innovations

1.7 Boundaries of mobile banking and scope of the research

Mobile banking can be subject to different interpretations and boundaries. Hence, it is important to define the scope of this study to avoid confusion. In the broadest sense mobile banking can be considered traditional banking services accomplished by portable devices. In a stricter sense, mobile banking is a channel for customers to interact with a bank via a mobile device, with the emphasis being on data communication. Mobile banking precludes voice or telephony banking that forms part of call centre operations (Barnes & Corbitt, 2003).

Currently, the four most popular channels of mobile banking are data-centric services (Infogile, 2007, p. 4):

- Short Messaging Service (SMS): SMS is a popular text-messaging standard using a push or pull methodology. In the push form the bank transmits alerts and messages, while pull recovers information at the customer's behest.

- Wireless Access Protocol (WAP): The function of WAP is similar to Internet banking using Hypertext Transfer Protocol (http). The mobile device has a WAP enabled browser which interfaces the banking applications to the customers.

- Standalone mobile application clients: These are specialised banking applications which allow customers to execute more complex functionalities like equity or foreign currency trading. It also allows the banks to enable high level security implementations through application clients.

- Mobile banking using Subscriber Identity Module (SIM) toolkit: SIM toolkit applications are Global System for Mobile Communications (GSM) standard applications. These allow high grade security cover to applications by using the uniqueness of SIM identifiers in the mobile devices (Mallat, Rossi & Tuunainen, 2004).

Interactive Voice Response (IVR) was introduced for mobile banking services, but had limited success being expensive and inefficient (Narendiran, 2011).

The ever-increasing spread of portable devices has catalyzed mobile banking usage. Mobile banking has evolved into a logical extension of Internet banking, adding value to it by way of speed, convenience and portability. Literature studies highlight the dominance of data centricity in mobile banking operations. Telephone banking remains the least favoured banking mode amongst banking users in developed

countries (Akinci, Aksoy & Atilgan, 2004). A study in Hong Kong reveals ATM as a most frequented mode, followed by Internet, branch and telephone banking in that order (Wan, Luk & Chow, 2005). A Forrester study in 2005 revealed that less than 5% (p. 310) respondents preferred telephone banking over electronic banking channels in Germany (Forrester, 2005; Scornavacca & Hoehle, 2007).

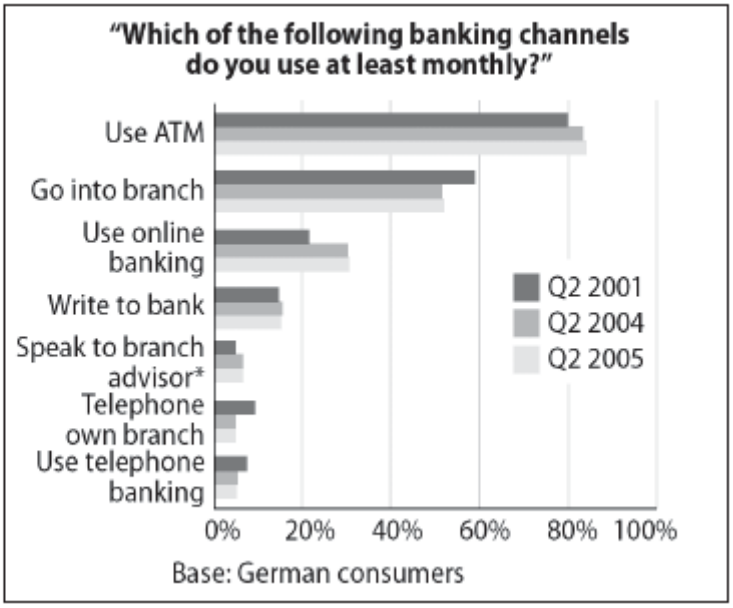

Figure 1.3 Use of banking channels in Germany

Source: Scornavacca & Hoehle, 2007, p. 322

The scope of this study is therefore restricted to the use of mobile devices for data and does not include voice, either in its traditional form of voice dial-up or through a service based on touch tone phones. The study focuses in mobile data technologies around four widely accepted and distinctive paradigms: messaging, browsing, applications and packet based data transfer.

1.8 Structure of the research

The research work is divided into five chapters. The introduction includes objectives, the significance of research and formulation of research questions. Chapter 2 focuses on various problems incurred in the study, the description of the research model from the literature reviewed and the approach to be adopted for the study. In Chapter 3 the methodology is discussed along with the techniques used for the collection. Chapter 4 explains the findings and carries out data analysis with the help of SPSS tools. Chapter 5 discusses the results obtained in Chapter 4.

CHAPTER TWO

LITERATURE REVIEW

Chapter Overview

This chapter studies the research on user adoption and behaviour of emerging technologies. Various IS/IT literature have been researched to understand what factors affect the adoption of mobile banking. Technology Acceptance Model (TAM) has been used to develop a research model for the purpose of this study.

Introduction

Over 5 billion people are now mobile phone users (ITU reports, 2010, p.1). It has been predicted that by the year 2015 mobile phone users would surpass desktop computer users (Ingram, 2010). This opens a whole new world of opportunities for businesses and retailers to market their goods and services for customer. Customers today are 'on-the-go' they appreciate things that are readily available to them. Banking is one example. Gone are the days when customers would line up in banks to do their banking needs. Today by a touch of a button using electronic banking they can transfer funds to and from their accounts. However, even though mobile technology is widely available amongst customers, there are proportionately few adopters for mobile banking (Deloitte, 2010).

Mobile commerce (m-com) can be defined as "any transaction, either direct or indirect with a monetary value implemented via wireless telecommunication network. Such transactions include mobile, banking, investing, shopping and services" (Wu & Wang, 2004, p. 720). Anckar & D'Incau (2002) further added that m-com should not be restricted to only mobile telephony, "meaning that a substantial volume of m-commerce should not be seen as an obvious outcome of high penetration rates of mobile phones. Rather mobile devices with wireless Internet connections should be

seen as a pre-requisite for m-commerce" (p. 44). Lee & Benbasat (2004) refer to m-commerce as "e-commerce activities via mobile devices, such as phones or PDAs" (p.79).

A close look at some of the advantages of mobile commerce shows cost efficiency (Antovski & Gusev, 2003; Kreyer, Pousttchi & Turowski, 2003; Zmijewska, 2005; van der Kar & van der Duin, 2004; Pousttchi & Zenker, 2003), usefulness (Antovski & Gusev, 2003; Dewan & Chen, 2005; Teo, Fraunholz & Unnithan, 2005; Zmijewska, 2005) and handiness/convenience (Dewan & Chen, 2005; Kreyer, Pousttchi & Turowski, 2003; Pousttchi & Zenker, 2003; Teo, Fraunholz & Unnithan, 2005). Convenience is related to mobile commerce (Lee, Kou & Hu, 2004). As per a research done in 2001, in New Zealand households' one could easily find one or two mobile phones (IDC New Zealand, 2004). Major financial institutions (banks) are now spending their money on research and development of smart applications that shall provide customers their banking facilities on their fingertips. A report by US based consultancy firm Celent (2007), envisaged that "35% of online banking households will use mobile banking by 2010, up from less than 1% today" (p. 1).

2.1 Fundamentals of mobile banking

Internet banking has been one of the most successful electronic commerce applications in the past decade. It is almost inconceivable for any contemporary bank to ignore the essence of e-banking and survive commercially. In the US, m-banking usage has increased from 14.9% in 2001 to 40.5% in 2007 (Graumann & Koehne, 2003, p. 3). 30-40% European households were using Internet banking actively [through mobile device] by 2007 (Graumann & Koehne, 2003, p. 2).

The potential of mobile banking use is even more than what has been achieved by Internet banking. It allows anytime, anywhere (within the network coverage) banking

with all the inherent advantages (Kreyer, Pousttchi & Turowski, 2002; Pousttchi & Schurig, 2004). The high penetration of mobile phones across the strata of society makes it a natural tool for taking e-commerce to its next level. It is more than likely that Internet banking and mobile banking would exist as allies rather than competitors for each other.

2.2 Mobile banking in New Zealand

Most New Zealand households now have at least one mobile phone but mobile banking usage is still in a nascent stage. It was in 2007 when Kiwibank rolled out real time mobile banking in New Zealand beating a lot of international competition and thus winning the Financial Innovation award (Kiwibank, 2007). Other New Zealand banks later followed Kiwibank's suite and launched their versions of mobile downloadable apps for smartphone.

A survey done by a management firm showcased that on an average 68% New Zealanders owned cell phones which were not older than a year (Newbery, 2005, p. 1). The survey results also mentioned the cost that an average user pays for calling in New Zealand is the highest when compared to the OECD countries (Newbery, 2005).

In January 2010, an interview was conducted with the Chief Technology Officer of Westpac (Sarv Girn) who shed light on the focus of catering to the needs of the ever growing mobile population in the next three years. An excerpt show's as below:

> *"Growth of the online internet population will be a key factor in the next frontier, as more people, organisations, and devices are connected. This will drive a level of innovation we have yet to see on the internet. If you think about it, the world internet penetration rate is about 25%, with mature regions such as North America sitting at 75%, and high growth regions such*

as Asia sitting at just 20%. So even if the penetration of Asia reaches 50% over the next 5 years (as expected), then on a global level we will have doubled the number of people connected to the internet. A key to this will be cross-industry collaboration to make a product or service a success. Some other dimensions to keep an eye on in the future include, use of location (GPS) in service /product offerings, accessibility (Wireless Broadband) to have internet capability embedded into other devices, gesture based interaction styles (Wii) to offer universal input, and use of information to make better informed business and personal decisions" (Jahangiri, 2010, p. 1).

Scornavacca and Cairns (2005) researched mobile banking in Japan and New Zealand, "the investigations found that the Japanese banks had recently embarked on a multi-channel strategy that combined telephone banking, Internet banking, and m-banking services, while in New Zealand m-banking remains in an embryonic stage" (Scornavacca & Hoehle, 2007, p. 310). Furthermore, a strategic model was developed in 2007 that depicted the mobile vs. online penetration in Germany (Scornavacca & Hoehle, 2007, p. 312) shown below:

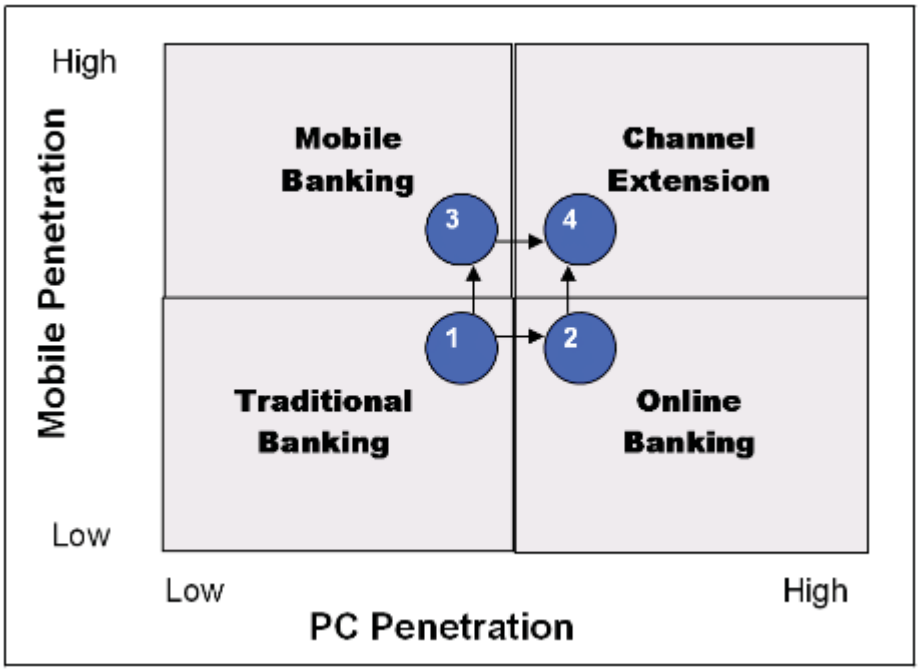

Figure 2.1 Mobile vs. online penetration in Germany

Source: Scornavacca & Hoehle, 2007, p. 312

The above model was derived from Scornavacca & Barnes (2008) m-banking strategic model that was applied to the Japanese market. The model categorizes the "potential development of m-banking services in different markets according to the penetration of mobile telecommunications and personal computer technology" (p. 229). In the year 2004, the personal computer penetration rate was 48% in Germany while 42% Germans had access to the Internet (ITU reports, 2004, p. 1). By 2005, 30% Germans used e-channel for their banking needs (Forrester, 2005, p.2). For their research Scornavacca and Barnes (2008) researched on hundred banks and found that all these banks have portals to cater to the needs of the customers'. This is depicted in the move from the traditional form of banking to online banking as shown from step 1 to 2.

Scorncovva & Barnes (2008) further explained through their study that m-banking is still at an early stage, however, the penetration of mobile devices creates an opening

for banks to leverage on. As German mobile technology moves to 3G, m-banking would become a reality. This is elaborated in step 3 of the above diagram. Once that is achieved, financial institutes would be lured to adopt a "multi-channel" approach. Multi-channel approach refers to utilizing all the channels e.g. branch, direct banking, online and m-banking for the effective utilization of services by the consumers (Scorncovva & Barnes, 2008). This can be seen in step 4.

It was found that the same development occurred in New Zealand where mobile banking is still in its early days; however, given the amount of mobile phone penetration it gives a huge opportunity to leverage mobile banking in New Zealand.

Other international research on mobile banking has been highlighted in section 2.2.1.

2.2.1 International research of mobile banking research

Some of the research done by international authors is outlined below:

Author	Title	Model/Method (When model is not known)	Factors
Kim, G., Shin, B. & Lee, H.G., 2009	Understanding dynamics between initial trust and usage intentions of mobile banking	Mathematical analysis and model (structural equations) were used	• Perception • Acceptance • Trust • Revenues • Cognition
Conclusion from the study: "Relative benefits, propensity to trust and structural assurances" (p. 300) have an effect on preliminary trust in mobile banking. A point to note here was that the reputation of the bank has no effect on users adopting mobile banking services.			

Gu, J-C., Lee, S-C. & Suh, Y-H., 2009	Determinants of behavioural intention to mobile banking	Technology Acceptance Model (TAM)	• Trust • Perceived ease of use • Self-efficiency
Conclusion from the study: Results showed that behavioural intention is a strong indicator for the use of mobile banking. Self-efficiency and perceived ease of use had an effect on behavioural intention. Trust was based on "structural assurances" (p. 11610) that led to an increase in its perceived use.			
Viehland, D. & Leong, R.S.Y., 2007	Consumer propensity to pay mobile service fees	Quantitative survey method	• Willingness to use • Inclination to pay
Conclusion from the study: The research sheds light on the users not liking to pay service fees charged by telecom giants which in return hampers them from using these services. The only scenario when a user would use mobile payments is when it is urgent and they do not have a choice.			
Laukkanen, T., 2007	Internet vs. mobile banking: comparing customer value perceptions	Qualitative study using interviewing technique along with "means-end" approach (p.788)	Looking into creation of value acuity
Conclusion from the study: There is a stark difference that can be seen between users using Internet and mobile platforms. Three key points were highlighted that helps in establishing insight into a customer's usage of a particular channel. These are: "efficiency, convenience and safety" (p. 795).			

