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Mari Suoranta

ADOPTION OF MOBILE BANKING IN FINLAND

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UNIVERSITY OF JYVÄSKYLÄ

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ABSTRACT

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Banking is an area in which technology has had a fundamental impact on the everyday lives of consumers. This article-based dissertation examines an innovation in the financial services industry, namely mobile banking services. It seeks to determine and explain the factors affecting the adoption of mobile banking services, thus the perspective taken by the dissertation is one that focuses on consumer behaviour patterns. In order to arrive at a theoretical model, it draws on traditional theories of innovation diffusion and adoption, and also on the literature relating to electronic banking and technology-based services. The model was tested with an empirical study. This aimed at conceptualising various factors and modelling the relationships between variables in the mobile banking adoption framework. Methodologically, the dissertation takes a descriptive approach to the phenomenon under study. The data in the empirical study were collected by means of a questionnaire mailed to banking customers (1253 responses received). The results indicated that certain attributes of mobile banking innovation drive usage or explain consumer behaviour, in particular relative advantage, compatibility, communication and trialability. By contrast, the investigation of complexity and risk of using mobile banking yielded no support as being barriers to adoption. The technology perceptions and certain demographical variables of the customers have a significant impact on the adoption behaviour. It is possible to arrive at a profile of a typical mobile banking user. Contrary to the assumptions of adoption theory, Internet banking does not emerge as a related service product. Overall, the dissertation goes some way beyond merely modelling consumer behaviour in the mobile banking context or questioning some aspects of adoption theory; it also presents insights that could be useful to banking practitioners.

Keywords: mobile banking, innovation diffusion, adoption, electronic banking, financial services, Rogers' model

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"Jokainen uloskäynti on sisäänkäynti jonnekin"
Tom Stoppard

Jyväskylä, December 2003

Mari Suoranta

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RESEARCH ARTICLES

I INTRODUCTION

The banking environment is constantly changing.
The financial services industry is in transition.
Technology is profoundly changing the nature of financial services.

Statements such as these occur both in the academic literature of banking and in trade literature within the banking. Technology and change became a mantra of the 1990s – and one which was by no means unjustified. It is evident that the financial services industry has been undergoing a profound transformation. Rapid changes in the banking environment, increased competition by new players from the non-banking sector, product innovations, globalisation and technological advancement – all these have led to a market situation in which the battle for customers is intense. As a consequence, banks have started to offer services through various delivery channels. In the name of increased customer satisfaction and efficiency, they have developed innovative service products and offered a wider range of services. The delivery of multi-channel services forms a part of these efforts. One step in achieving the goal of the banks is the provision of banking services through electronic delivery channels. Among the newest services to be offered is a wireless delivery channel, with banking services being available via mobile phones or Personal Digital Assistants (PDAs). Clearly, mobile banking services form an important innovation in the banking sector, and it is mobile banking as a phenomenon which is under investigation in the present research. This introductory chapter aims at familiarising the reader with the overall nature of the research phenomenon, presenting the basic concepts, and the way in which they are to be understood and defined for the purposes of this dissertation.

1.1 Motivation

The emergence of new forms of technology has created highly competitive market conditions, and these have had a critical impact upon consumer behaviour. Not surprisingly, this competition puts a premium on innovation and precision in delivering services. These two constructs have become the basis for the new competencies required by banks. In other words, innovation and service delivery, and more importantly, managing the opportunities offered by current technological advancement, can be seen as critical factors for success at the present time.

Technological innovation is a complex notion for various reasons, one of these being the generic breadth of the concept itself. In fact, many kinds of technology and definitions of technology are applicable to the concept. Betz (1998, 9) defines technology as "*the knowledge of the manipulation of nature for human purposes*". Carlell (2002) cites in her thesis Joerges' (1988, 221) definition of technology: technology is said to refer to "*artificial things, and more particularly modern machines: artificial things that require engineering knowledge for their design and production, and perform a large amount of operations by themselves*". Both definitions refer to *knowledge,* thus harking back to the etymological root of the word. The Creek word "technos" means the process of doing something and "ology" a systematic understanding of something (Betz 1998). Technology acts as a mediating device for bringing life into realisation, for bringing the world to us. In present-day society technology also focuses on a different kind of mediation, since it is supposed to ease people's efforts and to speed them up (Carlell 2002). Innovation, for its part, can be defined following Rogers (1995, 11) as "*an idea, practice, or object that is perceived as new by an individual*". Here the research interest is on consumer behaviour, with the emphasis being placed on the perceived newness of the idea and rather than on its objective newness; furthermore the unit of adoption is taken to be the individual, rather than, for example, an organisation.

New technologies create new markets and opportunities for the banking sector, and thus managing and satisfying the customers in this new banking environment has become a key issue for the players in the industry (Jayawardhena and Foley 2000). Opposing possibilities exist: of exploiting advanced technologies successfully, or by contrast, investing in an unsatisfactory technology and drowning in a technological chasm. The question is how to select and exploit new forms of technology in the right way and at the right time so that the banks can compete successfully: developing new processes without having their returns threatened as a result of wasteful expenditure. Bank managers must be increasingly aware of the opportunities that come with technological change. In order to rise to these challenges, service providers are finding it ever more vital to improve their understanding of consumer behaviour patterns in banking, and consumers' adoption of new banking technology.

Mattila and Pento (2002) present their own view of the problem of combining marketing knowledge with technological development, regarding it as the "black hole" of the marketing-technology interface (see Figure 1). The upper part of the figure indicates marketing knowledge (information on customer's needs, the employment of different marketing tools, choices on distribution channels) and the lower part the technical approach, i.e. one that has regard to available technologies and their feasibility. The point is that though both customer-specific and market information are essential for determining market needs and profit opportunities, in most cases they seem to vanish as if into a black hole, somewhere between the marketing and the technical approaches. Given this situation, such information asymmetries may result in very low adoption rates of new financial products. Until recent years, mobile application innovations such as Wireless Application Protocol services followed a technology-driven model of design. Failures in the introduction of these new services have taught valuable lessons, not least to providers of financial services. In order to succeed, innovations need to be market-driven and customer-centric.

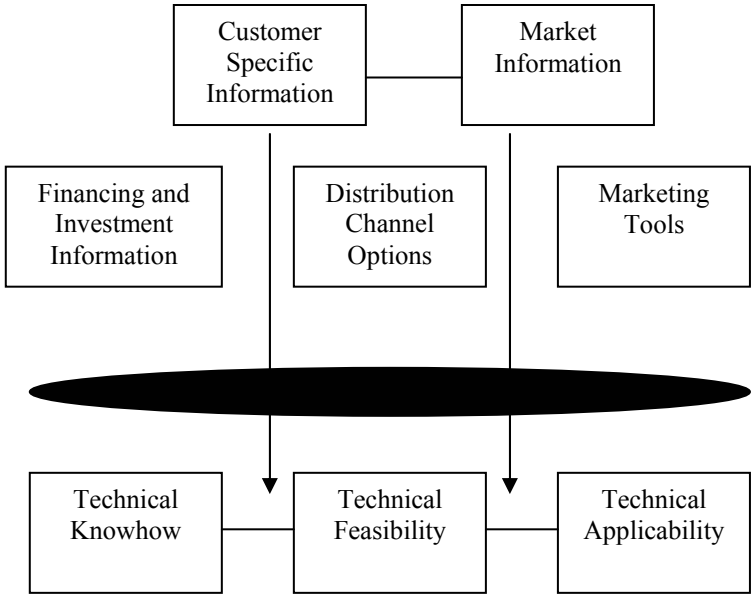


FIGURE 1 The "black hole" of the marketing-technology interface (Mattila and Pento 2002)

The use of technology in banking activities is by no means something totally new; Vesala (2000) distinguishes in his thesis the effects of two types of technological development. The *internal* wave of technological development in banking began as far back as the 1960s and 1970s. This involved the development of an information technology which substituted computers for paper-based and labour -intensive methods of accounting; the areas it affected included customer deposits, withdrawals and other transactions, and many internal operations. This resulted in significant increases in efficiency and productivity, and lowered banks' costs. However, more recent developments in

information technology have provided the opportunity for customers to access banking services without direct face-to-face contact with bank personnel. This *external* wave of technological development has intensified in recent years and will further reduce financial institutions' costs.

At the present time, we are witnessing a revolution in one particular technological development, namely wireless technology. Mobile communication is an emerging information technology that makes "anytime-to-anyplace" communication possible. In order to exploit these opportunities, companies in various industries have rapidly begun to integrate mobile communication technologies into their business models, and the financial services sector is no exception (Yen and Chou 2000). Mobile technologies for communications, for accessing the Internet and for mobile commerce transactions are being adopted extremely rapidly; indeed, over the few last years mobile devices have become the consumer product that has been most quickly adopted to date (Dholakia et al. 2003). Siau and Shen (2003) have set out the features of mobile services that can be seen as key drivers as well: mobility, reachability, localisation and personalisation. The essence of the popularity of the services involves the capability of reaching consumers, and of being able to deliver the right information to the right place at the right time – features which are in fact fundamental to marketing in general.

In the financial services industry, the major changes brought about by developments in information technology involve particularly the link between consumers and firms, and the generation of new service products (Devlin and Wright 1995). Undoubtedly, there has been a reshaping of the behavioural patterns that exist between consumers and their financial institutions. Today, customers can easily access and obtain information on different suppliers of banking services and hence make comparisons, and one might expect customer loyalty to diminish as a consequence. Yet although consumer empowerment is discernible at a general level, it is debatable to what extent the shift is truly evident in banking because of the nature of financial services. One is led to consider whether reluctance to change banks is based on strong feelings of loyalty, or merely to high costs deriving from the need to compare various service offerings (often of considerable complexity), to change bank cards and electronic banking key codes, and so on (Harrison 2002). However, consumers are all the time becoming more technologically aware, and their distrust of technological innovation may be lessening. All in all, one can say that the infusion of new technologies into the services sector is ubiquitous, and that it will continue to increase (Bitner et al. 2000).

1.2 Electronic banking

The drivers for the take-up of information and communication technologies in the financial services industry cover a wide spectrum. The basic trends affecting the financial market are globalisation, deregulation, liberalisation, mergers and acquisitions, competition, technology and new demographic trends (Vesala 2000; Koch and MacDonald 2000). Nowadays, technology runs through every part of the banking business. And why not? This is precisely what one would expect: the banking industry has provided fertile ground for the application of technological innovation due to the fact that banking activities are easily digitised and automated (Bradley and Stewart 2002; Daniel 1997). Of course, one of the key drivers of this phenomenon was the radically reduced cost of conducting transactions electronically (Minakakis and Rao 1999). Most of the players in the financial services industry have recognised the fact that electronic banking is an area of major importance, and various versions of online banking are offered by all the major banks. In American markets since the early 1990s in addition to the spectacular growth of Internet, the strong bull market has aided the growth of electronic banking. Traditional players in the industry have been forced to rethink their business models and uncover true measures of value they provide to customers (Rao 1999). This is the case throughout developed markets, but also increasingly in emerging markets (Karjaluoto et al. 2002; Datta et al. 2001).

Electronic banking can be defined in various ways. In this dissertation as using the term electronic banking it is referred to a definition, which explains it as the provision of information and services by a bank to its customers via electronic wired or wireless channels, for example Internet, telephone, mobile phone or interactive television (Daniel 1999). In other words, electronic banking is a high-order construct consisting of several delivery platforms of which mobile devices are an example; thus mobile banking as a construct is a subset of electronic banking. In this dissertation, mobile banking is taken to involve the use of a traditional banking service via a mobile device (e.g. account balance inquiry), but not, for example the use of mobile devices for instant payment of vending machine items. It is obvious that electronic banking cannot be detached from the context of Internet, which has had and will continue have to a significant impact on the diffusion of electronic banking. It is interesting to note that on a global level the first Internet-based banking service system was in fact launched in Finland; this was in 1996 (Karjaluoto et al. 2002), around the time when the use of the Internet was just starting to become widespread within the country.

Clearly, there is growth potential in electronic banking, as its overall growth is likely to follow the curves of personal computer and Internet usage. Similarly, the ongoing expansion of delivery channels should enhance future market growth. According to Deutsche Bank Research (2001) the share of on-line banking could rise from 8.5 percent to 50 percent in developed countries. In

the Nordic countries electronic banking could even reach nearly 80 percent by year 2005, while UK and US penetration would approach 50 percent. In emerging markets the share could rise from 1 percent to 10 percent. Figure 2 outlines electronic banking customer uptake estimates for Europe, US, South Korea and Japan in the years 2001-2004.

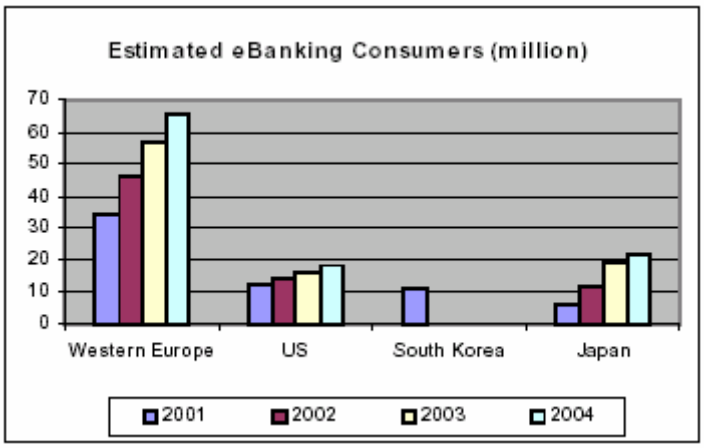


FIGURE 2 Electronic banking customer uptake (Centeno 2003) (Western Europe: Benelux, France, Germany, Italy, Nordics, Spain, Switzerland, UK)

Bissola (2003) has outlined the projected evolution of online banking activities, as shown in Figure 3. Various categories of financial products and services are distinguished. The difference between these categories is not only the level of interaction and personalisation allowed by the technologies, but also the value perceived by customers. Bissola (2003) believes that the European market has reached the end of the second step and that the first attempts at an evolution towards the personalisation of services have already been made. In Finland this evolution has gone beyond that in Europe; thus the banks in Finland already offer services that can be categorised as belonging to step three in the framework

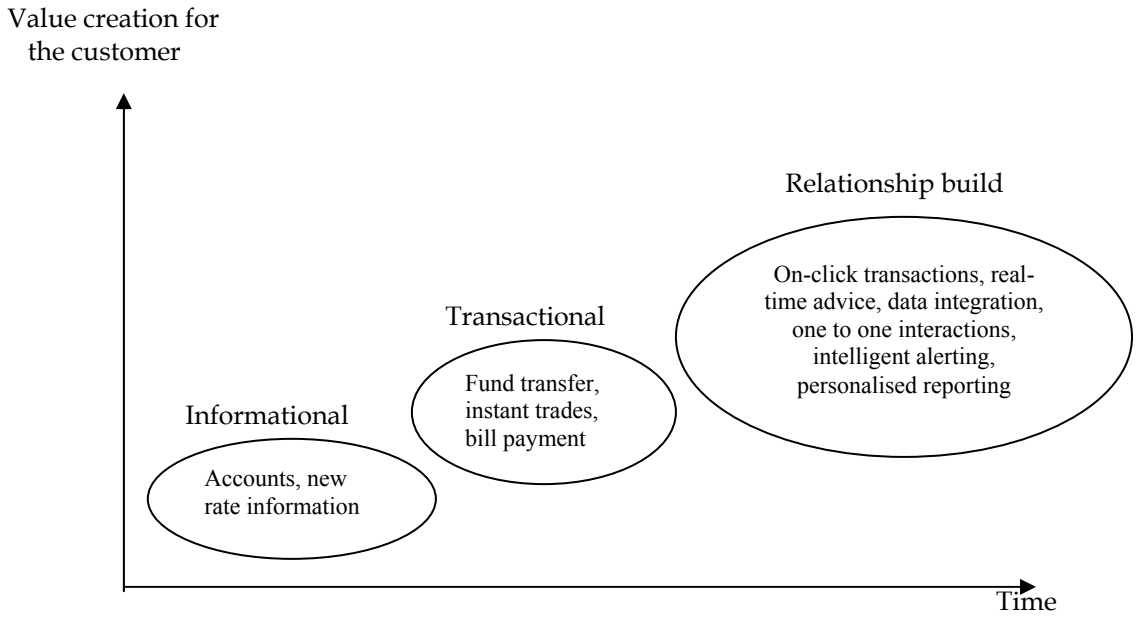


FIGURE 3 Evolution of online banking activities (adapted from Bissola 2003)