Yang, K.C.C., 2005	Exploring factors affecting the adoption of mobile banking in Singapore	TAM	• Perceived Usefulness • Attitude • Innovativeness
Conclusions from the study: The results of this study suggested that apart from the TAM factors there were other key factors that affect adoption of this technology. They were "consumer innovativeness, past adoption behaviour, technology cluster adoption, age and gender" (p. 261). The result also mentioned that men are more favourable adopters of mobile commerce technology as opposed to women.			
Luarn, P. & Lin, H-H., 2005	Toward an understanding of the behavioural intention to use mobile banking	• TAM • Theory of Planned Behaviour (TPB)	• Perceived credibility • Perceived Self-efficacy • Perceived financial cost
Conclusions from the study: The researchers felt that TAM overlooks a key construct namely trust in mobile commerce (m-com) space. Hence, there were extensions of TAM that were introduced in the study which strongly indicated in forecasting any users aim to adopt this technology.			
Laforet, S. & Li, X., 2005	Consumers' attitudes towards online and mobile banking in China	Qualitative study	• Behavioural • Attitude • Demographic
Conclusions from the study: In this study, the final outcome highlighted that the barrier to the adoption of mobile banking is lack of knowledge around the potential benefits to the traditional cash-carrying Chinese population. Security is also perceived as a huge hurdle in the adoption of mobile banking.			

2.3 Factors affecting the adoption of mobile banking

The characteristics of mobile technology necessitate some requirements needed to support mobile banking proliferation. However, there are some hindrances that deter mobile phone users to use the technology to its optimal level:

2.3.1 Technology issues

The diverse devices available need to support mobile banking applications effectively and seamlessly. The hardware architecture and operating systems on the mobile devices should be able to support the applications. The current systems have their failings while supporting different applications and interfacing on different communication networks (Luarn, 2005). Data transmission needs to be compressed to save on costs.

2.3.2 User-interface issues

There ought to be an ability to personalise the display to appeal to the likes of different users. Drill down facility should be in place for details are required in case the user wishes to obtain more information for a transaction; the design should allow them to drill into the details (Pedersen, P.E., Methlie, L.B. & Thorjbornsen, 2002). The mobile devices lend themselves well to allow the user to get timely alerts and this feature needs to be judiciously used to add value for the customers. The users have got used to extensive features in electronic banking (Dholakia & Dholakia, 2002). They must not be handicapped to get similar features through mobile banking; any design constraint which inhibits the features will impede widespread usage.

2.3.3 Security issues

One of the most important factors that a user considers before opting for a technology is security (Wang et al., 2006). Banking is the most important aspect of anyone's life and potential loss of money could hamper their experience with the institution.

Mobile technology is potentially more vulnerable to interception as it is propagated through wireless mode. However, some studies show that "using mobile phone in banking is trustworthy" (Mattila, 2002, p. 10). Risk is identified as "a perception of consumer, not a characteristic of a product" (Fain & Roberts, 1997, p. 45). It is known that risk/security can change a "consumers' perception to use technology" (Laforet & Li, 2005, p. 365). In a research conducted by Wang et al. (2006, p. 158) it was identified as a major concern in adoption of mobile banking as "individuals' may worry about security issues such as data transmitted and resultant output, loss of connection risk (Kuisma et al., 2007; Black et al., 2001) and performance mistakes (Laukkanen & Lauronen, 2005; Black et al., 2001). There needs to be a strong encryption techniques used to ensure security of sensitive data and functionalities of mobile banking. Security controls need to be built into the application functions to disallow unauthorised and fraudulent usage. Security should be foolproof but efficient. It should not infringe on the time taken for authorisations as it would make usage more costly and prohibitive (Brown et al., 2003; Laukkanen & Lauronen, 2005).

Many researchers have argued that security is not the only major concern that restricts customers from accessing their mobile banking services (Suoranta, 2003; Laukkanen & Lauronen, 2005; Soroor, 2005). Other barriers include mobility, personalization, localisation and reachability (Souronta, 2003).

VeriSigns mobile banking survey highlights the security aspect as the key fear that prevents customers from adopting mobile banking.

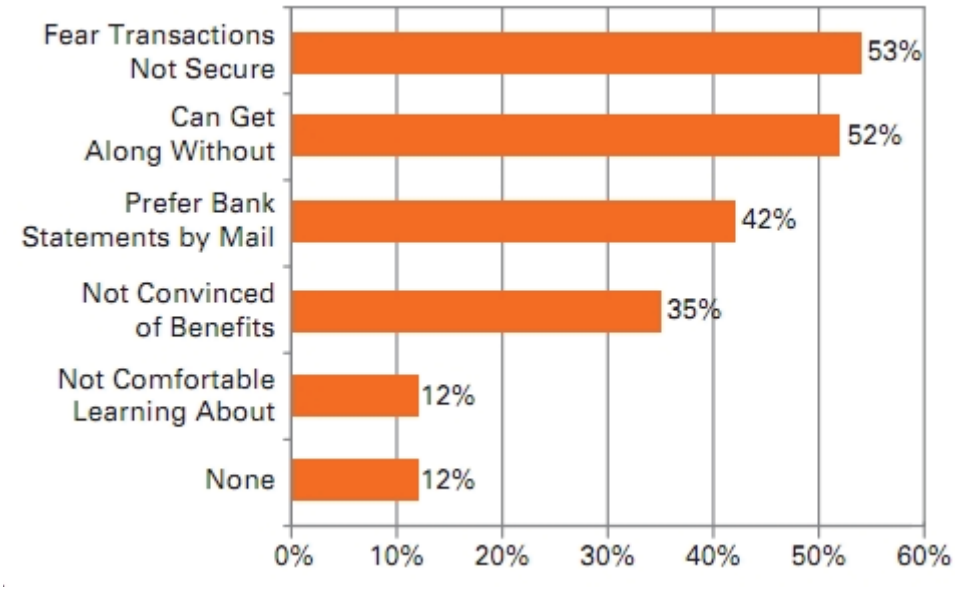

Figure 2.2 Factors affecting the adoption of mobile banking

Source: VeriSign mobile banking survey, 2009, p.4

Security aspect should be highlighted as an area to be investigated in the New Zealand context.

2.3.4 Usability issues

Venkatesh (1999), Compeau, Higgins & Huff (1999) and Ellen, Bearden & Sharma (1991) had examined the aspect of resistance of users to accept innovations and changes. Ram and Sheth (1989, p. 7) have identified the factors impeding the acceptance of mobile technology as summarised in the figure below:

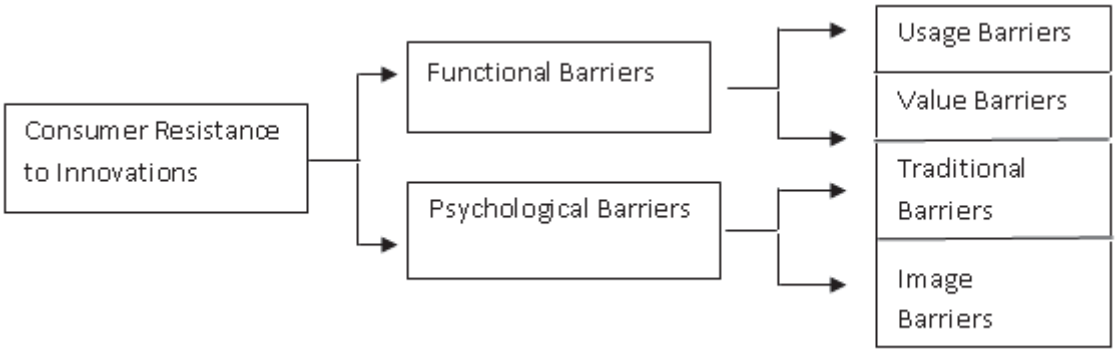

Figure 2.3 Factors impeding the acceptance of mobile technology

Source: Ram & Sheth, 1989, p. 7

A major limitation to usability of mobile devices has been the inconvenience in inputting data. The latest generation of devices have been able to work around these limitations by the introduction of touch screen technology. Banking applications would need to address this issue to provide the consumers ease of use. Applications would need to have the facility of continuing usage even after disruption of mobile communications without compromising on security (Srite & Karahanna, 2006). Potential to use applications offline would enhance their usability. The applications must lend them to ease of usability by providing shortcuts to frequently used transactions. The users must not have to resort to lengthy inputting to access data.

2.3.5 Cost issues

A major impediment to widespread mobile banking usage is its cost (Tarasewich, Nickerson & Warkentin, 2002). For carrying out banking through a mobile phone there is a cost associated with buying a handset and getting connected through a service provider (Nah, Siau & Sheng, 2005). Ram (1987) and Ram & Sheth (1989) coined the term “performance-to-price” (p. 7) advantage for users to adopt a technology.

2.4 Theoretical frameworks

Technology Acceptance Model (TAM) and Extended TAM are discussed below as the theoretical models that underpin this study.

Technology Acceptance Model (TAM) is an oft-referenced framework in determining the preparedness of organisations to adopt new technological applications (Venkatesh & Davis, 2000). Between the years 2000 and 2003 more than forty studies were carried out with keen interest (Burton-Jones, & Hubona, 2005, p.60). TAM follows four stages: "beliefs, attitude, intention and use" and belief has two primary variables namely "perceived usefulness (PU) and perceived ease of use (PEU)" (p.60). "Beliefs drive attitude, which in turn influence intention and finally the actual use of the technology" (Burton-Jones, & Hubona, 2005, p.61).

Davis et al. (1989) linked perceived usefulness to productivity. They defined it as "the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 985). Some researchers also believe that there is a positive correlation between perceived usefulness and the intention to use a technology (Cheong & Park, 2005; Venkatesh et al., 2003). Perceived ease of use is defined by Davis (1989) as "the degree to which a person believes that using a particular system would be free of effort" (p.320).

The willingness to adopt mobile banking is dependent on perceived usefulness as seen by the user of the technology (Luarn & Lin, 2005; Dewan & Chen, 2005). Consumers shall adopt this new medium if they find a value add as compared to their exiting means to do their banking. Kleijnen et al. (2004) conducted a study about wireless finance in Netherlands, in that they found that "a significant measure in the

development of people's intention to use wireless finance" (p.57). This result was similar to the finding as determined through a few other researches (Wang et al.., 2003; Adams et al., 1992). A strong link is revealed between perceived usefulness and perceived ease of use (Kleijnen et al.., 2004; Wang et al.., 2003; and Davis et al.., 1989).

Luarn & Lin (2005) extended the existing TAM model (Figure 2.4) by adding four new constructs to understand mobile banking adoption in Taiwan. These three constructs were: perceived credibility, perceived self-efficacy, perceived risk and perceived finance cost.

Although perceived usefulness, perceived ease and intention to use contribute towards the adoption of mobile banking; concerns around security and privacy are two other important considerations for a user (Luarn & Lin, 2005; Wang et al., 2003). Wang et al. (2003) further add that security and privacy concerns add to the perceived credibility dimension. In mobile banking context, perceived credibility is defined as "one's judgment on the privacy and security issues of mobile banking" (Ba & Pavlou, 2002, p.244). Perceived credibility relies on information and reputation as defined by others. Luarn & Lin (2005) note the correlation between perceived credibility and the readiness to adopt mobile banking. Fear of lack of security and privacy concerns have been noted in research on banking industry as a stumbling block to the acceptance of mobile banking (Howcroft et al.., 2002; Sathye, 1999).

Self-efficacy can be defined as "the conviction that one can successfully execute a given behavior" (Bandura, 1998, p.25). It is an important construct as it helps in the consideration of an individual's reaction to information technology. In this research the focus is on whether or not the individual is ready to adopt mobile banking. Schwarzer (1992, p.34) defines self-efficacy as "the belief that one can perform a novel or difficult task, or cope with adversity in various domains of human functioning". It can therefore be said that an individual with a "higher level of self-

efficacy will have higher trust perception of the institutional environment" (Luo et al., 2010, p.225).

Perceived risk is viewed as a hesitation regarding the result (whether good or bad) regarding using a product/service. It is defined as "a combination of uncertainty plus seriousness of outcome involved and the expectation of losses associated with purchase and acts as an inhibitor to purchase behaviour" (Bauer, 1960, p.389). A Likert scale is used to "measure an expectancy x value methodology typically multiplying either probability of loss, exposure or danger (uncertainty component) by the cost or importance of that potential loss or exposure (severity component)" (Luo et al.., 2010, p.224).

Perceived financial cost is proven to have an adverse effect on an individual intention to use mobile banking (Luarn & Lin, 2005). It is further found that cost is assessed closely with the benefits obtained by using a service (Crawford, 2002; Luarn & Lin, 2005; Lu et al., 2003). In this research context perceived financial cost is associated with the cost of the handset, cost charged by the network provider for using the Internet on the phone or cost of sending a text message to the financial institute.

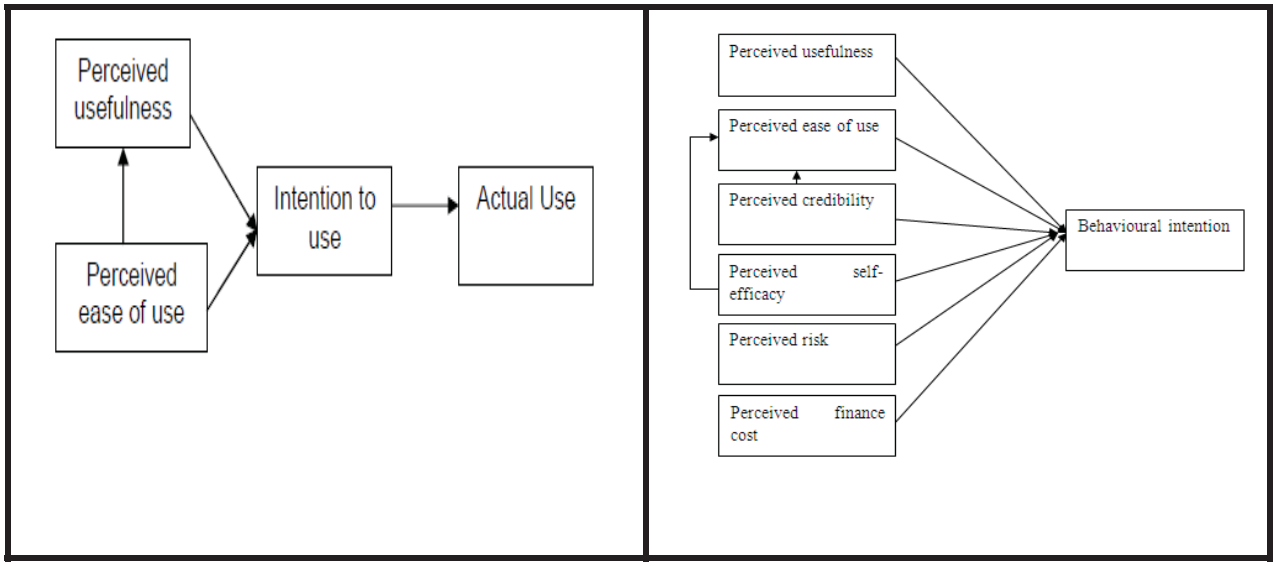

Figure 2.4: Technology acceptance model (on the left) and Extended technology acceptance model (on the right)

Source: Davis, 1989, p.320; Luarn & Lin, 2004, p.41

2.5 Research approach

The basis of this study is to identify the factors affecting the use of mobile banking in New Zealand. In section 2.2.1 literature were reviewed on studies conducted internationally. The premise was to understand if there could be a link that we could determine from the adoption issues arising overseas with New Zealand. Research overseas do ascertain that in countries like Japan and Korea where mobile penetration is high, mobile banking works; however, research in those countries may not entirely hold relevant for New Zealand due to parameters like mobile penetration, usage and user behaviour. The study being conducted for New Zealand is set to answer:

- What are the factors affecting the user adoption of mobile banking?

The next chapter shall outline the quantitative and qualitative research methodology adopted for this study. The use of quantitative method is best suited for this study as by using statistical means we would be able to quantify and provide concrete evidence to analyse the issue. A survey and focus group were used to determine results.

The focus group deliberated on the identified issues based on the key findings from the literature review. The information gathered from the focus group helped frame the survey instrument and research hypotheses. The discussion in the focus groups was guided by the participants' perceptions and personal experiences while using mobile phones to conduct their banking activities (i.e. through SMS and/or using dedicated smartphone apps). Survey questions were mapped to the research hypotheses. The survey responses were further used to ascertain if the identified hypotheses are supported or rejected.

Based on the results as discussed in chapter four and five, recommendations would be provided to highlight relevant behavioural and motivational factors that influence users' adoption of mobile banking.

2.6 Summary

According to the literature reviewed above, themes have been identified for the most important factors affecting the usage of mobile banking. These are: cost, security, quality of service and attitude toward mobile banking. As discussed in section 2.4 this study would use the TAM model to base the research model on. The methodology chapter shall elucidate a few additional constructs.

CHAPTER THREE

METHODOLOGY: RESEARCH MODEL DEVELOPMENT

Chapter Overview

Qualitative followed by a quantitative approach is adopted for this study. This chapter explains data collection techniques used and ethical considerations taken into account

Introduction

The research question that this study is trying to answer is "What factors influence the adoption of mobile banking in New Zealand". In the previous chapter the constructs were identified through the literature namely: information and service quality, confidence in technology, cost, hardware/software issues, security issues, ease of use, financial risk, psychological factor and trust factor. Dependent variables identified through Technology Acceptance Model were perceived trust, perceived risk and perceived usefulness contribute to mobile banking usage. The influence of the identified independent variables on the dependent variables will be analysed using an empirical approach and appropriate statistical models.

To test these constructs mixed methods approach is employed in this research. A focus group (qualitative study) would be conducted first to understand the reasons why people are hesitant in using mobile banking. The reason for employing qualitative study is to understand at a more humane level (Calder, 1977) the fears that users may have in adopting mobile as an option for their banking needs. Secondly, the purpose of using quantitative study is to interpret how people perceive the use of mobile phone for their banking needs. Hence, a survey would be conducted amongst random people who do their day-to-day banking through various banking channels

(e.g. branch, online and mobile). Quantitative study would provide a true and a more or less accurate picture by the use of hypothesis as discussed further. It also provides a platform to test the focus group themes at a statistical level.

Ethical considerations - Approvals from ethical regulators have been obtained for the conduct of the focus group and survey.

3.1 Stage one: deliberations by the focal group

The use of focus group enables researchers to get specific controlled information in a relatively short time which may not be possible with other methods (Gibbs, 1997).

The advantage of focus groups is that they can help optimise the research design before initiating the actual data collection through surveys and interviews (Morgan, 1988; Jarvenpaa & Lang, 2005). Calder (1997) recommends the use of focus groups to provide researchers with efficient tools for explorative studies which do not cost a lot and are fast to perform (Kontio, et al.., 2004). Wilkinson (2004) outlined in his article the success of the focus group is dependent on the "group dynamics and interactions which help researchers dwell on individual's perspectives" (p. 25).

Mobile banking is a nascent application which is potentially attractive to a wide demographic profile (Cyr, Bonanni & Ilsever, 2004). The focus group would facilitate gathering information about user perceptions towards mobile banking. The focus group would be used to validate the preliminary research model designed from the literature review. It will either reinforce the factors identified in the literature review or alternatively provide inputs to modify them suitably. Using this information the research model and the questionnaire for the survey will be defined.

3.1.1 Methodology

For conducting a focus group prior research was conducted as outlined in chapter two. However, there were two steps that were used to conduct this research.

3.1.2 Selecting participants and conducting the focus group

The aim of this research is to understand the factors affecting the adoption of mobile banking in New Zealand. Participants were selected on the basis of their level of usage of technology ranging from intermediate to experts in using mobile phone features. The basic criteria for selection were having a bank account and a mobile phone.

Based on research, it has been observed that the ideal size for conducting a focus group ranges between seven to ten participants (Krueger, 2000). Morgan (1988) however recommends four to twelve participants. Hence, a group of eight were selected. The session for discussion was to run between thirty to forty five minutes. Participants were made aware of the importance of the research and were assured of the confidentiality of the nature of the study. A comfortable environment can serve as a simulation for open and in depth ideas (Stewart & Shamdasani, 1990).

The focus group questionnaire is attached as an appendix (Appendix A). Open ended questions were asked to respondents which they had to answer verbally in their own words (Converse, 1987). Notes were taken during the discussion for analysis purposes. The job of the researcher was to constantly engage the participants to provide their opinion during the course of the discussion. The discussion was semi-structured so as not to be too detailed while remaining close to the topic on mobile banking adoption.

The focus group for this study was composed of 8 members who included 4 students and 4full time professionals. The subject was introduced to the focus group and the aim of the research explained elaborately. Brief ideas about the literature study and technology developments in mobile communications were explained to the participants. The discussions were moderated with useful thoughts and ideas collated to assist in the formulation of the survey questionnaire.

3.1.3 Focus group data analysis

Qualitative methodology was employed at this stage.

3. 1.3.1 Focus group findings and results

The participants were divided into two focus groups of four each. As mentioned all participants either had some knowledge about mobile banking while others did not. There was an even split of four males and four females all of whom belonged to Auckland. The age group ranged between 22 years to 40 years old.

As per the discussion questions asked during the focus group, it was observed that most participants were comfortable using online banking to do their day-to-day transaction activities. The advantage for them were mostly around fee free banking (for four participants), self-service opportunities and having to avoid long queues outside branches. Their responses regarding mobile banking opportunity are summarized below:

i) Mobile banking was highly useful in situations when they required a quick balance update or wanted to top up their mobile phones using the top up facilities. Not to mention the speedy updates received while

comparing to the IVR systems of the bank where a customer has to answer a series of questions before being connected to an operator.

ii) The cost (to send text message) to some was quite reasonable for using the service (max 50c per text). While others had issues trying to retrieve their bank balances at times, two out of three participants found it hard to navigate through the mobile application version of their bank's homepage on their smartphone.

iii) Security is a prime concern amongst many as they fear once their device is lost, someone may steal their bank account details. Also, a growing fear of mobile viruses makes them more vulnerable to phishing attacks.

iv) Young New Zealanders are more tolerant towards the changes in technology and are enthusiastic about trialling these services on an ongoing basis.

v) Mobile advertising is an emerging field and providing banking rebates/offers would motivate and engage more people to use mobile banking.

3.2 Stage two: survey questionnaire

The survey is the first second process for analysing the number of people (from a sample of forty) who use mobile banking for their day to day use. The research model and the conduct of the survey are highlighted in the paragraphs below:

3.2.1 Initial research model and hypothesis

The preliminary research model was modelled in conjunction with TAM (Davis et al.., 1989) and the extended TAM (Luarn & Lin, 2005). Furthermore, the constructs that were identified through the literature (chapter two) have been plotted in a diagram as shown in figure 3.1.

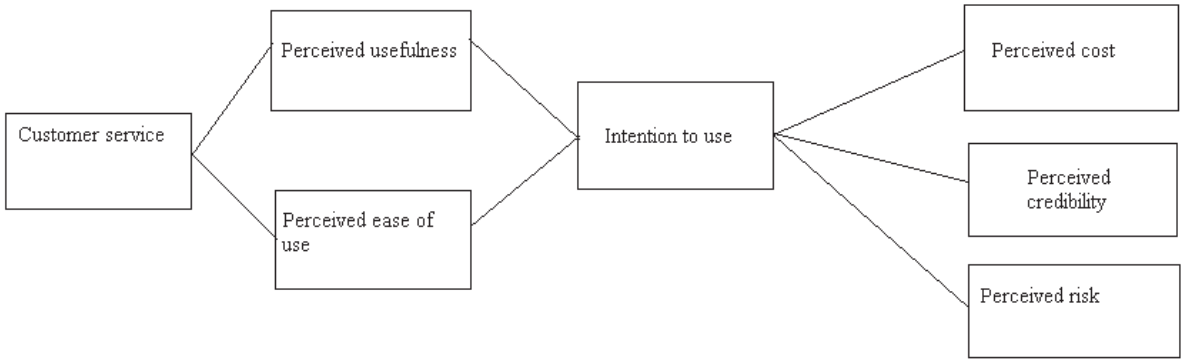

Figure 3.1 Initial research model

The constructs modelled in the initial research model were improved upon after the focus group deliberation. A few hypotheses were thus generated to further test the research question. A hypothesis is a statement that gives an expected relationship between the independent and dependent variables. It sums up the preliminary postulation of what the researcher wants to prove or disprove in the research (Eisenhardt, 1989). The hypothesis would evolve from the final research model. Some suggestions for hypotheses based on the preliminary literature study are postulated below (see figure 3.2). The hypothesis arising from the constructs are explained further.

3.2.1.1 Usage of mobile banking

Usage of mobile banking technology is the final dependent variable which needs to be assessed using this model. Three key principles drive the usage of mobile banking i.e. how useful it is for the common man to use this technology, how much risk is involved in terms of any monetary loss or security concerns etc and given the risk involved can trust still be built upon for people to use mobile banking.

3.2.1.2 Perceived trust

The following hypothesis would be tested:
H12: Perceived trust will improve mobile banking usage

Information and service technology

Laukkanen and Lauronen (2005) talk about the trust factor increasing if there is ready access to information and services. The information and service quality should facilitate the ease of use of service applications. The focus group clearly felt that aspects such as lack of help features, simplicity of application design and hassles such as complicated authentications can have an adverse impact on mobile banking adoption.

The following hypothesis would be tested:
H1: Quality of information and services has a positive impact for mobile banking use

Confidence in technology

"I know the balance alert that I receive through SMS is up-to date" (Participant, two, 2010). *"My bank's has a mobile friendly version by which I can confidently transact online"* (Participant three, 2010). Goldsmith & Bridges (2000) believe that confidence is attained by regular usage of a technology application.

The following hypothesis would be tested:
H2: Confidence in technology used has a positive influence on perceived trust for mobile banking use

Reliability

The following hypothesis would be tested:
H3: Reliability of the mobile technology and networks has a positive impact on mobile banking use

3.2.1.3 Perceived usefulness

The following hypothesis would be tested:
H14: Mobile banking will get a positive impetus if perceived useful

The sub-variants of perceived usefulness are:

Size and design issues

"The screen [of my mobile phone] is so small. I always tend to enter the wrong information" (Participant five, 2010).

The following hypothesis would be tested:
H4: Size and design of mobile devices has a negative impacts perceived usefulness

This was a major concern that emerged from focus group deliberations and literature study. The focus group felt that the limited screen size and inconvenience for inputting data can adversely impact mobile banking usage.

Ease of use

The following hypothesis would be tested:
H5: Perceived usefulness is positively impacted by ease of use.

Speed and efficiency

"Mobile banking is fast and oh so convenient" (Participant 1, 2010). *"Checked my balance in less than a minute if I had to call the bank I'd have to wait for at least 7-8minutes"* (Participant 2, 2010). During the focus group discussions participants mentioned the need for high speed for data transmission as it uplifts the performance and positively impacts adoption of mobile banking. The focus group felt that if mobile communications do not give results speedily, it would serve as a strong deterrent for their use. The participants felt that efficiency of mobile banking systems would involve handling sophisticated applications, thereby adding value to the potential users.

The following hypothesis would be tested:
H6: Speed and efficiency has a positive influences perceived usefulness in mobile banking.

The focus group deliberations highlighted that aspects such as processing power, memory and connections speeds would have an impact on mobile banking applications and their usage.

Usage costs

"Bank fees and network charges not happy about this" (Participant three, 2010).

The following hypothesis would be tested:

H7: High cost of us has a negative impact on the perceived usefulness of mobile banking

3.2.1.4 Perceived risk

Perceived risk is one of the key factors to be taken into consideration while introducing new technology applications as there could be strong inhibitions amongst the consumers. Users would question if it is safe especially when applications involve financial transactions. There could also be privacy concerns in the minds of the consumers when they carry out financial transactions involving larger amounts. Consumers are sensitive to the exposure of confidentiality details during such transactions. The major concern of users is the fear of "not getting what they want" (Cox & Rich, 1964, p.33).

The hypothesis that would be tested is as follows:

H13: Perceived risk will be a barrier to mobile banking usage.

The facets of perceived risk are:

Financial risk

The following hypothesis needs to be tested:

H8: Perceived monetary concerns have a negative influence on the perceived risk for mobile banking use.

The focus group felt that potential misuse or frauds in the system resulting in financial loss to the users will serve as a major deterrent for mobile banking usage.

Security concerns

"A crook can have access to all my bank details if my phone is stolen" (Participant seven, 2010).

The following hypothesis would be tested:
H9: Security concerns adversely influence perceived usefulness of mobile banking

Privacy concerns

The following hypothesis would be tested:
H10: Privacy concerns adversely influence the perceived usefulness of mobile banking

There was a unanimous view that users would fear loss of personal information like bank account details, address and telephone numbers. It was felt that these aspects could potentially endanger perceived usefulness of mobile banking.

Psychological concerns

The focus groups had identified psychological concerns as an important determinant of perceived risk.

The following hypothesis would be tested:
H11: Psychological factors have an influence on the perceived usefulness of mobile banking

This hypothesis emerged after focus group users felt that there was a psychological block to the usage of mobile devices for banking. Their was a feeling that human resistance for adapting to a comparitively new technology could impact mobile banking adoption.

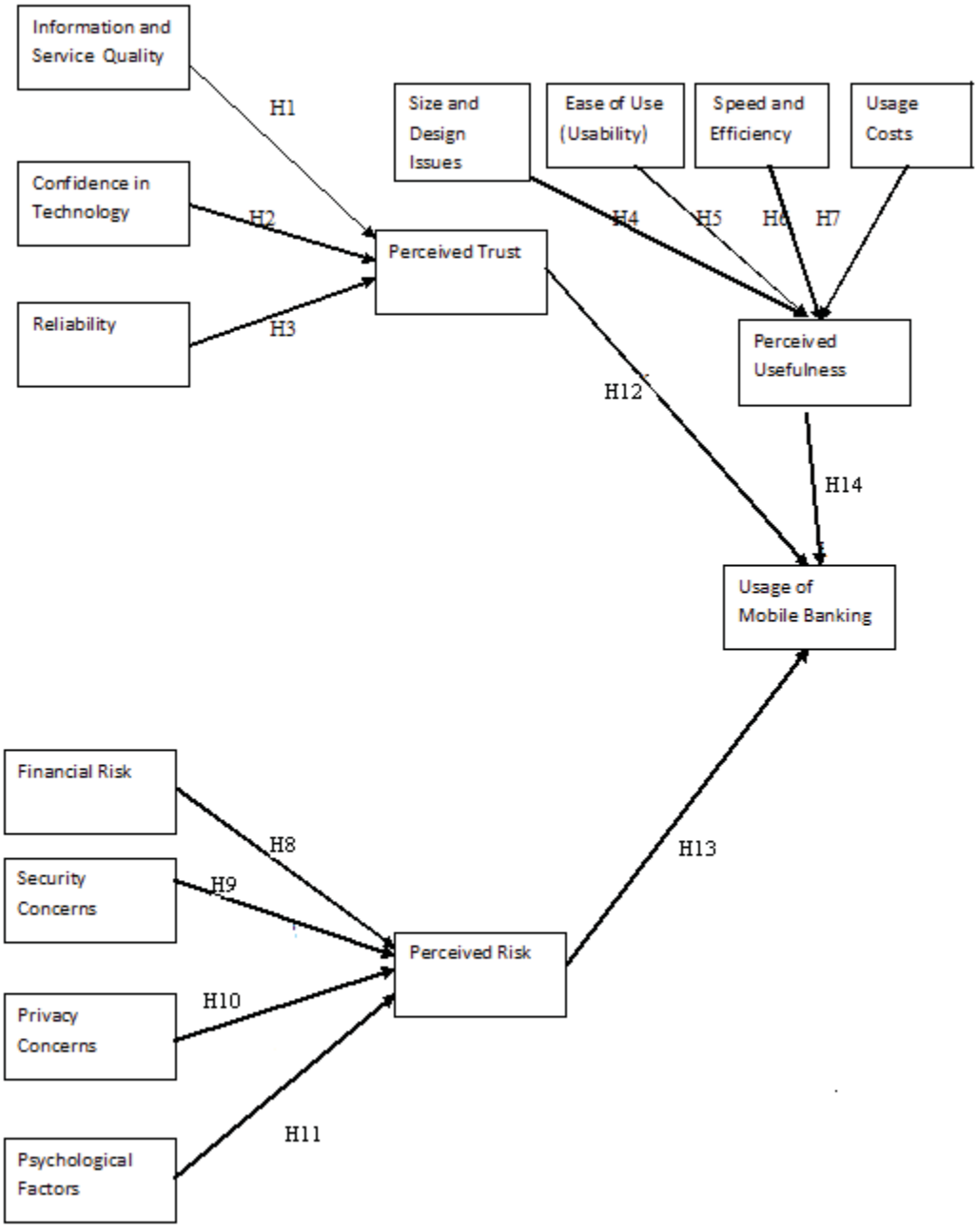

Figure 3.2 Proposed research model

3.2.2 Survey instrument

Surveys are an important research tool to gather people's thoughts and behaviour. The survey questionnaire should be concise and easy to understand to enable the respondents to provide the desired inputs (Fowler, 1995). It is also important for the survey to be designed for capturing the data effectively for the purpose of the research. The survey questions should cover the context for all the research independent and dependent variables adequately. Fowler (1995) suggests simplicity, uniformity and objectivity in the survey questions. A copy of the questionnaire is attached as Appendix A.