1.2.1 Mobile banking

In addition to offering branch-based services via new delivery channels, technology allows banks to offer new value-added services which are only available in an electronic environment, such as personalised financial information menus, Short Messaging Services alerts, real-time brokerage. The existing and envisaged changes in the technologies of service delivery have the potential to affect the full range of retail services (Vesala 2000). Recent innovations in telecommunications have opened up an additional channel for electronic banking. The market potential exists for mobile banking which would enable customers to bank virtually anywhere, and at any time. Wireless devices may outpace personal computers in market penetration, and many are sophisticated enough to serve as access points to the Internet and to private networks. They may even function as handheld PCs in their own right (Kiesnoski 2000). According to Barnes and Corbitt (2003) new mobile data services (such as mobile banking) can be understood as a convergence of Internet and mobile phone technologies, which both on their own have already profoundly affected consumer behaviour in the last decade. Using a variety of platforms, services are being created to enable mobile devices to perform many activities which earlier have been available only as Internet services.

The uptake of mobile banking will probably be further encouraged by the improvements in mobile service and application space anticipated with the arrival of 2.5G and 3G networks. Those improvements include the ability of mobile devices to provide location-specific information and new means of personalisation, together with enhanced availability and immediacy of service. It is this immediacy that is likely to contribute most to the predicted shift from wired Internet connections to wireless mobile services in banking (Wah 1999). Immediacy of information access will be enhanced by always-on functionality;

this will support the provision of the time-critical information needed to conduct high value transactions, including participation in mobile auctions and the execution of mobile stock-trading deals. It has been argued that these types of value-added mobile services are bound to take their place among the most interesting revenue-generating services, simply because of the economic value attached to them (Durlacher Report 2001).

In Finland, payments and account management transactions have been available as an SMS service via mobile GSM phones for more than a decade (since 1992, to be precise); television-based banking has been available since 1998, and banking via mobile internet WAP since 1999 (Mattila and Pento 2002). Furthermore, mobile phone penetration amounted to 94 percent in 2002. On these grounds, the diffusion of mobile banking in Finland would seem to have a bright future. Already at the time of writing, the technology of mobile banking enables services such as checking account balances and transactions, the transfer of funds, bill payments, share dealing and the obtaining of share quotations, portfolio management, and the purchase of insurance.

1.2.2 The Finnish mobile banking environment

Finland is often considered to have been one of the pioneers in mobile communication and in conducting mobile business; it is a country of early technological adoption, known for its strong mobile phone industry and the development of that industry. According to Peltonen and Dholakia (2002), the roots for this development actually date back to 19th century; this was when the first telecom networks were built in the country, an undertaking initiated by the Russian Czar and by the Finnish autonomous government of the time. Finland's telecom industry, led by the national monopoly company Telecom Finland (which initially operated as a division of the Finnish national Post Office, changed its name to Sonera in 1997, and is now merged with Sweden's Telia) gradually developed one of the most sophisticated networks in Western Europe, a sophistication which increased further along with the processes of liberalisation and digitalisation

The structures of Finnish society – including its information infrastructure – have over the years developed in ways which are favourable to the adoption of technology-based products and services. Finland has a history of building an information infrastructure in order to connect its geographically dispersed population. Additional factors include a well-educated workforce, an effective policy environment and a sophisticated use of information and communication technologies (Ratnathicam 2002). The fact that Finns have information networks as a part of their everyday lives has lowered the threshold for using electronic services; for example, at the end of 2002, more than 73 percent of individuals had access to an Internet connection (Finnish Bankers Association 2003). The banks have made over 2.8 million agreements on electronic banking with their customers (see Figure 4). 67 percent of invoices were paid via information networks in 2002, while only some five percent of payments were made in branch offices (see Figure 5). The rapidity of the change in this area is striking;

at the beginning of the 1990s almost 20 percent of payments were still being carried out in branch offices (Böhle et al. 2000; Finnish Bankers' Association 2003).

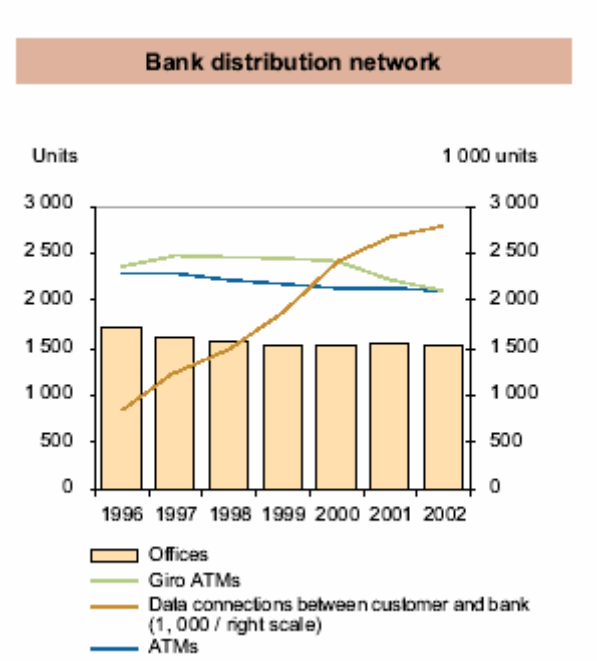


FIGURE 4 Bank distribution network in Finland (Finnish Bankers' Association 2003)

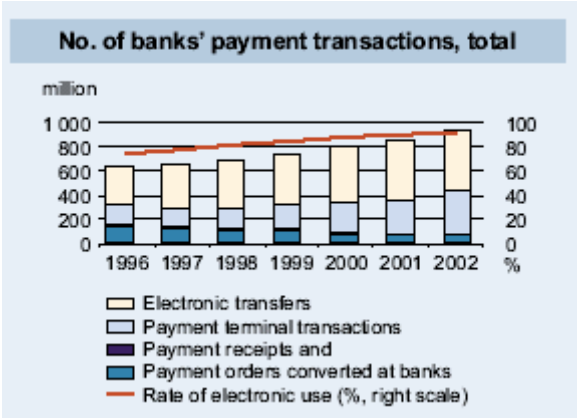


FIGURE 5 Number of banks' payment transactions (Finnish Bankers' Association 2003)

Starting in the early 1990s, the financial services industry set up internal information technology services that would allow advanced payment, security and verification procedures; this has enabled Finland to be among the first country in the world to offer online and mobile services. Along with other Scandinavian countries Finland has championed the technological development and employment of these new technologies. It is worth noting that the Scandinavian countries as a whole are among the most advanced in adapting to and using various new mobile and technological appliances (Statistics Finland

2002). Finnish consumers have been relatively eager to try out new mobile applications such as SMS chatting, SMS dating, and television voting (Pelkonen and Dholokia 2002). This has carried over into the banking sector: consumers have been provided with increasingly versatile means of using banking services, and have been willing to use them.