For the conduct of this research, participants were provided with a succinct description of the research objective and a summarised description of mobile banking. According to the research it is important to set the context so that participants thoroughly understand the purpose of the research (Sudman & Bradburn, 1982; Babbie, 1990). The questionnaire comprised of close ended questions and participants were asked to choose their best response from the set of options given (Cavana et al., 2001). They were reassured that all their data remains confidential and would be used for the purpose of this research only.

3.2.3 Sample selection

An optimal sample size is important to draw meaningful deductions in a study. A large sample size can become administratively unwieldy to handle while a small one could give inaccurate results. It is therefore vital to select a sample size that determines a statistically significant outcome. It is also important to ensure that the sample selected reflects an unbiased opinion. For this study the constraints of time and cost were important while making a sample selection. A sample of the population was selected at random through personal interaction and online survey

interface to accumulate data to represent the entire population. Previous studies have shown students forming a large population of mobile device consumers (M: Metrics, 2006). An effort was made to include a large number of University students as respondents for this survey. A total of 258 respondents were selected constituted the sample for the research. This sample size was based on the need to have a precision of +7 to -7 precision level where a population base > 100,000 needs at least 204 respondents (Israel, 2009).

3.2.4 Data analysis method

The quantitative data selected from participants was analysed using descriptive statistics. The data was entered in Excel sheets and micros were used to identify the sequence and pattern of the findings. SPSS was used for analysis, discussions and summarising the study findings. To test the hypotheses linear regression was used. Probability sampling method was used to minimise the bias and variations in the given sample. This helped identify and predict the variance for a larger segment. The results could hence be considered more representative of the trend prevalent in the complete population.

3.2.5 Measurements and data collection

Similar studies reveal that survey questionnaire is a good mode to collate data from the target population. Focus group and literature study was used to compile the survey instrument. The questions were framed to facilitate accurate data collection to facilitate the research objective. The questionnaire was simplified for ease of assimilation and prevents ambiguity. The questionnaire was intended to adequately cover all the hypotheses intended to be tested. Online instrument was adequately tested to enable the capture of the relevant data. The interactive sessions were

initiated by briefly introducing the purpose of the survey to the participants. A friendly introduction also enabled motivating the respondents towards a more enthusiastic participation. Majority of the participants were observed to have enjoyed the experience and focussed while providing the responses.

3.2.6 Items and measurement

The questionnaires were tailored to suit the criterion needed for the study. These were selected from the literature studies researched and the outcome of focus group sessions. The technology acceptance model (TAM) was the guiding framework wherein the responses were measured to gauge the perceptions towards adoption and usage of the new technology.

All questions excluding demographics were measured using the Likert five-point scale encompassed within the range of ‘strongly agree’ to ‘strongly disagree’

3.3 Data collection and analysis

Two methods were used for data collection: online participation and face-to-face interaction. For online participation a website was designed with the survey instrument. Detailed instructions were posted to assist the respondents. Efforts were made to invite the participants to contribute to the survey online. Face-to-face interaction involved garnering the respondents and requesting them to fill the survey instrument. The instructions were handed over to the respondents and explained verbally to them. Most individuals approached in this manner willingly participated and seemed enthusiastic to give their responses.

3.4 Secondary data and information

Secondary data and information has been gathered from white paper, article published in trade magazines and newspapers, industry research and any updates via search engines like Google Scholar about latest developments around the world in the mobile banking field.

3.5 Summary

This chapter outlines the mechanism adopted for the quantitative and qualitative method adopted for the research. Literature study and focus group discussions constituted the qualitative approach to derive the research model. Survey instrument was used for the quantitative approach towards data collection. This data was then used to analyse and report the findings.

CHAPTER FOUR

SURVEY FINDINGS AND ANALYSIS

Chapter Overview

This chapter analyses the responses and represents the research findings from the data collected from the survey. The data collected is ordinal and numerical, thus data analysis is based on a quantitative method.

Introduction

This chapter collates the survey data and carries out a research analysis of the findings to test the hypothesis model. The data is organized using a Likert 5 point scale to assess each response of the participants. Quantitative methodology is used to analyse the collated numeric data.

The questions are grouped and mapped to each of the identified hypothesis issue. The average score for each issue has been worked out based on this grouping. Independent regression techniques are then applied for each predictor and response variables. However, since there are many predictor variables to each response variable, the analysis further uses multiple stepwise regressions to establish specific relationships. This analysis gives insight into the independent variables which have a more profound influence on their respective dependent variables.

The analysis is conducted in four stages. The first three stages analyse the dependencies for each of the sub-hypothesis models namely perceived trust,

perceived risk and perceived usefulness. The equations derived from the multiple stepwise regressions are then used to establish the values for each of these three dependent variables. In stage 4, perceived trust, perceived risk and perceived usefulness are the predictor variables to deduce their influence on the usage of mobile banking services.

4.1 Data collection method

The data was collected through a formatted survey using the questionnaire (Appendix A). The questionnaire was collated based on the identified variables and hypothesis model constructed through the literature study. The study covered wide ranging areas of contemporary attitudes towards technology and information systems in general and mobile banking in specific. The questions were framed with the aim of investigating user attitudes towards mobile banking and their perceived inclinations. The questions in the survey instrument were mapped to each of the variables based on the assessed relevance (Appendix B). Inputs obtained from the focus group were utilized appropriately to finalize the questions and their mapping to the identified variables.

The responses were obtained using a diverse selection of respondents. A brief introduction of the research intent was conveyed to the respondents at the beginning of each questionnaire. Care was taken to make the language of the questions simple, unambiguous and close ended to elicit objective responses. The respondents were assured confidentiality and anonymity. The demographics information was placed at the end of the questionnaire.

4.2 Data source and sample selection

Appropriate sample selection is crucial to the success of a positivistic quantitative analysis. The selection should be diverse, unbiased and responsive enough to collate meaningful data. The sample size should also be large enough for drawing meaningful inferences. Interviewing a very large number of bank customers was an option but constraints of time and budget necessitated the selection of 255 respondents through an online and physical survey. This ensured a fairly large and diverse mix of inputs to base the research on. The physical survey was conducted at various locations such as Massey University, bank outlets and public places to draw a wide ranging potential customer mix. Effort was made to provide the survey instrument to stratified groups of potential users based on different age, gender, ethnic and social mix. The ratio of respondents for the physical survey and online survey was 60:40. The response rate was satisfactory and most participants seemed eager to provide the inputs.

4.3 Data analysis

Data analysis is divided in four stages. These have been discussed in the following paragraphs (please refer to Appendices C and D for detailed analysis data):

4.3.1 Stage one

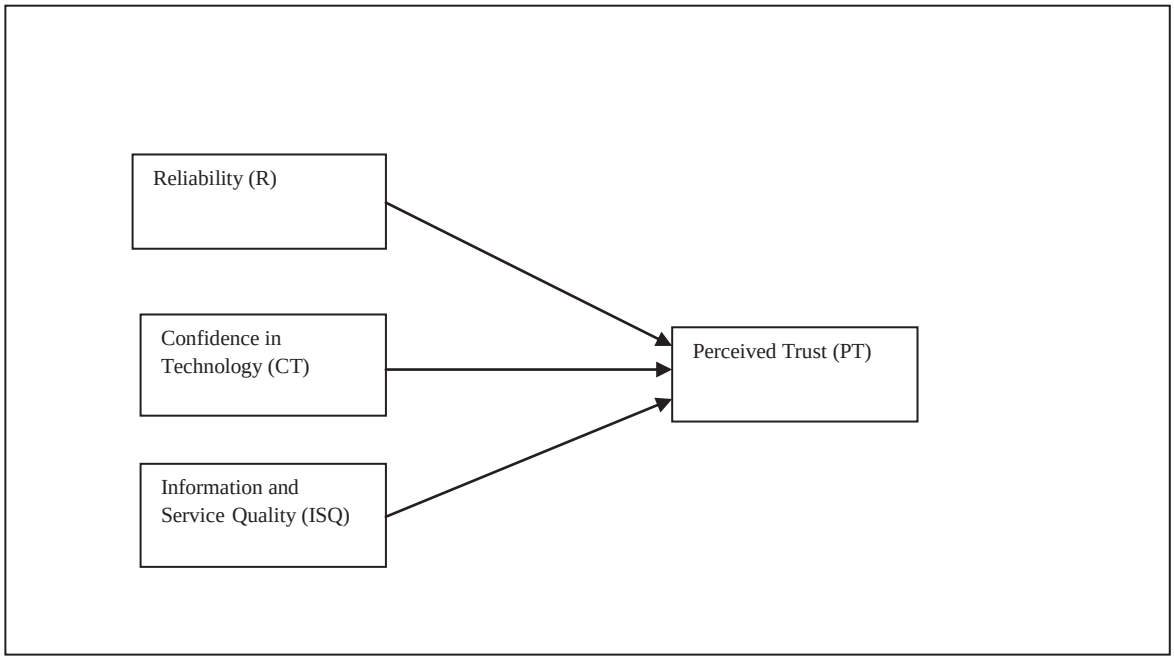

Figure 4.1: Model testing - stage one

In stage one, we examine the impact of three variables reliability, confidence in technology and information and service quality on the response variable perceived trust (figure 4.1). The independent variables were arrived at based on the literature review and focus group discussions.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.375	.229		14.727	.000
	R	.095	.068	.087	1.392	.165

a. Dependent Variable: PT

Table 4.1Simple linear regression reliability with perceived trust

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.163	.295		10.722	.000
	CT	.200	.111	.113	1.801	.043

a. Dependent Variable: PT

Table 4.2 Simple linear regression confidence in technology with perceived trust

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.765	.305		9.056	.000
	ISQ	.261	.085	.190	3.074	.002

a. Dependent Variable: PT

Table 4.3 Simple linear regression information and service quality with perceived trust

After simple linear regression we observe from Tables 4.1 to 4.3 that only Information and service quality (ISQ) and confidence in technology (CT) has a significant influence (significance levels < 0.05) on perceived trust (PT). Reliability does not significantly associate with perceived trust, a possible indicator that users find the current technology reliable enough for mobile banking.

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.765	.305		9.055	.000
	ISQ	.261	.085	.490	3.075	.002

a. Dependent Variable: PT

Table 4.4 Multiple stepwise regression analysis - stage one

In order to test the model capability, stepwise multiple regression has been conducted on the above three dependent variables with the independent variable perceived trust. The results of these multiple regression analysis are depicted in Table 4.4. The coefficient for ISQ is 0.261 and the significance level is 0.002. The other dependent variables CT and R get excluded in the multiple regression. Hence, while ISQ and CT are individually correlated with PT, only ISQ is significantly correlated when combined and applied using stepwise multiple regression. The resulting regression equation derived is depicted as follows:

Estimated Perceived Trust = 2.765 + 0.261 (Information and Service Quality)

$R^2 = 0.036$

Stepwise regression was applied to find the most parsimonious predictors that effectively influence the dependent variable PT. The variables R and CT were excluded in the stepwise regression, leaving ISQ as the only predictor that has a statistically significant impact in improving the value of R square. The B coefficient for the best predictor ISQ is positive with a value of 0.261, which implies its direct relationship with the dependent variable PT. The increase in R square as a result of

including this independent variable was 0.036. The low R square value indicates that only 3.6% variance in PT is explained by ISQ. However, this is statistically significant since the probability of the F statistic ($p<0.001$) was less than the level of significance (0.05). The Multiple R for the relationship between ISQ and PT was 0.490 which can be characterized as low to moderate.

Research models often dwell on how large or small R square values need to be interpreted. It is often incorrect to apply a rule of thumb to these interpretations. R square results differ for a variety of reasons. For example, R square results tend to be high when sampled across time while those observed at a single point in time are often quite low (Jaccard, Wan & Turisi, 1990). Hence, interpretation of low R square values must be contextualized with the relevance and statistical indicators.

4.3.2 Stage two

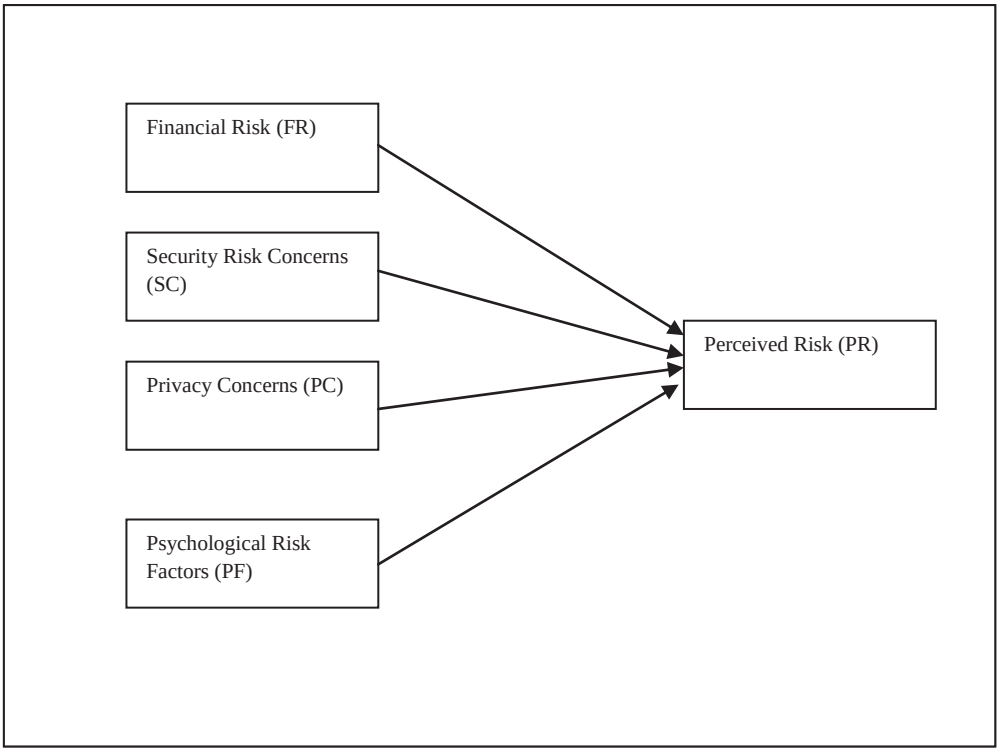

Figure 4.2: Model testing - stage two

In stage 2, the independent variables identified are financial risk (FR), security risk concerns (SC), privacy concerns (PC) and psychological risk factors (PF), while the dependent variable is perceived risk (PR). The hypothesis schematic tested is depicted in Figure 4.2. These variables and their relationship are derived from the literature review and focus group discussions.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.528	.260		13.567	.000
	FR	.008	.074	.007	.110	.043

a. Dependent Variable: PR

Table 4.5 Simple linear regression financial risk with perceived risk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000

a. Dependent Variable: PR

Table 4.6 Simple linear regression security risk concerns with perceived risk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.415	.272		12.541	.000
	PC	.041	.075	.034	.540	.590

a. Dependent Variable: PR

Table 4.7 Simple linear regression privacy concerns with perceived risk

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.576	.312		8.249	.000
	PF	.261	.081	.200	3.244	.001

a. Dependent Variable: PR

Table 4.8 Simple linear regression psychological risk factors with perceived risk

The simple linear regression conducted on each of the four independent variables with the dependent variable is depicted in Tables 4.5 to 4.8. From these results, it can be inferred that financial risk, security risk concerns and psychological risk factors significantly impact perceived risk for mobile banking (significance levels between

0.000 and 0.043). Privacy concerns do not seem to significantly influence perceived risk (significance level 0.590) in the perception of the potential mobile banking users surveyed.

Further, to test the hypothesis, stepwise multiple regression was carried out on the four predictor and one response variable. The results obtained are shown in Table 4.9 below:

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000
2	(Constant)	1.654	.335		4.936	.000
	SC	.384	.067	.343	5.748	.000
	PF	.158	.078	.121	2.021	.044
3	(Constant)	1.865	.349		5.337	.000
	SC	.397	.067	.355	5.945	.000
	PF	.223	.084	.171	2.648	.009
	FR	.150	.075	.127	1.996	.047

a. Dependent Variable: PR

Table 4.9 Multiple stepwise regression analysis – stage two

The above table shows that three variables financial risk (FR), security risk concerns (SC) and psychological risk factors (FR) positively impact (significance levels between 0.000 and 0.047) the dependent variable perceived risk (PR). However, privacy concerns (PC) do not significantly impact perceived risk in the mind of the potential mobile banking users. Since PC has been excluded in the multiple regression analysis, the resultant regression equation is derived as follows:

Estimated Perceived Risk = 1.865 + 0.397 (Security risk Concerns) + 0.223 (Psychological risk factors) + 0.150 (Financial Risk)

$R^2 = 0.165$

From the equation above, it is evident that 16.5% of the variance for perceived risk is explained by the three predictor variables.

4.3.3 Stage three

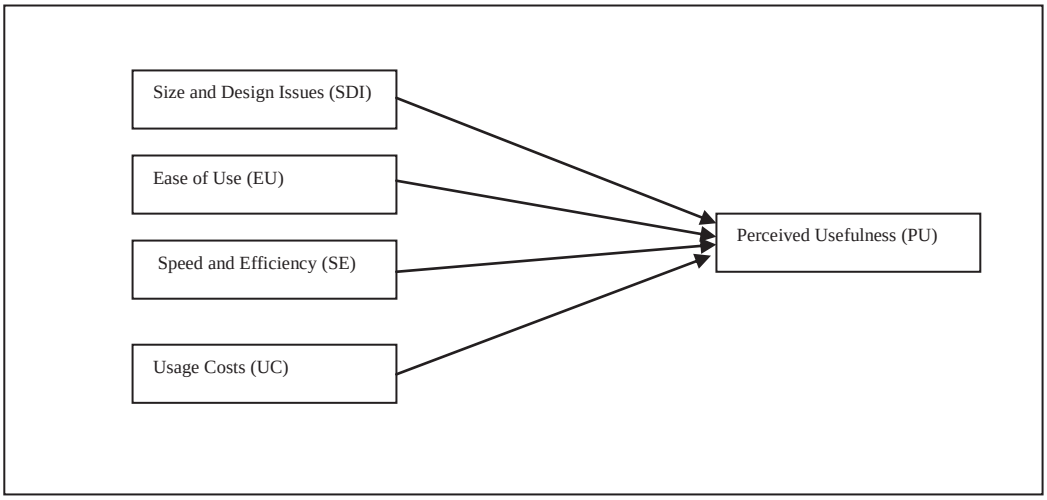

Figure 4.3: Model testing - stage three

In the stage three of the model testing there are four independent variables size and design issues (SDI), ease of use (EU), speed and efficiency (SE) and usage costs (UC). The dependent variable is perceived usefulness (PU). The schematic for the hypothesis testing for stage three is depicted in figure 4.3 above.

After conducting simple linear regression on each of the predictor variable independently with the response variable, it is observed that size and design issues, speed and efficiency and usage costs are correlated with perceived usefulness (refer Tables 4.10, 4.12 and 4.13). The significance level of these three independent variables ranges between 0.022 and 0.048. However, ease of use does not influence mobile banking usage (Table 4.14).

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.142	.146		21.560	.000
	SDI	.008	.037	.014	.226	.022

a. Dependent Variable: PU

Table 4.10 Simple linear regressions – size and design issues (SDI) with perceived usefulness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	3.133	.177		17.694	.000
	EU	.007	.051	.008	.131	.896

a. Dependent Variable: PU

Table 4.11 Simple linear regression – ease of use (usability) with perceived usefulness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.114	.131		23.681	.000
	SE	.001	.043	.002	.028	.048

a. Dependent Variable: PU

Table 4.12 - Simple linear regression – speed and efficiency with perceived usefulness

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.931	.176		16.657	.000
	UC	.059	.056	.066	1.051	.044

a. Dependent Variable: PU

Table 4.13 - Simple linear regression – usage costs with perceived usefulness

To test the model's capability, multiple stepwise regressions were conducted on the variables associated with stage 3. The results obtained are depicted in Table 5.4. Based on these deductions, in sync with independent simple regression results, it is again observed that the predictor variable ease of use is eliminated in the equation derived for calculating the estimated perceived usefulness. The regression coefficients of the associated predictor variables – speed and efficiency, usage costs and size and design issues are 0.142, 0.166 and 0.084 respectively. 16.5% of the variance in the perceived usefulness of mobile banking can therefore be explained by the regression equation derived as below:

Estimated Perceived Usefulness = 1.991 + 0.142 (Speed and Efficiency) + 0.166(Usage Costs) + 0.084 (Size and Design Issues)

$R^2 = 0.165$

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.604	.109		23.914	.000
	SE	.212	.036	.351	5.956	.000
2	(Constant)	2.190	.156		14.071	.000
	SE	.173	.036	.287	4.764	.000
	UC	.173	.047	.219	3.644	.000
3	(Constant)	1.991	.172		11.608	.000
	SE	.142	.038	.235	3.748	.000
	UC	.166	.047	.211	3.533	.000
	SD	.084	.032	.159	2.626	.009

a. Dependent Variable: PU

Table 4.14 Multiple stepwise regression analysis – stage three

4.3.4 Stage four

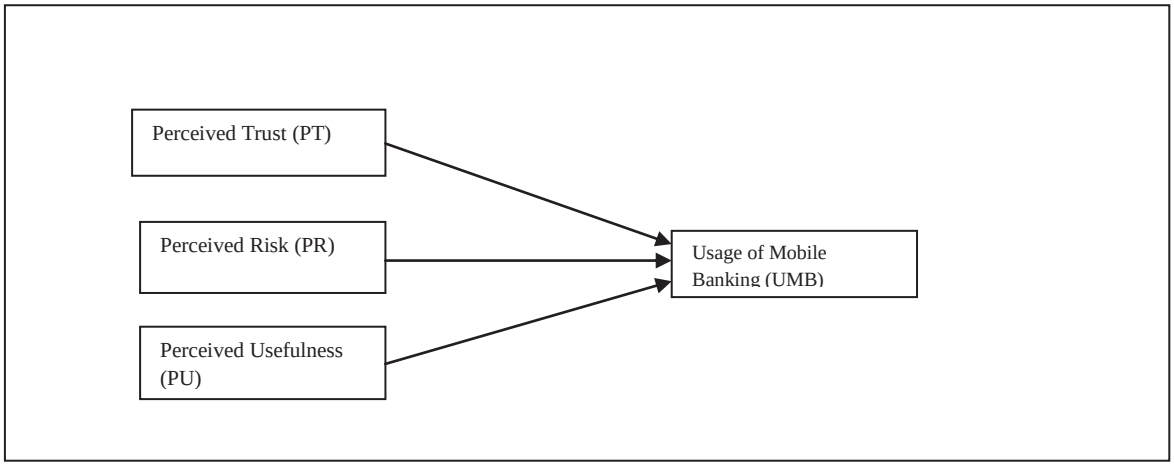

Figure 4.4: Model testing - stage four

Stage four evaluates the potential usage of mobile banking based on the summarized predictor variables perceived trust (PT), perceived risk (PR) and perceived usefulness (PU). These three variables were the response variables in stage one, two and three of the analysis. The model for testing stage four is depicted in figure 4.4 above.

Simple linear regression of the three predictor variables independently with the response variable perceived usefulness is depicted in Tables 4.15, 4.16 and 4.17. Perceived trust (significance level 0.027) and perceived risk (significance level 0.000) are strongly associated with the intention to use mobile baking. However perceived usefulness (significance level 0.631) does not correlate the use of mobile banking.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.967	.244		12.147	.000
	PT	.141	.063	.139	2.223	.027

a. Dependent Variable: UMB

Table 4.15- Simple linear regression – perceived trust with usage of mobile banking services

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.459	.088		5.232	.000
	PR	.851	.023	.918	36.680	.000

a. Dependent Variable: UMB

Table 4.16 - Simple linear regression – perceived risk with usage of mobile banking services

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.642	.337		10.802	.000
	PU	-.051	.106	.030	.481	.631

a. Dependent Variable: UMB

Table 4.17 Simple linear regression – perceived usefulness with usage of mobile banking services

Further, to carry out the hypothesis testing of the stage four model, stepwise multiple regression yields outputs in Table 4.18 below. Two independent variables perceived trust and perceived usefulness are excluded and only perceived risk is strongly associated (significance level 0.000) with the influence on the use mobile banking. 11.2 per cent of the variance for the use of mobile banking is explained by the regression equation obtained. The regression coefficient derived for perceived risk is 0.642 while working out the influence on mobile banking usage as given below:

Influence on mobile banking services usage= 0.563 + 0.642 (perceived risk)

$R^2 = 0.112$

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.563	.524		1.074	.284
	PR	.642	.114	.334	5.630	.000

a. Dependent Variable: UMB

Table 4.18 Multiple stepwise regression analysis – stage four

4.4 Summary of the findings

The findings of simple linear regression of the model are summarized in Table 4.19 below:

Stage	Hypothesis	Response variable	Predictor variable	Derived regression coefficient	Significance level p-value	Association
One	H1	Perceived trust (PT)	Information and service quality (ISQ)	0.190	0.002	Significant
	H2		Confidence in technology (CT)	0.113	0.043	Significant
	H3		Reliability (R)	0.087	0.165	Not Significant
	H8		Financial	0.007	0.043	Significant

			risk (FR)			
Two	H9	Perceived risk (PR)	Security risk concerns (SC)	0.371	0.000	Significant
	H10		Privacy concerns (PC)	0.034	0.590	Not Significant
	H11		Psychological risk factors (PF)	0.200	0.001	Significant
Three	H4	Perceived usefulness (PU)	Size and design issues (SDI)	0.014	0.022	Significant
	H5		Ease of use (EU)	0.008	0.896	Not Significant
	H6		Speed and efficiency (SE)	0.002	0.048	Significant
	H7		Usage costs (UC)	0.066	0.044	Significant
Four	H12	Usage of mobile banking (UMB)	Perceived trust (PT)	0.139	0.027	Significant
	H13		Perceived risk (PR)	0.918	0.000	Significant
	H14		Perceived usefulness (PU)	0.030	0.631	Not Significant

Table 4.19 Summary of results from simple linear regression analysis

Stage	Hypothesis	Response variable	Predictor variable	Unstandardized regression coefficient	Significance level p-value
One	H1	Perceived trust (PT)	Information and service quality (ISQ)	0.261	0.002
Two	H8	Perceived risk (PR)	Financial risk (FR)	0.150	0.043
	H9		Security risk concerns (SC)	0.397	0.000
	H11		Psychological risk factors (PF)	0.223	0.001
Three	H4	Perceived usefulness (PU)	Size and design issues (SDI)	0.084	0.022
	H6		Speed and efficiency (SE)	0.142	0.048
	H7		Usage costs (UC)	0.166	0.044
Four	H13	Usage of mobile banking (UMB)	Perceived risk (PR)	0.642	0.000

Table 4.20 Variables which impact significantly after multiple regression analysis

It can therefore be concluded from table 4.20, the variables that are influencing user behaviour to adopt mobile banking are information and service quality, financial risk, security risk concerns, psychological risk factors, size and design issues, speed and efficiency and usage costs. Users do not consider the other factors confidence in technology, reliability, privacy concerns and ease of use to significantly influence their intention to use mobile banking. The findings also bring out that hypothesis H13 demonstrated perceived risk does play a significant role in the mind of users while adopting mobile banking. On the other hand the results also indicate hypothesis

H12 and H14 are not supported. This would imply that perceived trust and perceived usefulness does not significantly impact the intention to use mobile banking. The outcomes indicate the apprehension in the minds of users and non users about perceived risks while adapting to mobile banking usage.

The implications of this finding on the influence of mobile banking in New Zealand are elaborated as under.

The questions framed for the assessment of perceived risk in the survey instrument are listed below:

Perceived Risk	Financial Risk	FR1 While using mobile banking, I am afraid of financial loss or misuse of my account
	Security Risk Concerns	SC1 I am interested in mobile banking but the concerns of security elude me to check my balances through my mobile phone
	Privacy Concerns	PC1 Do you fear loss or misuse of personal information while using mobile banking
	Psychological Factors	PF1 Usage of mobile banking inherently seems risky to me PF2 I lack confidence and perceive risk in mobile banking since my bank itself does

		not promote it

These questions were scored by the respondents on a Likert scale of 5, where 1 indicates 'strongly disagree' and 5 indicate 'strongly agree':

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

Hence, if the respondents scored a higher value (more towards 5) for these questions, it indicates that they perceive a higher risk to deter mobile banking usage.

The derived regression equation is for 'Influence on mobile banking services usage' is:

Influence on mobile banking services usage= 0.563 + 0.642 PR

Hence, perceived risk (PR) is a predictor that influences mobile banking services usage. If PR goes up then it will have a greater influence (albeit a negative one) on the usage of mobile banking services. This inference is derived from the manner in which the questions are framed in the survey. On the other hand, if the derived regression equation had depicted perceived trust (PT) on the right side of the equation, it would have been construed to have a 'positive' rather than 'negative' influence on mobile banking usage. Thus implying that if PT goes up, the influence

on mobile banking would wean towards more usage. However, in the current study perceived trust has not supported mobile banking usage.

CHAPTER FIVE

DISCUSSION OF FINDINGS, IMPLICATIONS AND SCOPE FOR FUTURE RESEARCH

Chapter Overview

This chapter discusses the findings of the research to understand the consumer behavioural patterns and their implications for mobile banking usage in New Zealand. It identifies the limitations of the research leading to the scope for future work. The conclusions drawn in this context provide pointers towards a more justified decision making towards more usage of this technology in New Zealand's banking landscape.

Introduction

Rapid changes in technology have profoundly impacted human behaviour and activities. The very way we conduct our business and retail transactions has undergone a paradigm shift. Global commerce has placed challenging demands on technology and this has fuelled an expansive mutual growth. Newer innovations with catalytic mobile device usage make mobile banking adoption seem a distinct possibility in the current commercial and business milieu (Mennecke & Strader, 2003). The landscape of wireless communications in New Zealand is improving rapidly with the enhancement of 3G and the forecast for development of 4G services. The high penetration of mobile phones across the strata of society makes it a natural tool for leveraging e-commerce to its next level. Mobile devices combine a ubiquitous access to information and serves as a model for convenient communication and networking (Watson et al., 2002).

There is a rapid growth potential in internet enabled mobile services for consumers. This raises the stakes for banks as they realize a high potential revenue growth opportunity while meeting location independent business banking needs of the customers. This study analyses factors that would influence this potential and underpin its delivery and usage patterns. The research findings focus on areas which influence user behaviour using modelling techniques generating an insight to the factors that could encourage or discourage the adoption of mobile banking in New Zealand. These findings are discussed further to identify the directions of the emerging usage patterns.