The sections above have outlined in general terms the current situation in electronic banking. From a more theoretical perspective, the aim of the research reported here is to contribute to the study of consumer behaviour in the context of technology. Thus, the perspective taken by the dissertation is one that focuses on consumption, and on the consumer. As Frambach (1993, 22) states this is typical in marketing research "*…in explaining individual adoption decisions diffusion theory in general, and diffusion research in marketing in particular, have taken an adopter-side perspective, mostly ignoring the influence of the supplier of the innovation on the adoption process*". The study will provide new information about consumer behaviour in the rapidly changing financial services industry. The more we know about consumer behaviour in the context of the research phenomenon in question, the more we are likely to gain insights which are useful to practitioners investigating the acceptance and potential diffusion rate of the various new types of services.

Frambach (1993) further cites to Metcalfe's (1988, 561) explicit distinction between adoption analysis and diffusion analysis, which is useful to adduce before proceeding with the dissertation.

> *"…adoption analysis which considers the decisions taken by adoption agents to incorporate a new technology into their activities, and diffusion analysis, which is concerned with how the economic significance of a new technology changes over time, the research on the variables influencing the (individual) adoption decision of an agent (behavioural) is often carried out under the heading diffusion research."*

This is why the both constructs, adoption and diffusion research, were included as a search construct in literature review process of this study.

The framework and the models presented in the dissertation will aim at conceptualising various factors that influence the electronic banking environment and delivering potential to generalise them to introduction of future products along this line. Until today academic research on mobile banking has been scarce, only couple of recent publications were found (Barnes and Corbitt 2003; Kleijnen et al. 2003) in literature search, in this respect the significance and interest in the findings of this research, and of the dissertation in general increases. It is clear that mobile banking, and mobile commerce in general, can be facilitated through the availability of more data concerning customers' behavioural patterns and profiles. Among other consequences, one direct result is that advertising will become even more targeted and customised. As Mattila and Hanin (2000) have argued, information about the behaviour of bank customers is of value in itself.

1.3 Research objectives and questions

As mentioned in the sections above, the purpose of this study is to provide a better understanding of the adoption of technology-based services, and to model customer behaviour in the mobile banking context. On the basis of a review of the literature (see Chapter II and Research Articles) and the hypotheses developed from the theory as well as the various general objectives regarded as pertinent to this research, the research questions listed below were formulated.

The primary academic question to be addressed is:

What are the dimensions affecting the adoption of mobile banking services in Finland?

To gain a comprehensive understanding of the phenomenon under investigation, and in order to be able to provide a sufficient justification for answering that question, a number of subordinate questions need to be addressed. For the purposes of the present research, these questions are:

- What are the attributes of innovation, and how are they constituted in the modelling of mobile banking adoption? Why is Everett M. Rogers' work applicable in this context?

- How do the following variables explain the adoption of mobile banking: Demographics, technology perceptions, communication?

- What are the drivers and the inhibitors of mobile banking?

- What are future trends in consumer behaviour in the context of mobile banking?

1.4 The structure of the dissertation

The dissertation is divided into two parts. The first part introduces the research phenomenon, the theoretical foundations, formulation of the hypotheses, the methodological approach, the steps taken in conducting the survey and also a review of some descriptive statistical data from the survey. In other words, the first part serves as an introduction to the research articles in the second part of the dissertation. It is *recommended* that the reader should become acquainted with the four research articles before proceeding to the final chapter, Chapter V Results and Concluding Discussion, of part one.

Introductory Chapter I presents the background against which this research has been undertaken, and hence provides the motivation for the research. The objectives and research questions are also laid out in this chapter.

Chapter II reviews the literature concerning the research topic and presents a synthesis of the constructs relevant to formulating the hypotheses and to building a framework for the research. This chapter proposes the use of three theoretical approaches as lenses for understanding the phenomenon under investigation. Chapter III outlines the research approach and the methodological standpoints taken in the research. It explains the method of data collection and the techniques used for quantitative data analysis as well as the variables chosen for the questionnaires. The reliability and validity of the study are briefly discussed.

Chapter IV presents a review of some statistics of the survey data in order to give statistical descriptions of the characteristics of the survey participants and of their electronic banking usage.

Chapter V discusses the main conclusions that can be drawn from the research. In addition, results of the hypotheses testing are presented herein. The limitations of the study and suggestions for future research are considered. Note that the empirical findings and their linkages to theory, and also the concluding arguments, are mainly presented later, within the research articles.

The collection of research articles forms the second part of the dissertation. Each paper adopts a different viewpoint with regard to the research topic. These research articles have been presented at international conferences and published in conference proceedings, or accepted for publication in a scientific journal, or else are under review for publishing in international scientific journals (for details see the opening page of each article). Each of the conference papers or journal articles has been subject to a double-blind refereeing procedure. Note that since Chapters II and V discuss issues that are presented in detail within the articles, references are made throughout the text to these articles. Each paper is included in the dissertation in the format in which it has been submitted.

Article I "Usage of Mobile Services: Empirical Findings from a Bank Customer Survey" studies the usage of mobile services in a fairly general sense. It focuses on demographic variables as indicators of certain type of consumer

behaviour, presents the profile of a typical mobile banking user and describes the relationships that exist between variables such as technology perceptions and usage.

Article II "Modelling Mobile Banking Adoption: An Empirical Investigation" identifies and explains the variables that exist within a mobile banking adoption framework. The starting point in this is the list of attributes of innovation defined by Everett M. Rogers.

Article III "Technology-based Service Products – a Study on the Drivers and Inhibitors of Mobile Banking" analyses the forces that encourage or discourage the use of mobile banking services, employing a practical approach. The model presented summarises the most important underlying constructs.

Article IV "Mobile Banking and Consumer Behaviour – New Insights into the Diffusion Pattern" examines traditional diffusion constructs, such as the Bass Model of communication flow and the differences between adopter categories. New insights are obtained regarding diffusion patterns, incorporating the empirical implications of the survey data. Following on from this, predictions can be made with respect to the future usage of mobile banking services.

II THEORETICAL BACKGROUND

This chapter reviews the literature which has formed the theoretical background for the research articles. The purpose here is not to go through each underlying theory in detail, since this is done in the research articles. Rather, this chapter concentrates on justifying the theoretical choices made during the research and on developing the formal hypotheses. The chapter discusses various theoretical viewpoints, i.e. viewpoints that have been selected to shed light on the main questions of this research. The literature review itself is presented in three major sections (2.1, 2.2, 2.3); these deal with theories which have wide currency at the present time, and which provide a solid foundation for the chosen constructs and variables, and for the empirical investigations of the present study. The chapter ends with a section (2.4) setting out the overall framework of the dissertation.

2.1 Convergence of technology and services

Mobile banking is an innovation involving both an intangible service and an innovative medium of service delivery employing high technology. From this perspective, it is obviously useful to examine research into technology and services.

2.1.1 Technology-based services

Concepts of innovation and the diffusion of innovation become particularly intricate in a case such as the present one, where both technology and service aspects affect the characteristics of mobile banking services. Here, indeed, we have a complex interaction between an intangible service and technology-based service delivery (Black et al. 2001). The impact of technology on the financial services environment was already discussed in Chapter I. Today's banking industry is, to large extent, driven by technological innovations. The banking industry shares the common characteristics of a high-technology industry

discussed in e.g. Mohr (2001), most notably in terms of market uncertainty, technology uncertainty and competitive volatility.

Technology-based self-service is growing at a tremendous rate all over the world, but it appears that a strong unifying theory which would encompass this form of service is lacking. Bobbit and Dabholkar (2001) seek to explain the pivotal role of attitudes in influencing intentions and behaviour relating to technology-based services. They propose a conceptual framework that incorporates several well-known attitudinal theories. The hope would be that frameworks of this kind might help to make better predictions of consumer decisions regarding technology-based products.