5.1 Demographic data analysis

The data was collated through questionnaire circulated to the respondents using a diverse profile of respondents. The background profile of the respondents is summarized in the table below:

Gender	**Numbers**	**Percentage**
Male	119	46.12
Female	134	51.94
Not commented	5	0.02
Age		
Under 25	68	26.35
25-40	76	29.56

40-50	57	22.09
50-65	32	12.4
Above-65	6	0.02
Not commented	19	0.07
Marital status		
Married	62	24.03
Unmarried	77	29.84
Partners	106	41.08
Others	4	0.02
Not commented	9	0.03
Occupation		
Executives	48	18.6
Other workers	64	24.82
Students	74	28.68
Casual workers	21	8.13
Others	33	12.79
Not commented	18	6.97

Table 5.1 Profile of the respondents

The demographic data gives an insight into the trends and socio-economic influences for technology adoption (Morris & Venkatesh, 2000). The analysis of the demographic data in this study cannot be used to derive definitive usage analysis, as all the respondents may not be users of mobile banking. The survey was voluntary and based on an open invitation. Hence, most respondents could be construed as comprising of those who had an interest in mobile banking. To that extent, the findings and discussion of the demographic analysis can be considered as indicative of a possible pattern rather than conclusive inference.

In this study, the gender distribution of the respondents was fairly even with 46.12% male and 51.94% female. The slightly higher percentage may be indicative of the higher interest level among females for mobile banking. This observation differs from a similar study by Sulaiman, Jaafar & Mohezar (2007, p. 161) which had 65.6 per cent males respondents compared to 34.4 per cent females. The majority of the respondents in the current study belong to the '25-40' (29.56%) age group. Two other age groups 'Under 25' (26.35%) and '40-50' (22.09%) were significant contributors in their response. On the other end of the spectrum, the 'above 65' group (0.02%) had a very low representation. The majority (65.11%) of the respondents are either married or in cohabitation. Almost one third of the respondents were unmarried. A predominant number of respondents (72.1%) turned out to be either employed or students.

To summarize, the demographic analysis of the respondents to the survey suggests that a typical New Zealand mobile banking profile is that of a young male or a female who is either a worker or a student. These indications are not surprising as the younger consumer in New Zealand is expected to be tech savvy, eager and innovative, therefore being more likely to adapt to a newer technology driven offering. Moreover, the educated and workers are likely to be the major users due to their needs and a natural leaning towards knowledge based technology applications (Kwon & Chidambaram, 2000). The inherent resistance to the adoption of newer technology by older generations can be mitigated by user friendly features and

applications (Morris & Venkatesh, 2000). In this context, the rapid evolution of the smartphone provides such an impetus. It reduces the limitations of the earlier generation mobile devices and leverages user efficacy. The number of smartphone sold in the United States is forecasted to increase from 42 million in 2010 to 67 million in 2012 (Deloitte, 2010, p. 12). By then, there would be more smartphone than conventional mobile devices in terms of usage (Deloitte, 2010, p. 12). These developments are likely to reduce the impact of demographic barriers towards mobile banking adoption amongst the older age groups and those who are not so tech savvy. These newer mobile devices tend to transcend age, gender and other traditional barriers allowing for more widespread use (Duncan-Howell & Lee, 2007).

5.2 Summary of hypothesis testing and findings

Hypothesis	Independent Variable	Dependent Variable	Research Finding	Remarks
H1	Information and service quality (ISQ)	Perceived trust (PT)	Supports	
H2	Confidence iFn technology (CT)	Perceived trust (PT)	Does not support	Excluded after multiple regression
H3	Reliability (R)	Perceived trust (PT)	Does not support	
H4	Size and design issues (SDI)	Perceived usefulness (PU)	Supports	
H5	Ease of use (EU)	Perceived	Does not	

		usefulness (PU)	support	
H6	Speed and efficiency (SE)	Perceived usefulness (PU)	Supports	
H7	Usage costs (UC)	Perceived usefulness (PU)	Supports	
H8	Financial risk (FR)	Perceived risk (PR)	Supports	
H9	Security concerns (SC)	Perceived risk (PR)	Supports	
H10	Privacy concerns (PC)	Perceived risk (PR)	Does not support	
H11	Psychological factors (PF)	Perceived risk (PR)	Supports	
H12	Perceived trust (PT)	Usage of mobile banking (UMB)	Does not support	
H13	Perceived risk (PR)	Usage of mobile banking (UMB)	Supports	
H14	Perceived usefulness (PU)	Usage of mobile banking	Does not support	

		(UMB)		

Table 5.2 Hypothesis summary and findings

The study identified the variables which support or reject the hypotheses formulated following the focus group discussions. Similar studies and literature review for adoption of mobile banking have been carried out by researchers across the globe. The current study has three distinctive attributes- specific relation to the New Zealand environment, relevance to the contemporary technology and time. The results therefore need to be analysed in this context, whilst relating to findings from previous studies. The findings of this study are analysed further and discussed in detail.

5.3 Discussion of research findings

The study was organized into four parts – literature review, focus group, modelling and survey. The modelling was divided into four stages. Stage one, two and three identified the variables that influence perceived trust (PT), perceived usefulness (PU) and perceived risk (PR) as dependent variables. In stage four, these three are used as the independent variables to predict the influence on the use of mobile banking (UMB) being the dependent variable.

Stage 1 shows only information and service quality (ISQ) supporting perceived trust (PT). Reliability (R) was eliminated after linear regression and confidence in technology (CT) after multiple regressions. These findings are in accordance with the views of the focus group, since they felt reliability and confidence in technology has improved considerably due to the advances in modern wireless communication systems. The study outcome reinforces the predominant view within the focus group that these technological enhancements have significantly reduced barriers in trust for mobile banking adoption. These findings suggest a shift in the level of influence that

these two variables exert in mobile banking adoption. It appears that the contemporary New Zealander no longer visualizes lack of reliability of mobile network systems or lack confidence in mobile technology. Previous literature studies and surveys suggested that technology and reliability of mobile systems did not inspire the same confidence, but rather impeded the usage of mobile banking services. In a study in 2004 in US, reliability and security ranked as the most influential factors that inhibited mobile banking adoption (Akinci et al.., 2004). Lee et al.. (2001) ranked reliability, responsiveness and assurance as the most important facets influencing mobile banking usage in France.

The most significant variable supporting perceived trust is information and services quality. The consumer demands more niche functionalities from mobile banking service providers. There is more consumer interest from the sophistication and quality of information provided by these services. It is pertinent to note that users today are aware of the potential of newer technologies and hence tend to be more demanding with enhanced expectation levels. Advani (2001) suggests that it is not enough for e-service providers to just deliver the same content through a different mode but rather showcase enhanced value-additions to be attractive to consumers. For instance, the majority usage of mobile phones have traditionally been limited to texting due to the high costs of voice calls and internet usage in New Zealand ("Mobile phones use in New Zealand", 2009). SMS has been a major form of mobile banking usage. The rapid advent of application and feature rich smartphone has changed this and caters for many value added services for the users. By Q1 2010, 28% of Vodafone customers in New Zealand access mobile internet out of which 60% are smartphone users while smartphone constitute 13% of all mobile users ("eBook: trends in m-Commerce", 2011, p. 2). Further, smartphones are allowing for the convergence of two hugely popular contemporary technological advancements – Internet and the mobile phone. Internet banking served as a predominant tool for the banking customers with a plethora of platforms, applications and services available. This exclusive domain is being challenged by mobile devices, given the advantage of its location independence and flexibility. Mobile devices may even push to become the primary channel for conduct of customer banking services providing added features to

users that were not hitherto available in previous contemporary technologies (Barnes & Corbitt, 2003).

Utilization of mobile banking by consumers hinge on the availability of credible feature rich services offered on this platform. The demand and supply of this requirement is already being fuelled by the availability of thousands of feature rich portable devices and tablets that are fast replacing their dumb counterparts (Donner et al., 2008). The multi-access solutions (SMS, MMS, WAP, Apps) support the full array of financial services that banking organisations would like to provide to their customers.

Customer value creation derived from the quality of information received is an important determinant towards the adoption of mobile banking services (Laukkanen & Lauronen, 2005). The importance of information services quality and its level of influence in the adoption of mobile banking services would vary in different countries and environments. Cultures assign different values to various products and services from the customer perceptions and expectations (Lee et al.., 2003). Hence, functionalities and information quality that appease users in New Zealand may not necessarily align to those popular in other environments.

In stage 2 of the study size and design issues (SDI), usage costs (UC) and speed and efficiency (SE) support the dependent variable perceived usefulness (PU). Ease of use (EU)) does not support perceived usefulness in the adoption of mobile banking. The focus group discussion had pointed that in the current environment of technological advancement and innovation, users do not get inhibited by limitations of mobile device usage anymore. Mobile devices today are considered easy to use and therefore do not adversely impact the perceived usefulness of mobile banking services.

However, the support of the variable size and design issues (SDI) for perceived usefulness contradicts the results from the focus group discussion. Like confidence in technology, the focus group felt that size and design issues are becoming a lesser barrier to the adoption of mobile banking. The results emphasise that size and design does influence perceived usefulness of mobile banking services. A possible explanation for this result is that since a mobile device has size and design constraints, it would impair the optimal use of mobile banking features. However, the rapid advancement and proliferation of these devices are expected to obliterate the size and design limitations that distinguish them in comparison to computers and laptops. Charlesworth (2009) suggests that the features and capabilities available with conventional computing devices a few years ago would be available with these portable devices. Mobile phones are transitioning from elementary data communications means like SMS messages to extensive web browsing and even streaming audio and video files (Keegan, 2004).

The support of the variable speed and efficiency is reinforced from focus group findings. Speed and efficiency in a way complements the impact of variable size and design limitation in their influence to mobile banking usage. The speed and efficiency issues are restrained mainly by CPU, storage, memory and power constraints. Aware of the potential use of mobile devices, manufactures are rapidly addressing these limitations by innovative means and technological enhancements to pack more processing punch in smaller sized chips. Service providers and manufacturers have realised that users need efficient, easy to use applications to exploit the potential of the mobile devices. Java technology has been in the forefront to improve usability in contemporary mobile devices. It uses robust, secure, open source tools to provide flexibility of running third party applications (Liljander et al., 2007). Some key attributes include flexible GUI, providing a shortcut to frequently used transactions, dynamic downloads and running offline programs. Such initiatives coupled with the ushering of platform independence have pushed efficiency and growth to meet potential user needs. There is a current drive to address the impediments that service providers face such as lack of standardisation of hardware and software platforms, unique features of SIM cards, different communication

networks and protocols. The users are being geared up with aspects such as better efficiencies based on personalised interface, multimedia features, value adds through customisation and innovations for the applications. These are leading to added momentum towards speed, efficiency and efficacy to fuel growth for applications that mobile banking needs to realise its targeted potential.

Frambach and Schillewaert (2002) suggest that usage efficiency plays a compelling role in the success of a technology adoption model. Efficiency through operational simplicity and ease of application use, remain vital for achieving customer confidence. Parasuraman (2000) has identified subjective barriers that form the resistance to the adoption of new technology. Psychological factors such as perceived usefulness by consumers play a major role in the success or failure of a techno innovative initiative (Parasuraman, 2000). Users have got used to features available in internet banking. Service providers would do well to complement these features by the intrinsic value adds of mobile technology to win over potential users. Usability of mobile devices is critically dependent on user attitudes and perceptions about convenience and efficiency. The user needs efficient interfaces and effective applications for the conduct of the banking transactions (Venkatesh, 2000).

This study has highlighted that users feel better size, design, speed and efficiency of mobile devices will assist in their adoption of mobile banking. These aspects do impact the usability of the devices for this application. Therefore, as brought out by the above literature reviews, mobile banking facilitators must ensure that mobile device constraints must not inhibit its usability for the intended functions.

The current trends are supportive of this study's outcomes. For instance, efficiency of use largely entails overcoming size limitation and inherent physical attributes of mobile devices. The latest generation of devices have been able to work around inputting data limitations by the introduction of touch screen technology. Similarly multimedia enhances user friendliness and reduces output constraints of mobile devices (Lee & Benbasat, 2003). Customization based on personal preferences has

been introduced to overcome spatial limitations of mobile devices by displaying information in a discernible form. Tablets are another popular device which enhances ease of use for the end users providing them with the best of world in portability, usability and processing power. The thrust towards smarter and efficient devices augurs well in support of the findings in this study.

Another outcome of the study shows that the variable usage cost supports perceived usefulness in mobile banking adoption. High cost of mobile systems is a strong impediment to the widespread propagation of mobile banking (Luarn & Lin, 2004). The consumer closely associates perceived cost benefits as a motivator for potential adoption of mobile technology for commerce and banking. High costs exert negative influence while low costs can play an accelerator for the adoption (Shankar, O'Driscoll, & Reibstein, 2003). Notwithstanding, mobile usage costs have reasonably declined with technological advancements, larger usage volumes and value added expansion of networks.

Till recent times, high costs had limited the mobile banking services mainly to the use of SMS for alerts. This scenario is expected to undergo rapid changes with the advent of efficient devices and transmission networks aided by the current infrastructure investments and thrust for mobile services propagation (Bughin, Lind, Stenius & Wilshire, 2001). Barnes, Liu & Vidgen (2001) suggests lowering of cost using fibre optic networks and volume induced lower pricing models to generate accelerated usage. They see considerable investment towards speedier, efficient and more cost effective networks which should provide impetus to mobile banking in light of this study outcome.

Stage 3 of the research studied the relevance of the four variables financial risk (FR), security concerns (SC), privacy concerns (PC) and psychological factors (PF) for their influence on the perceived risk (PR). All these independent variables except privacy concerns support the perceived risk for users adopting mobile banking in

New Zealand. Users do not see potential privacy intrusion as a hindrance to mobile banking adoption which was a surprising outcome. It differs from perceptions prevailing in many literature review studies and the views expressed in focus group discussions. Privacy protection and security concerns have been dominant factors in technology adoption models (TAM) for their influence in mobile banking (Lin & Wang, 2005; Chen, 2008). A possible explanation to this finding is that there is an increased awareness amongst the service providers to this perceived risk and have therefore put assuring regulatory safeguards in place. This may not have eliminated user concerns for privacy encroachments but contributed to the reduction of its risk salience. There is an increasing consumer confidence in the regulatory frameworks that safeguard privacy concerns for enabling better m-commerce application usage (Turner & Dasgupta, 2003).

Many previous studies reveal that security and financial risks are significant contributors to perceived risk for mobile banking users. Mobile devices by virtue of their wireless propagation mode are more vulnerable to security infringements compared to wired systems (Bauer et al.., 2005). "Financial transactional risks and the potential of frauds" remained most important inhibitors for mobile commerce adoption (Carlsson, Hyvnen, Repo & Walden, 2005, p. 6). Security perceptions impact behavioural pattern of the users while carrying out financial transactions (Liao & Cheung, 2002). The results from the study highlight that users do not feel secure while using basic mobile banking services. Therefore mobile banking features must be adequately covered by security and authentication procedures to reduce their perceived risk.

Security concern has a significant influence over consumer confidence and reduces user motivation for mobile banking adoption (Wu & Wang, 2005). Service providers recognise this major customer concern and have been building security safeguards for m-commerce applications which include authentications, data encryptions, firewalling and IP profiling. Banking applications are often customised with security hardened propriety software with the application of regular patches to counter

newer threats (Kienzle et al., 2002). Banking processes are also becoming more sophisticated and efficient in an effort to make them security foolproof. For instance, innovatively devised process controls have been introduced to prevent the hacking of bank account details and credit card numbers over the mobile network. Many banks, financial service and m-commerce providers have been reasonably successful to win over their customers with better security offerings (Gafni, Staddon & Yin, 1999). Banks like ASB register client cell phones numbers and send authentication codes on them before completing financial transactions to ensure legitimacy. Tyfone (2011) uses patented digital wallet techniques called the Sidetap microSD solution ensuring sophisticated electronic transaction security to its mobile banking users.