In fact, it is only fairly recently that academic researchers have recognised the critical importance of technology in the delivery of services (e.g. Bitner et al. 2000; Dabholkar 1996; Lee and Allaway 2002). It has been suggested that the traditional marketplace interaction has been replaced by a market*space* transaction. Meuter et al. (2000) cite Rayport and Sviokla's (1995, 14) definition of marketspace as *"a virtual realm where products and services exist as digital information and can be delivered through information based channels"*. Electronic banking services, and thus mobile banking also, are a typical example of marketspace transactions that require no personal interaction.

In order to better understand the role of technology, it became apparent that there was a need for a wider focus, considering the role of technology in banking in ways that went beyond those academic banking articles (e.g. Durkin and Howcroft 2003) and trade literature (e.g. Koch and MacDonald 2000; Seymann 1998; Keyes 1999) which directly discuss the development of banking technology. It was deemed necessary to review the literature on services marketing which focuses on the impact of technology on services from a number of different research angles. Thus, it proved useful to make a small excursion into services marketing theories too.

Indeed, the change in the services environment has been discussed in the literature of relationship marketing, as well as in other domains. Reflecting the changing landscape of services, and capturing the complexities resulting from the growing infusion of technology, Parasuraman (1996) proposed a now well-known pyramid model of services marketing, which was an extension of Kotler's (1994) triangle model of services marketing. The traditional triangle was modified, with technology included as the crucial fourth end-point (see Figure 6). Through the base of the pyramid, services are now seen as involving a dynamic relationship between employees, customers and technology. The adapted pyramid model can be regarded as one likely to encourage and direct research, that is, research that could encompass the important and growing role of technology in the delivery of services (Bitner et al. 2000; Parasuraman and Greval 2000).

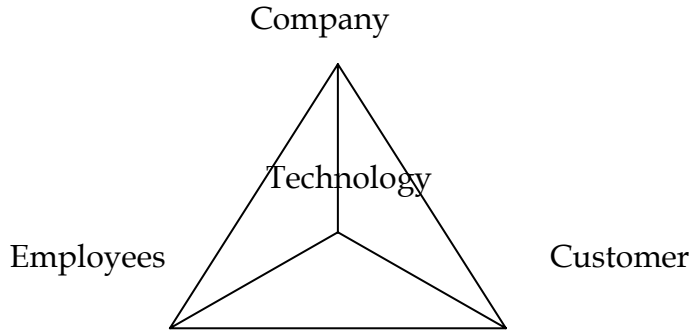


FIGURE 6 Pyramid model of services marketing (Parasuraman 1996)

Dabholkar (1994) explicates further the convergence of technology and services. Services marketing literature has traditionally distinguished between technological services and non-technological services. However, with today's technological advances, this distinction is increasingly difficult to make; the line between technological and non-technological services is becoming blurred. Across different industries, service firms are offering and delivering similar technology-based services, with similar implications for marketing. In consequence, it is impossible for research to overlook these developments.

2.2 Research into innovation diffusion and adoption

Mobile banking services represent both an innovative service, considered as something intangible, and an innovative medium of service delivery employing high technology. Thus, in order to arrive at a framework for the present study, it was necessary to use as key underlying notions the concept of innovation adoption and also the concept of the diffusion of technology-based services.

The diffusion of an innovation has traditionally been defined as the process by which that innovation "*is communicated through certain channels over time among the members of a social system*" (Rogers 1995, 5). Considered in this way, there are four key elements in the diffusion process: the innovation itself, channels of communication, time, and the social system. Innovation was defined in Section 1.1. Communication channels for their part are the means by which information is transmitted to or within the social system. Time relates to the rate at which the innovation is diffused, or the relative speed with which it is adopted by member of the social system. The social system consists of those individuals, organisations, or agencies that share a common "culture" and are potential adopters of an innovation (Mahajan and Peterson 1985).

Within this research area, one of the most frequently cited studies is that by Everett M. Rogers (e.g. Moore and Benbasat 1991; Howcroft et al. 2002; Tan and Teo 2000) which originally dates back to 1962. The theoretical framework of the present dissertation is based on this traditional approach to innovation diffusion. There are several overviews of diffusion and adoption theories in the

literature of marketing (e.g. Mahajan et al. 1990a), and in the literature of information systems (e.g. Lu et al. 2003: Puumalainen and Sundqvist 2000). The diffusion and adoption process has also been viewed from various perspectives within academic research on electronic banking, for example from an organisational perspective (e.g. Daniel 1999) or from a distribution channel perspective (e.g. Black et al. 2002; Mols 2001). In addition, there is a large body of current research on consumers as adopters, and on their behaviour. In attempts to understand consumers' adoption of technology (at least where the research has focused on the consumer perspective) investigators have often explicitly employed Rogers' diffusion model.

The present research also builds on the work of Rogers, in so far as mobile banking adoption can be explained and described in terms of five innovation attributes. Furthermore, Rogers' conceptualisation of the various characteristics of adopters is of interest in the study. An additional rationale stems from the fact that Rogers' model has been successfully applied in producing various forecasts, and various descriptive accounts.

In considering the applicability of traditional diffusion research to the present study, it is worth going over certain points in Rogers' (1995) argument. According to Rogers, the diffusion model is a conceptual paradigm with relevance to many disciplines; thus the diffusion approach provides common conceptual ground. Rogers further suggests that most social scientists are interested in social change, and that diffusion research offers a particularly useful means of gaining an understanding of change, since innovations are a type of communication message whose effects are relatively easy to isolate. Thus, when studying mobile banking adoption one is dealing with a change in human behaviour, or in marketing terms a change in consumer behaviour. One of the key concepts in diffusion research is that change in consumer behaviour is affected by different forces, which can be driving or inhibiting, and which can lead to the adoption or non-adoption of a particular innovation. The research methodology implied by the classical diffusion model is clear-cut and relatively simple. Diffusion scholars have often emphasised quantitative research approaches; they have focused especially on characteristics related to individual innovativeness that can be arrived at through cross-sectional analysis (Rogers 1995).

2.2.1 Attributes of innovation

In accordance with Rogers' suggestion that the explanation for different diffusion paths can be found in the attributes of the innovations being adopted, researchers have generally been in favour of evaluating the innovation according to product characteristics involving five constructs. These are listed as *relative advantage*, *compatibility*, *complexity*, *trialability* and *observability*. An additional concept of *perceived risk* is often included, as suggested by Bauer (1960). According to Moore and Benbasat (1991), measuring potential adopters' perceptions and intentions regarding innovations is a "classic issue in the innovation literature" and a "potential key" for integrating various findings within diffusion research. Furthermore, empirical research has shown user perceptions to account for a substantial proportion of the variance in *current use* and *future intentions to use* (Agalwal and Prasad 1997). Marketing research has been particularly concerned with predicting the rate of adoption of new products, with studies on how the perceived attributes of an innovation affect its purchase.

One of the most frequently cited reviews of perceived characteristics literature is that by Rogers. It was for this reason that one of the research articles in the present dissertation set out to test the set of characteristics listed in the paragraph above, within the context of mobile banking adoption. A brief discussion of these attributes follows. Each of the six different attributes of innovation is to some extent empirically interrelated to the remaining five. However, following the thinking of Rogers (1995) they will be regarded here as conceptually distinct.