The psychological factors identified by the focus groups contributing to perceived risk are as follows:

Psychological Factors	PF1 Usage of mobile banking inherently seems risky to me PF2 I lack confidence and perceive risk in mobile banking since my bank itself does not promote it

Psychological factors play in the mind of customers and influence their decision in the adoption of mobile banking. User perceptions and their consequent motivation to use technology driven devices are controlled by influences governing attitudes and psychological norms (Tan & Teo, 2000). The research findings reinforce that psychological factors contribute towards perceived risk for users in mobile banking adoption.

Stage 4 studied perceived trust (PT), perceived risk (PR) and perceived usefulness (PU) as independent variables for their influence on the usage of mobile banking (UMB) being the dependent variable. The findings of this study reveal that perceived

trust and perceived usefulness do not influence, whilst perceived risk influences mobile banking usage.

5.4 Limitations of this study

The aim of this study was to look at the reasons that currently impact the growth of mobile banking in New Zealand and identifying the factors that influence its adoption. The structure of this study was to empirically test the multi faceted artefacts identified with perceived risk, trust and usefulness of mobile banking usage for New Zealanders. Any research inevitably has limitations associated with it.

In the current study, the sample used had a skew towards an urbanite, internet savvy customer base. These findings therefore may not be construed representative of the entire population of potential mobile banking users.

The survey was not segmented on a detailed demographic basis. Hence, the study outcomes cannot be analysed on age, gender, qualifications, incomes, computer skills etc. The socio-demographic profiling can be useful in drilling down data and used as a differentiator for the factors influencing mobile banking usage (Verdegem & Verhoest, 2009). Such a detailed analysis can be useful for service providers to target desired groups. They can also exploit situational and functional areas that provide the best benefits towards wider mobile banking usage.

The research does not establish relationships between the independent variables. For instance, both usage costs and information and service quality support mobile banking usage. However, it is possible that users may not mind paying extra costs to

derive high quality content and services. In this context; usage costs would be relegated in importance compared to information and services quality for mobile banking users. Such relationship between independent variables can provide useful insights for mobile banking service providers.

The data for the study was collected using the same modus operandi (survey instrument) and constricted to a limited time frame. Avolio et al. (1991) suggests that there is a potential of variance for the data collected from the same mode and not spatially distributed in time. Perceptions of users are subject to change over time and are dependent on situational paradigms. Investigations spread over time can have a moderating impact on such variances, leading to more reliable data. Future research could adopt multi-modal channels such as field studies, interviews of stakeholders dispersed over different time frames to improve the accuracy and reliability of the collated data. It will also help differentiate behavioural patterns of user groups and their influences based on varying socio-economic and technology exposures.

A detailed study of conventional and electronic banking systems can lead to a better understanding of the future of mobile banking services usage. In this context, it would be pertinent to research aspects and linkages related to branch banking services, traditional payment instruments, Internet banking and mobile banking artefacts. This would lead to a clearer vision on whether mobile banking is to be construed as an extended arm or an independent mode of banking service. Such a research was outside the scope of the current study.

This study focused on assessing user intentions and perceptions rather than their actual behaviour. The results by no means are conclusive towards user attitudes for mobile banking adoption in New Zealand. Research outcomes can be substantiated to a reasonable extent using the casual relationship that exists between intention and behaviour (Taylor & Todd, 1995). However, to draw more precise results, it would be prudent to research further into the actual behaviour of mobile banking users.

5.5 Future research

This study has given an insight into the current thinking of New Zealand users and their attitude towards the adoption of the mobile channel their banking needs. The vast potential of mobile banking has evinced a lot of research interest in this field. There are a plethora of conceptual, design and empirical studies that have been carried out. The rapid change in technology, banking processes, and regulatory frameworks, social and behavioural patterns tend to constantly impact future mobile banking directions (Enoki, 2001).

Perceptional traits vary amongst people from different nationalities and cultures thereby having diverse impacts on their mobile commerce usage. For instance, users preferences differ: such as the prevalence of cash transactions in many Asian countries, account based systems in countries like Sweden, Netherlands and Belgium while cheque transactions are a usual norm in USA and France (Bohle & Krueger, 2001). The diverse social and functional environments influence mobile commerce adaption suiting local business culture, mobility, time and operational efficiency paradigms. This diverse behaviour and socio-cultural environment manifestations form a vast research area. It would need understanding of country or regional environments and their impact on the demand, supply and success of mobile banking.

The economic and infrastructure environment is also likely to play a major role in the growth of electronic commerce (Kleijnen et al., 2004). It would be interesting to research the extent these environmental factors play in the growth of mobile banking services. There could be a linkage between the level of development of the telecommunication infrastructure, related financial services, securities and regulatory frameworks and the related growth of mobile commerce. A comparative study of different national environments and the level of development of mobile banking services in them would highlight their linkages.

The outcomes of this study support some hypotheses while rejecting others. For instance, there was lack of support of confidence in technology, reliability, ease of use and privacy concerns for mobile banking adoption. This however does not necessarily eliminate the role these factors completely in mobile banking. Their influences may be extrinsically linked to variants that did not emerge in the current study. For example, the sample may have predominantly included younger generation who really do not care for these factors. Also, there could be some variables such as perceived satisfaction or perceived enjoyment which may exert some influence in the current era of rapid technological changes. Future research could examine the impact of these additional factors.

Implications of changes in technological architectures continue to be one of the most researched areas for mobile banking adoption (Yang, 2005). This is not surprising as mobile technology changes are still in transition and would continue to profoundly impact mobile banking adoption. Future research is likely to focus on these areas and study their influence on perceived trust, usefulness and risk for mobile banking adoption. For an abject assessment, it may be pertinent to examine the linkage between technological growth and its influence on related user perceptions. For instance, do the current authentication and encryption techniques for mobile platforms enhance consumer confidence or rather construed as a perceived risk. If there is a consumer confidence deficit, how does technological enhancement address or assuage it? Is there a need for greater technological growth consummating user security, trust and risk concerns, given the profound influence these play in mobile banking adoption? What is the contribution of technological advancement towards more reliability, application standardization, and regulatory enforcement? What is the efficiency in the trade-off between security and usability? Future studies could dwell on answering such research questions for a better understanding of facets that influence mobile banking adoption.

For any electronic commerce mode, uniformity of legal and regulatory strictures plays an important role for their universal acceptance. Mobile commerce is global in nature and standardization of regulations across national boundaries is important. While electronic transactions are gaining widespread popularity and usage, lack of standardizations could well be an inhibiting factor. Future research could analyse the lack of uniform international regulations and their impact on mobile banking adoption.

This study underlined perceived risk rather than perceived usefulness or perceived trust as a significant influencing factor in the adoption of mobile banking in New Zealand. This need not necessarily undermine the influence of perceived trust and perceived usefulness on mobile banking usage. For instance, consumers may get more concerned with the outcomes and usefulness, after the risks to usage are mitigated. Therefore, future research may revisit these factors once users risk perception for mobile banking has been reduced.

The current study has used regression modelling to analyse the user inputs. Future research could dwell on more sophisticated statistical tools to improve the precision of the results. The use of structural equation modelling (SEM) has grown steadily and is often described as a second generation technique relegating the long standing ubiquitous traditional techniques such as ANOVA, MANOVA, linear regression etc. to 'first generation' (Roberts, 2006, p. 1).

SEM is a sophisticated tool that estimates coefficients in a set of linear structural equations having a unique ability to not only examine multiple relationships of dependence but also, and at the same time, examine numerous dependent variables (Shook et al., 2004).

Despite its sophistication and its numerous advantages over regression, it is appreciated that (Hult et al., 2006):

- SEM is complex as it is needed to assess all pathways of a relationship simultaneously even though the dependent variable may become the indicator in a subsequent pathway
- Compared to regression and factor analysis, the field of SEM is relatively young. Only 27 studies are published till 2002 in Strategic Management Journal (p. 387).
- Given the relative 'youth' of SEM there are still some 'teething' problems stemming from inexperienced application and interpretation (p. 390).
- For models such as the current one having 10 – 15 indicators, SEM would require about 400 observations. Even when applying the most conservative rule of thumb, multiple regression requires only 100- 150 under the same circumstances (p. 391).

For the current research, the objective of relational analysis was exploratory and scope limited. Hence, regression analysis was considered the most appropriate technique to use. Future research could use SEM for more sophisticated analytics on mobile banking adoption.

5.6 Conclusion

The objective of this study was to design and empirically test the model for mobile banking adoption in New Zealand. The research model was designed through extensive literature study and focus group discussions. The facets influencing mobile banking usage were ascertained by testing the derived hypotheses. The research results found support for trust (one factor), usefulness (two factors) and risk (three factors) as major influencing contributors for mobile banking usage in New Zealand.

Mobile banking is poised for interesting times with the rapid technological strides and the convergence of wireless communications and the Internet. Service providers are expected to take note of the potential customer power and the underpinnings that influence their demand and usage patterns. The removal of the inhibitors and promoting the factors that add most value to the customers will determine the future market structures. User adoption research models lead to vital consumer-centric insights for service providers. To provide impetus to the mobile banking initiative, stakeholders such as retailers, banks and financial institutions would need to collectively drive the differentiators for achieving enhancement of the services. The pertinent aspects for these initiatives would include removal of impediments, migration of traditional banking services, generating value adds through newer service forms geared for exclusivity on the mobile platform.

Banks need to win customer confidence by leveraging value inherently suited to mobile banking services. For instance, applications such as on-the-spot transactions, bill payments, credit card operations, foreign exchange and stock trading seem eminently suited for the mobile platform, where convenience, timeliness, security and reliability are of paramount importance (Zheng & Chen, 2003). In order to achieve operational efficiencies, banks would need to drive the synergy between mobile services providers, merchants, social media outfits, software developers, mobile device manufacturers and other stakeholders. The future potential to have mobile banking solutions integrated seamlessly with the retail networks is realisable (Ngai & Gunasekaran, 2007). The differentiators that values add to the services would need to be research mapped to the efforts that will drive the future of mobile banking services.

In this study, perceived risk is identified as a pre-dominant inhibitor to mobile banking usage in the New Zealand context. Frauds and systemic failures can severely impair user confidence and cripple widespread user acceptance for mobile banking services (Jordan & Silcock, 2005). Customer apprehensions of risk and security are genuine as transmissions pass over multiple network systems owned by various

service providers. Hence, mechanisms to mitigate risk are vital for customer confidence. Further, mobile banking players need a focus on accuracy, confirmation of successful transactions, sophisticated monitoring tools and uninterrupted product support to consumers. They need to break global deadlocks and political barriers to implement well regulated open, efficient and standardised architectures.

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APPENDICES

Appendix A – Survey Questions

The survey instrument used for the study is as shown below.

Note: A scale of 1 to 5 has been provided where 1 indicates 'strongly disagree' and 5 indicate 'strongly agree' in the survey questions below.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree

1. Mobile banking does not annoy me even if I need to remember different passwords or codes

2. My mobile banking provides me help facility which is easy to use/access

3. Mobile banking how-to-use guides are provided by my bank on their website

4. I prefer sending mobile text message to my bank to get my account balance rather than downloading banking applications

5. I want to use mobile banking and trust the current generation mobile services

6. I recommend my family or friends to mobile banking as it is reliable

7. While using mobile banking, I am afraid of financial loss or misuse of my account

8. I am interested in mobile banking but the concerns of security elude me to check my balances through my mobile phone

9. Do you fear loss or misuse of personal information while using mobile banking

10. Usage of mobile banking seems inherently risky to me

11. I lack confidence in mobile banking and perceive risk since my bank never promotes it

12. Mobile banking applications/sending text messages to banks currently restrict my banking options as I would like to do more

13. Mobile banking is easy to use than online banking or visiting a branch or phone banking.

14. I have no problems in accessing my funds through mobile banking and to an extent prefer it over other access options such as online banking, phone banking or visiting a branch.

15. I do not find mobile banking time consuming

16. With mobile banking, I am on-the-go and can transfer funds with the touch of a button

17. I am not reluctant to use mobile banking because my bank charges for it

18. I am not reluctant to use mobile banking because my mobile service provider (Vodafone/Telecom/2 Degrees etc) charges me for using it

19. I trust the use of mobile banking

20. I perceive mobile banking to be risky

21. Mobile banking provides me flexibility than online banking or visiting a branch or phone banking

22. I find mobile banking a convenient option that suits my lifestyle

23. I am willing to change my bank to another bank who provides me mobile banking services

24. I am quite happy with my current setup of my online banking or phone banking or visiting the branch and do not want to use mobile banking

25. I would look into using mobile banking in the near future

Appendix B – Questionnaire items mapping

The survey questions were mapped to the identified variables/sub-variables. The mapping was done as under:

Variable	Sub-Variable	Item
Perceived trust	Information and service quality	ISQ 1- Mobile banking does not annoy me even if I need to remember different passwords or codes ISQ2- My mobile banking provides me help facility which is easy to use/access ISQ3- Mobile banking how-to-use guides are provided by my bank on their website
	Confidence in technology	CT1- I prefer sending mobile text message to my bank to get my account balance rather than downloading banking applications CT2- I want to use mobile banking and trust the current generation mobile services
	Reliability	R1- I recommend my family or friends

		to mobile banking as it is reliable
Perceived risk	Financial risk	FR1- While using mobile banking, I am afraid of financial loss or misuse of my account
	Security risk concerns	SC1- I am interested in mobile banking but the concerns of security elude me to check my balances through my mobile phone
	Privacy concerns	PC1- Do you fear loss or misuse of personal information while using mobile banking
	Psychological risk factors	PF1- Usage of mobile banking seems inherently risky to me PF2- I lack confidence and perceive risk in mobile banking since my bank itself does not promote it since my bank itself does not promote it
Perceived usefulness	Size and design issues	SD1- Mobile banking applications/sending text messages to banks currently restrict my banking options as I would like to do more
	Ease of use (Usability)	EU1- Mobile banking is easy to use than online banking, visiting a branch or phone banking EU2- I have no problems in accessing my funds through mobile banking and

		to an extent prefer it over other access options such as online banking, phone banking or visiting a branch
	Speed and efficiency	SE1- I do not find mobile banking time consuming SE2- With mobile banking, I am on-the-go and can transfer funds with the touch of a button
	Usage costs	UC1- I am not reluctant to use mobile banking because my bank charges for it UC2- I am not reluctant to use mobile banking because my mobile service provider (Vodafone/Telecom etc) charges me for using it
Usage of mobile banking	Perceived trust	PT1- I trust the use of mobile banking
	Perceived risk	PR1- I perceive mobile banking to be risky
	Perceived usefulness	PU1- Mobile banking provides me flexibility than online banking or visiting a branch or phone banking PU2- I find mobile banking a convenient option that suits my lifestyle PU3- I am willing to change my bank to another bank who provides me mobile banking services

		PU4- I am quite happy with my current setup of my online banking or phone banking or visiting the branch and do not want to use mobile banking UMB- I would look into using mobile banking in the near future

Appendix C: Multiple stepwise linear regressions for relationships in stage 1, 2, 3 and 4

The details of multiple linear regressions for the study are elaborated below. These regressions were carried out for the four stages of the study using the statistics software SPSS.

C.1 Regression - stage 1

Multiple regressions in stage 1 show only information and service quality (ISQ) supporting perceived trust (PT). Reliability (R) was eliminated after linear regression and confidence in technology (CT) after multiple regressions. The statistical outputs obtained are as below.