Relative advantage is concerned with the degree to which an innovation is perceived as being better than the idea it supersedes. The degree of relative advantage is often expressed as economic profitability, social prestige, a saving in time and effort, immediacy of the reward, or as a decrease in discomfort (Rogers 1995). The construct of relative advantage is highly domain-specific and thus advantage can be viewed differently according to the innovation in question, and also according to the consumer in question. In general, perceived relative advantage of an innovation is positively related to its rate of adoption. As electronic banking services allow customers to access their bank accounts from any location, at any time of the day, it provides tremendous advantage and convenience to users. Based on this line of reasoning, it can be hypothesised that:

H 1 The greater the perceived relative advantage of using mobile banking services, the more likely that mobile banking will be adopted

Complexity is the degree to which an innovation is perceived as being difficult to use and understand. It has been often measured in relation to perceptions about the purpose of the respective innovation, its intended use and ease with which it can be used (Gerrard and Cunningham 2003). Previous studies on technology-based innovations have indicated that more complex an innovation

is to use, and the greater the skill and effort needed for adopting it, the less likely that it will be adopted (Tan and Teo 2000). Complexity is also a subjective concept and not an innate attribute of a product or service, and can be perceived differently by different individuals (Agarwal and Prasad 1997). The perception of the complexity involved in conducting a financial transaction via a mobile channel is can be argued to be inversely related to the consumer's experience with technology in general.

H2 The lower the perceived complexity of using mobile banking services, the more likely that mobile banking will be adopted

Compatibility refers to the degree to which an innovative channel such as a mobile device is compatible with the individual's past experiences and values; it appears to have a significant impact on a person's willingness to adopt (Rogers 1995; Moore and Bensabat 1991). Consumer behaviour tent to be based on known solutions and past successes, for example computer literacy has been proven to affect adoption of Internet banking (Tan and Teo 2000). Nevertheless, not all experience is necessarily efficacious in the acceptance of technology-based products, because the switching costs associated with moving to a very dissimilar technology may offset any positive gains due to experience (Agalwal and Prasad 1999). A consumer's innovativeness is often measured as how technology-oriented, change oriented or convenience oriented she is (e.g. Thornton and White 2001).

H3 The greater the perceived compatibility of mobile banking with one's values, the more likely that mobile banking will be adopted

The *observability* of an innovation describes the extent to which an innovation is visible to other members of a social system, and how easily the benefits can be observed and communicated. In the present case, the lack of a physical domain in service products may present some problems, even though the service delivery medium, i.e. the mobile phone itself, may provide physical evidence for the innovation. This research investigated observability as communication process meaning the effects of used channel and mode of communication on adoption of mobile banking under the theoretical framework of diffusion of innovations following the approach outlined for example by Lee at al. (2002), Mahajan et al. (1990a) and. Moore and Bensabat (1991) refer also to Tornatzky and Klein's (1982) discussion in which they noted that communication, or communicability as they term, was closely related to observability. Following from that communication was considered as being of considerable significance and meriting a discussion of its own which is presented in Section 2.2.3. Drawing on that discussion the following hypothesis was proposed:

H4 Media channels are relatively more important than interpersonal channels for earlier adopters than for later adopters

Rogers (1995) argues that potential adopters who are allowed to experiment with an innovation will feel more comfortable with it and are more likely to adopt it. Consequently, if consumers are given the opportunity to try out the innovation, fears of the unknown and of being unable to use the innovation can be reduced. A trial can further convince that even mistakes can be rectified, thus providing a more predictable situation and give necessary confidence for using an innovation (Gerrard and Cunningham 2003). This attribute is labelled *trialability*. This leads to the hypothesis:

H5 The greater the trialability of mobile banking services, the more likely that mobile banking will be adopted

An additional attribute augmented by Bauer (1960) appears to be that of *perceived risk.* Particularly in banking services, consumers consider the risk associated with the financial service product itself, and also with the electronic delivery channel, to be higher than with basic consumer goods; hence the importance of this attribute is emphasised (Harrison 2000). In the context of Internet banking, Black et al. (2001) have suggested that errors and the security afforded might be considered as measures of risk. Hewer and Howcroft (1997) refer to the term trust in this context.

H6 The lower the perceived risk of using mobile banking services, the more likely that mobile banking will be adopted

In addition to these attributes included in Rogers' model, empirical research on the adoption of financial services has suggested the existence of a number of other factors; these include societal concerns, involving for example job losses, the development of a lazy society or "sense of fatalism" meaning the feeling customers had that technology-based channels are forced upon customers (Black et al. 2001).

One major objective in the research is to determine to what extent and why these dimensions actually do account for the adoption of mobile banking. Thereby attributes of mobile banking services are examined through the lenses of the proposed framework described in detail later in Section 2.4. Investigating mobile banking adoption through the lenses of these theoretical concepts follows the path chosen in various studies on electronic banking, including those of Tan and Teo (2000), Black et al. (2001), Polatoglu and Ekin (2001).

2.2.2 Adopter categories: individual differences

The notion that individual differences play a crucial role in the implementation of any technological innovation has been a recurrent research theme in a wide variety of disciplines – not only in marketing, but also in information systems and in production. Numerous individual difference variables have been studied, including demographic and situational variables, cognitive variables, personality-related variables and the communication behaviour of potential adopters (Agarwal and Prasad 1999; Rogers 1995). It has been found that all these factors are indeed significant predictors of the consumer adoption of technology-based innovations (e.g.Polatoglu and Ekin 2001; Mattila 2001; Lee et al. 2002). Previous research has also explored each of these variables in relation to the financial services sector.

The demographical variables are all potentially critical to our understanding of adoption, since they could play an important role in determining how consumers make their decisions about adopting and using new technology-based services. Indeed, there is already a significant body of evidence from empirical studies. Thus, for example, gender differences have been investigated in the context of individual adoption and the sustained use of technology (Morris and Venkatesh 2000), and investigators have looked at individual levels of education and the prior similar experience of adopters (Agalwal and Prasad 1999). It was found necessary to specify the demographical variables to be investigated as suggested for example in Al-Ashban and Burney (2001) and Thompson (2001). Thus, it can be proposed that:

H7 a Individual differences will have an effect on adoption of mobile banking services in terms of technology perceptions and

H7 b Individual differences will have an effect on adoption of mobile banking services in terms of demographics defined as:
1) gender, 2) age, 3) marital status, 4) education, 5) household income

Furthermore, in diffusion research, the interest is in aggregates of individual users, typically identified as user segments or as other aggregate communities of users. Diffusion research mainly focuses on describing and explaining the adoption process as a process of innovation diffusion at the aggregate level. Studies focusing on description typically characterise user segments along the diffusion process, such as *innovators, early adopters*, *early majority users, late majority users* and *laggards*. Demographic and socio-economic variables are used for this purpose (Pedersen and Ling 2002). This is also one of the main research interests of the current study. Note that examples of valuable avenues of research already exist: for example, Mattila et al. (2003) studied Internet adoption among mature customers, and Wei (2001) studied the socio-economic characteristics of mobile phone laggards.

Traditionally, the Rogers adoption continuum recognises five categories of consumers, differing in terms of adoption rate and (as the findings of this study

will reveal) in terms of certain socio-economic characteristics. The common extrapolation (e.g. Rogers 1995; Mohr 2001) characterises adopter categories as follows:

- Innovators: the first adopters, interested in technology itself with positive technology attitudes;
- Early adopters: also interested in technology and willing to take a risk;
- The early majority: these are people who can be considered pragmatist and process oriented;
- The late majority: these are people who are more or less sceptical, with negative technology attitudes;
- Laggards: these have extremely negative technology attitudes and hence never adopt technology, at least within the main stream.

2.2.3 Communication

In the early 1970s, diffusion studies started to pay attention to the behavioural theories behind the innovation adoption processes. This aspect is clearly presented in the diffusion model by Bass (Puumalainen 2002). In marketing, one of the main impetuses underlying diffusion research has in fact been the Bass model (see Figure 7), which focuses on how information is communicated in the media and interpersonally. It shows how the two mechanisms of communication result in an S-shaped aggregate adoption rate, a phenomenon often observed in studies on innovation diffusion. The key elements in the Bass model are adopter due to media messages (p), adopters due to interpersonal messages (q) and an index of market potential (m) for the new product. The upper figure shows the number of new adopters per time unit is due to mass media channels and to interpersonal communication. The lower figure on the left shows that the crucial variable to predict is the number of adopters from the time of the prediction to the mean time of adoption, when a point of inflection occurs in the diffusion curve. The figure on the right shows that the cumulative number of adopters can then be estimated because the S-shaped diffusion curve is symmetrical around the mean year of adoption (Rogers 1995). Hence, a theory of diffusion can also be characterised as a theory of communication (Mahajan et al. 1990a).

It is important to note that communication is also a critical process factor for the diffusion of innovation in electronic banking. In accordance with the studies of Lee et al. (2002) and Lievens and Moenart (2000) communication was highlighted as a significant predictor of the consumer adoption of technological innovations, the present study will also address this area. The Bass diffusion model assumes that the potential adopters of an innovation are influenced by two types of communication channel: mass media channels (external influence), and interpersonal worth-of-mouth channels (internal influence). In the very beginning of the diffusion process it is typical that adoptions are more due to external influence, i.e. mass media, and as the process continues internal influences gain in importance.

Rogers (1995) argues that perhaps interpersonal influence is not so necessary to motivate earlier adopters to decide favourable because they possess a more venturesome orientation, and the mass media message stimulus is enough to move them over the mental threshold to adopt. But the less change-oriented later adopters require a stronger and more immediate influence, such as that from interpersonal networks.

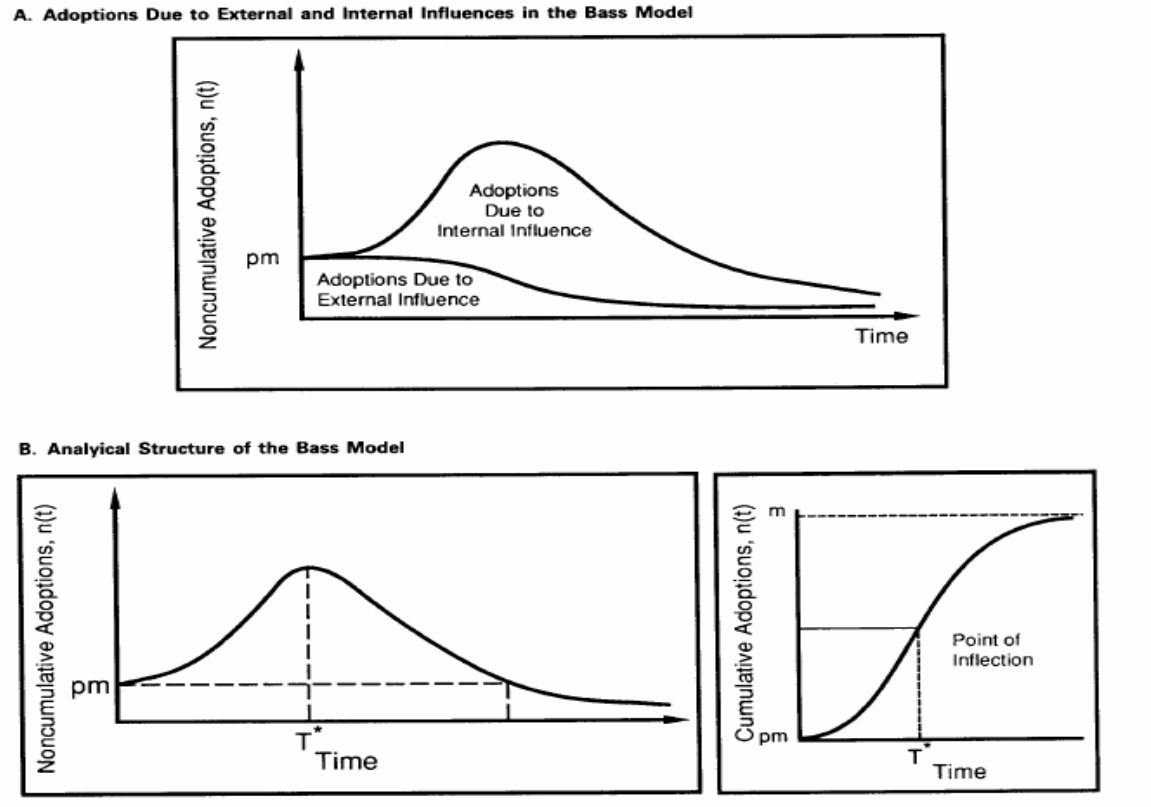


FIGURE 7 The Bass new product diffusion model (Mahajan et al. 1990a)

Similarly, Link (1998) presents a two-step communication process on which the initial exponential or logistic shape of the diffusion of an innovation is built (see Figure 8). In the first step, information is transferred by the mass media from a marketing company to potential adopters who eventually adopt. Thereafter, in the second step, the actual adopters influence other potential adopters who in turn adopt the innovation. These considerations led to the hypothesis 4, which was outlined in Section 2.2.1.

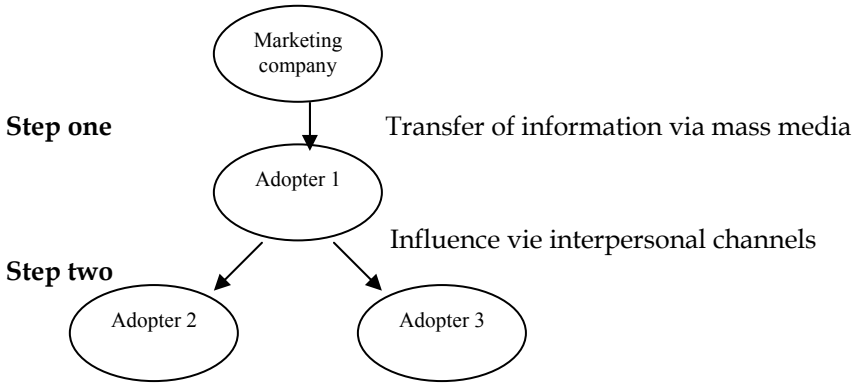


FIGURE 8 Two-step communication-of-experiences model (Link 1998)

In Rogers' (1995) conceptualisation of the innovation-decision process, communication channels have a central role, as can be seen in Figure 9. Communication is defined as effective if it generates changes in the receiver's behaviour that were intended by the information sources (Rogers and Shoemaker 1973). This change has its manifestation in the decision stage in the model. Employing these models, the present research aimed to determine which sources of communication, employing which communication mode, have affected the adoption of mobile banking.

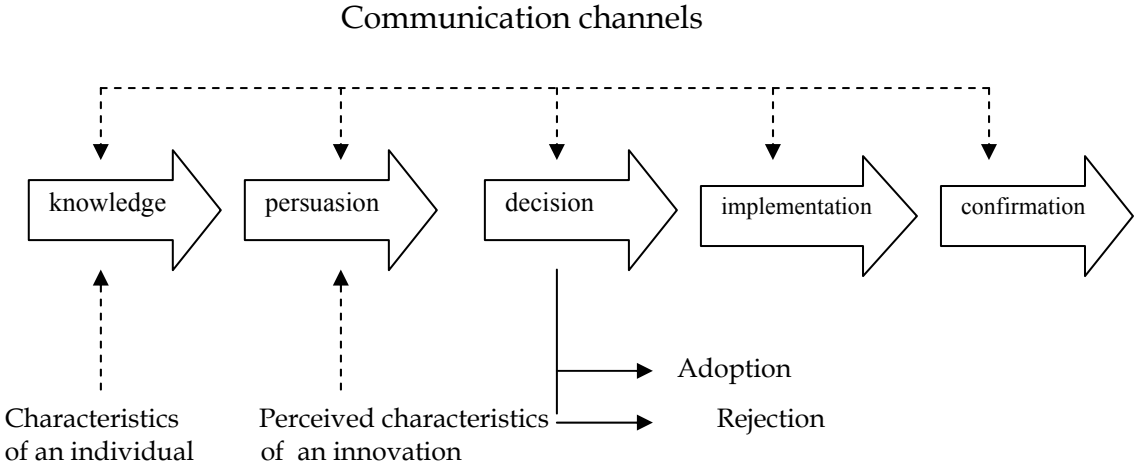


FIGURE 9 Stages in the innovation-decision process (adapted from Rogers 1995)

2.3 Electronic banking research

The definition of mobile banking discussed in Section 1.1 offers a straightforward justification for reviewing this field of research. Electronic banking, sometimes referred as on-line banking, is the high-order construct and it has created research enthusiasm among academic community of the banking and services scholars.