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	2.765	.305		9.055	.000
	ISQ	.261	.085	.190	3.075	.002

a. Dependent Variable: PT

Excluded Variables[b]

Model						Collinearity Statistics
		Beta In	t	Sig.	Partial Correlation	Tolerance
1	CT	.114[a]	1.816	.071	.114	.954
	R	.095[a]	1.533	.127	.096	.999

a. Predictors in the Model: (Constant), ISQ

b. Dependent Variable: PT

Output equation derived is:

Estimated Perceived Trust = 2.765 + 0.261 (Information and Service Quality)

R^2= 0.036

C. 2 Regression –stage two

In stage 2 of the study size and design issues (SDI), usage costs (UC) and speed and efficiency (SE) support the dependent variable perceived usefulness (PU). Ease of use (EU)) was not support perceived usefulness in the adoption of mobile banking. The statistical outputs obtained in stage 2 are given below.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	SC	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	PF	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	FR	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.371[a]	.138	.135	1.20254
2	.390[b]	.152	.145	1.19525
3	.406[c]	.165	.155	1.18821

a. Predictors: (Constant), SC

b. Predictors: (Constant), SC, PF

c. Predictors: (Constant), SC, PF, FR

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.311	1	58.311	40.323	.000[a]
	Residual	364.418	252	1.446		
	Total	422.728	253			
2	Regression	64.143	2	32.071	22.449	.000[b]
	Residual	358.585	251	1.429		
	Total	422.728	253			
3	Regression	69.769	3	23.256	16.472	.000[c]
	Residual	352.959	250	1.412		
	Total	422.728	253			

a. Predictors: (Constant), SC

b. Predictors: (Constant), SC, PF

c. Predictors: (Constant), SC, PF, FR

d. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000
2	(Constant)	1.654	.335		4.936	.000
	SC	.384	.067	.343	5.748	.000
	PF	.158	.078	.121	2.021	.044
3	(Constant)	1.865	.349		5.337	.000
	SC	.397	.067	.355	5.945	.000
	PF	.223	.084	.171	2.648	.009
	FR	.150	.075	.127	1.996	.047

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000
2	(Constant)	1.654	.335		4.936	.000
	SC	.384	.067	.343	5.748	.000
	PF	.158	.078	.121	2.021	.044
3	(Constant)	1.865	.349		5.337	.000
	SC	.397	.067	.355	5.945	.000
	PF	.223	.084	.171	2.648	.009
	FR	.150	.075	.127	1.996	.047

a. Dependent Variable: PR

Excluded Variables[d]

Model						Collinearity Statistics
		Beta In	t	Sig.	Partial Correlation	Tolerance
1	FR	.062[a]	1.038	.300	.065	.968
	PC	-.039[a]	-.655	.513	-.041	.963
	PF	.121[a]	2.021	.044	.127	.946
2	FR	.127[b]	1.996	.047	.125	.822
	PC	-.099[b]	-1.544	.124	-.097	.825
3	PC	.046[c]	.361	.719	.023	.206

a. Predictors in the Model: (Constant), SC

b. Predictors in the Model: (Constant), SC, PF

c. Predictors in the Model: (Constant), SC, PF, FR

d. Dependent Variable: PR

Statistical equation derived is:

Estimated Perceived Risk = 1.865 + 0.397 (Security Concerns) + 0.223 (Psychological factors) + 0.150 (Financial Risk)

$R^2 = 0.165$

C. 3 Regression - stage three

Stage 3 of the research studied the relevance of the four variables financial risk (FR), security concerns (SC), privacy concerns (PC) and psychological factors (PF) for their influence on the perceived risk (PR). All these independent variables except privacy concerns support the perceived risk. The statistical output obtained is as below.

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	SC	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	PF	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	FR	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.371[a]	.138	.135	1.20254
2	.390[b]	.152	.145	1.19525
3	.406[c]	.165	.155	1.18821

a. Predictors: (Constant), SC

b. Predictors: (Constant), SC, PF

c. Predictors: (Constant), SC, PF, FR

ANOVA[d]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	58.311	1	58.311	40.323	.000[a]
	Residual	364.418	252	1.446		
	Total	422.728	253			
2	Regression	64.143	2	32.071	22.449	.000[b]
	Residual	358.585	251	1.429		
	Total	422.728	253			
3	Regression	69.769	3	23.256	16.472	.000[c]
	Residual	352.959	250	1.412		
	Total	422.728	253			

a. Predictors: (Constant), SC

b. Predictors: (Constant), SC, PF

c. Predictors: (Constant), SC, PF, FR

d. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000
2	(Constant)	1.654	.335		4.936	.000
	SC	.384	.067	.343	5.748	.000
	PF	.158	.078	.121	2.021	.044
3	(Constant)	1.865	.349		5.337	.000
	SC	.397	.067	.355	5.945	.000
	PF	.223	.084	.171	2.648	.009
	FR	-.150	.075	-.127	-1.996	.047

a. Dependent Variable: PR

Excluded Variables[d]

Model						Collinearity Statistics
		Beta In	T	Sig.	Partial Correlation	Tolerance
1	FR	-.062[a]	-1.038	.300	-.065	.968
	PC	-.039[a]	-.655	.513	-.041	.963
	PF	.121[a]	2.021	.044	.127	.946
2	FR	-.127[b]	-1.996	.047	-.125	.822
	PC	-.099[b]	-1.544	.124	-.097	.825
3	PC	.046[c]	.361	.719	.023	.206

a. Predictors in the Model: (Constant), SC

b. Predictors in the Model: (Constant), SC, PF

c. Predictors in the Model: (Constant), SC, PF, FR

d. Dependent Variable: PR

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	SE	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	UC	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	SD	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: PU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.351[a]	.123	.120	.59261
2	.409[b]	.167	.161	.57868
3	.436[c]	.190	.180	.57200

a. Predictors: (Constant), SE

b. Predictors: (Constant), SE, UC

c. Predictors: (Constant), SE, UC, SD

ANOVA[d]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	12.456	1	12.456	35.468	.000[a]
	Residual	88.499	252	.351		
	Total	100.954	253			
2	Regression	16.902	2	8.451	25.236	.000[b]
	Residual	84.053	251	.335		
	Total	100.954	253			
3	Regression	19.158	3	6.386	19.518	.000[c]
	Residual	81.796	250	.327		
	Total	100.954	253			

a. Predictors: (Constant), SE

b. Predictors: (Constant), SE, UC

c. Predictors: (Constant), SE, UC, SD

d. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.604	.109		23.914	.000
	SE	.212	.036	.351	5.956	.000
2	(Constant)	2.190	.156		14.071	.000
	SE	.173	.036	.287	4.764	.000
	UC	.173	.047	.219	3.644	.000
3	(Constant)	1.991	.172		11.608	.000
	SE	.142	.038	.235	3.748	.000
	UC	.166	.047	.211	3.533	.000
	SD	.084	.032	.159	2.626	.009

a. Dependent Variable: PU

Excluded Variables[d]

Model						Collinearity Statistics
		Beta In	T	Sig.	Partial Correlation	Tolerance
1	SD	.171[a]	2.766	.006	.172	.883
	EU	-.005[a]	-.084	.933	-.005	.921
	UC	.219[a]	3.644	.000	.224	.914
2	SD	.159[b]	2.626	.009	.164	.881
	EU	-.002[b]	-.038	.969	-.002	.921
3	EU	-.033[c]	-.550	.583	-.035	.887

a. Predictors in the Model: (Constant), SE

b. Predictors in the Model: (Constant), SE, UC

c. Predictors in the Model: (Constant), SE, UC, SD

d. Dependent Variable: PU

Statistical equation derived for stage 3 is:

Estimated Perceived Usefulness = 1.991 + 0.142 (Speed and Efficiency) + 0.166 (Usage Costs) + 0.084 (Size and Design Issues)

R^2= 0.165

C.4 Regression –stage 4

Stage 4 studied perceived trust (PT), perceived risk (PR) and perceived usefulness (PU) as independent variables for their influence on the usage of mobile banking (UMB) being the dependent variable. Based on the regression outputs obtained, perceived trust and perceived usefulness do not influence, whilst perceived risk influences mobile banking usage.

The statistical output obtained is depicted below:

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.334[a]	.112	.108	1.13184

a. Predictors: (Constant), EPR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	40.612	1	40.612	31.702	.000[a]
	Residual	322.825	252	1.281		
	Total	363.437	253			

a. Predictors: (Constant), EPR

b. Dependent Variable: UMB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.563	.524		1.074	.284
	EPR	.642	.114	.334	5.630	.000

a. Dependent Variable: UMB

Excluded Variables[b]

Model						Collinearity Statistics
		Beta In	T	Sig.	Partial Correlation	Tolerance
1	EPT	-.137[a]	-1.921	.056	-.120	.687
	EPU	.065[a]	1.070	.285	.067	.957

a. Predictors in the Model: (Constant), EPR

b. Dependent Variable: UMB

The statistical equation derived for stage 4 is:

Influence on Mobile Banking Services Usage = 0.563 + 0.642 (Estimated Perceived Risk)

$R^2 = 0.112$

Appendix D: Linear regressions for relationship between each independent and dependent variable

The details of simple linear regressions done for each independent and dependent variable using SPSS are shown below.

1. **A – Statistical outputs after carrying out simple linear regression – information and service quality (ISQ) with perceived trust (PT) is given below:**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	ISQ[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PT

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.490[a]	.036	.032	1.16283

a. Predictors: (Constant), ISQ

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.781	1	12.781	9.452	.002[a]
	Residual	340.747	252	1.352		
	Total	353.528	253			

a. Predictors: (Constant), ISQ

b. Dependent Variable: PT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.765	.305		9.056	.000
	ISQ	.261	.085	.190	3.074	.002

a. Dependent Variable: PT

1. **B – Statistical outputs of simple linear regression of confidence in technology (CT) with perceived trust (PT) are given below:-**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	CT[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PT

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.113[a]	.013	.009	1.17688

a. Predictors: (Constant), CT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.493	1	4.493	3.244	.043[a]
	Residual	349.035	252	1.385		
	Total	353.528	253			

a. Predictors: (Constant), CT

b. Dependent Variable: PT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.163	.295		10.722	.000
	CT	.200	.111	.113	1.801	.043

a. Dependent Variable: PT

1. **C - Statistical output of simple linear regression – reliability (R) with perceived trust (PT) is given below:**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	R[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PT

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.087[a]	.008	.004	1.17991

a. Predictors: (Constant), R

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.698	1	2.698	1.938	.165[a]
	Residual	350.829	252	1.392		
	Total	353.528	253			

a. Predictors: (Constant), R

b. Dependent Variable: PT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.375	.229		14.727	.000
	R	.095	.068	.087	1.392	.165

a. Dependent Variable: PT

2. A- Statistical output of simple linear regression – financial risk (FR) with perceived risk (PR) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	FR[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.007[a]	.000	-.004	1.29515

a. Predictors: (Constant), FR

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.020	1	.020	.012	.043[a]
	Residual	422.708	252	1.677		
	Total	422.728	253			

a. Predictors: (Constant), FR

ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	.020	1	.020	.012	.043[a]
	Residual	422.708	252	1.677		
	Total	422.728	253			

a. Predictors: (Constant), FR

b. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.528	.260		13.567	.000
	FR	.008	.074	.007	.110	.043

a. Dependent Variable: PR

2. **B – Statistical output of simple linear regression – security concerns (SC) with perceived risk (PR) is given below:**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	SC[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.371[a]	.138	.135	1.20254

a. Predictors: (Constant), SC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.311	1	58.311	40.323	.000[a]
	Residual	364.418	252	1.446		
	Total	422.728	253			

a. Predictors: (Constant), SC

b. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.138	.236		9.073	.000
	SC	.416	.065	.371	6.350	.000

a. Dependent Variable: PR

2. C - Statistical output of simple linear regression – privacy concerns (PC) with perceived risk (PR) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	PC[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.034[a]	.001	-.003	1.29443

a. Predictors: (Constant), PC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.489	1	.489	.292	.590[a]
	Residual	422.240	252	1.676		
	Total	422.728	253			

a. Predictors: (Constant), PC

b. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.415	.272		12.541	.000
	PC	.041	.075	.034	.540	.590

a. Dependent Variable: PR

2. D – Statistical output of simple linear regression – psychological factors (PF) with perceived risk (PR) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	PF[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PR

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.200[a]	.040	.036	1.26896

a. Predictors: (Constant), PF

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.943	1	16.943	10.522	.001[a]
	Residual	405.785	252	1.610		
	Total	422.728	253			

a. Predictors: (Constant), PF

b. Dependent Variable: PR

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.576	.312		8.249	.000
	PF	.261	.081	.200	3.244	.001

a. Dependent Variable: PR

3. **A - Statistical output of simple linear regression – size and design issues(SD) with perceived usefulness(PU) is given below:**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	SD[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.014[a]	.000	-.004	.71551

a. Predictors: (Constant), SD

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.026	1	.026	.051	.822[a]
	Residual	129.012	252	.512		
	Total	129.038	253			

a. Predictors: (Constant), SD

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.142	.146		21.560	.000
	SD	-.008	.037	-.014	-.226	.822

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.142	.146		21.560	.000
	SD	-.008	.037	-.014	-.226	.822

a. Dependent Variable: PU

3. B - Statistical output of simple linear regression – ease of use (EU) with perceived usefulness (PU) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	EU[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.008[a]	.000	-.004	.71556

a. Predictors: (Constant), EU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.009	1	.009	.017	.896[a]
	Residual	129.030	252	.512		
	Total	129.038	253			

a. Predictors: (Constant), EU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.009	1	.009	.017	.896[a]
	Residual	129.030	252	.512		
	Total	129.038	253			

a. Predictors: (Constant), EU

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.133	.177		17.694	.000
	EU	-.007	.051	-.008	-.131	.896

a. Dependent Variable: PU

3. C - Statistical output of simple linear regression – speed and efficiency (SE) with perceived usefulness (PU) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	SE[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.002[a]	.000	-.004	.71558

a. Predictors: (Constant), SE

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.000	1	.000	.001	.978[a]
	Residual	129.038	252	.512		
	Total	129.038	253			

a. Predictors: (Constant), SE

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.114	.131		23.681	.000
	SE	-.001	.043	-.002	-.028	.978

a. Dependent Variable: PU

3. D - Statistical output of simple linear regression – size usage costs (UC) with perceived usefulness (PU) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	UC[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: PU

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.066[a]	.004	.000	.71402

a. Predictors: (Constant), UC

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.563	1	.563	1.104	.294[a]
	Residual	128.476	252	.510		
	Total	129.038	253			

a. Predictors: (Constant), UC

b. Dependent Variable: PU

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.931	.176		16.657	.000
	UC	.059	.056	.066	1.051	.294

a. Dependent Variable: PU

4. **A - Statistical output of simple linear regression – perceived trust (PT) with usage of mobile banking services (UMB) is given below:**

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	PT[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: UMB

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.139[a]	.019	.015	1.18932

a. Predictors: (Constant), PT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.989	1	6.989	4.941	.027[a]
	Residual	356.448	252	1.414		
	Total	363.437	253			

a. Predictors: (Constant), PT

b. Dependent Variable: UMB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	2.967	.244		12.147	.000
	PT	.141	.063	.139	2.223	.027

a. Dependent Variable: UMB

4. B - Statistical output of simple linear regression – perceived risk (PR) with usage of mobile banking services (UMB) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	PR[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: UMB

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.918[a]	.842	.842	.47698

a. Predictors: (Constant), PR

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	306.104	1	306.104	1345.440	.000[a]
	Residual	57.333	252	.228		
	Total	363.437	253			

a. Predictors: (Constant), PR

b. Dependent Variable: UMB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.459	.088		5.232	.000
	PR	.851	.023	.918	36.680	.000

a. Dependent Variable: UMB

4. C - Statistical output of simple linear regression – perceived usefulness (PU) with usage of mobile banking services (UMB) is given below:

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	PU[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: UMB

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.030[a]	.001	-.003	1.20037

a. Predictors: (Constant), PU

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.333	1	.333	.231	.631[a]
	Residual	363.104	252	1.441		
	Total	363.437	253			

a. Predictors: (Constant), PU

b. Dependent Variable: UMB

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	3.642	.337		10.802	.000
	PU	-.051	.106	-.030	-.481	.631

a. Dependent Variable: UMB