According to Lievens and Moenaert (2000) the study of innovation in the financial service industry is a relatively new area of research. They consider the research in this area to have got under way around the mid 1980s. An analysis of the literature on financial service innovations brings up several research topics. Thus there have been fairly recent studies on the diffusion and adoption of tele-banking (e.g. Al-Ashban and Burney 2001; Howcroft et al. 2002) and on Internet banking (e.g. Jayawardhena and Foley 2000; Mattila 2001). The focus in those investigations has been to a large extent on the consumers using the services in question.

Milesworth and Sourtti (2002), Sathye (1999) and Fain and Roberts (1997) have investigated the adoption of an innovation from a reverse research angle, namely consumer resistance to innovations. Rogers (1995) also warns that diffusion literature may be subjected to pro-innovation bias, were researchers assume that an innovation *should* be diffused. The resistance to adopt innovations has received relatively little marketing attention, even though understanding it is critical to success of an innovation. Ram and Sheth's (1989) conceptualisation of innovation resistance provides justification for inclusion of adoption barrier discussion, investigation of the factors inhibiting the adoption of mobile banking, in this research (see Figure 10).

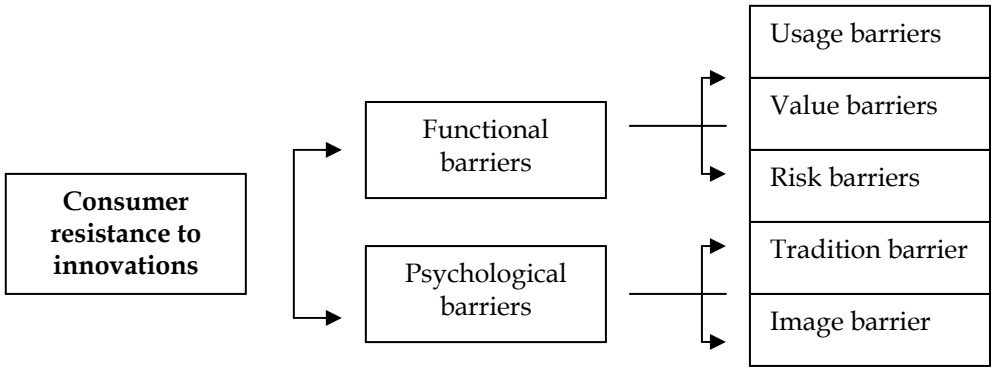


FIGURE 10 Typology of innovation resistance (adapted from Ram and Sheth 1989)

Research on Internet banking, and to some extent research on mobile services adoption, can act as a valuable starting point for examining the adoption of mobile banking, a point made also by Pedersen and Ling (2003). In this context it is useful to refer also to Gatignon and Robertson's (1985) findings based on a review of adoption research. They take the view that, in a case where no prior

data on a totally new product or service concept exists, some conclusions can be drawn from the adoption of other products within the same product category. Similarly, Hirschman (1980) has suggested that prior experience with a product category (e.g. Internet banking) may lead to greater acceptance of new products (e.g. mobile banking), hence increasing the likelihood that they will be adopted. This rationale can be linked both with the discussion of compatibility of an innovation with the values of an adopter, and why general technology orientation affects behaviour (Thornton and White 2001).

In fact, one soon discovers that there is no lack of research material on Internet banking services (e.g. Karjaluoto et al. 2002; Bradley and Steward 2002), and more specifically, research material applying the Rogers model to Internet banking (see e.g. Black et al. 2001; Polatoglu and Ekin 2001; Tan and Teo 2000). However, in the case of mobile phones, and consequently in the case of mobile banking services, we can observe characteristics that differ sharply from such wired line devices such as personal computers or televisions. Siau and Shen (2003) list some key drivers for mobile services which further explicate the differences between wireless and wired service environment.

- Mobility: The primary advantage of mobile services. Users can get any information they want, whenever they want, regardless of their location. Mobile services fulfil the need for real-time information and for communication anytime.
- Reachability: Through mobile devices, business/government entities are able to reach customers/constituents anywhere, anytime. With a mobile terminal a user can be in touch with and accessible to other people anywhere anytime. The user can also limit her "reachability" to particular persons or at particular times.
- Localisation*:* The knowledge of a user´s physical location at a particular moment also adds significant value to mobile services. With location information available, many location-based services can be provided. For example the mobile application can alert a user quickly when a friend or colleague is nearby or to help with the user locate the nearest restaurant or ATM.
- Personalisation: Although enormous amounts of information, services and applications are currently available on Internet, not all information is relevant to all users. Mobile services can be personalised to filter information or provide services in ways appropriate to a tailored user.

Computer as a device has often many users; the ownership is publicly shared (e.g. library's computers) whereas mobile phone is proprietary owned and used by a consumer. Additionally, since the concerns of security are often raised a mobile device can be more easily identified and even with the latest biometric technology, a person using mobile phone can be identified (Yuan and Zhang 2003).

The expected improvements for the mobile service and application space arriving with 2.5G and 3G networks can act as a trigger for acceptance. These include ability of mobile devices to provide location-specific information, new

ways of personalisation, enhanced availability and immediacy of service. Particularly the last mentioned feature can contribute to the predicted shift from wired Internet connections to wireless mobile services in banking too (Wah 1999). The immediacy of information access will be enhanced by the always-on functionality, which supports the provision of time-critical information conducting high value transactions, such as participating in mobile auctions and executing mobile stock trading deals. These type of value-added mobile services will without doubt become some of the most interesting, revenue-generating services simply because of the economic value attached to them (Durlacher Report 2001).

Given this situation, the research findings on marketing and consumer behaviour patterns that may have applied in the wired line environment do not necessarily hold good for the wireless environment. This is, in fact, one paramount reason why research into mobile banking is needed: consumer behaviour in the mobile context has up to now remained more or less uncharted territory.

2.4 The framework of the dissertation

Drawing on the literature discussed above, and having considered the applicability of a large body of empirical studies, the various theoretical constructs and models that seemed likely to be helpful in reaching answers to the research questions were selected and the hypotheses formulated. Following on from this, an underlying framework for the dissertation was arrived at (see Figure 11).

2.4.1 Model development

The work presented in the dissertation represents a synthesis and extension of the three research streams that were identified in discussion above. The model is based on the work of Rogers (1995) and comprises five constructs of innovation attributes, augmented with a perceived risk factor, plus external factors such as social system, time, communication channels and the demographics of the adopters. The six constructs (*relative advantage, complexity, compatibility, trialability, observability, risk*) are the attributes which define the perceived characteristics of an innovation. These perceived attributes constitute one important explanation of the rate of adoption of an innovation. A particular construct is often highly domain-specific; thus its influence on adoption can be seen differently in the context of different innovations and different consumers. In the present work, the domain under study is the adoption of mobile banking services. The dimensions highlighted in the framework present the constructs that form the main research interests in this dissertation. In addition to innovation attributes, the characteristics of the adopters, in respect of

demographical variables and *communication channels*, have been investigated. The arrows indicate the influencing effect of a dimension on adoption, i.e. the hypotheses postulates.

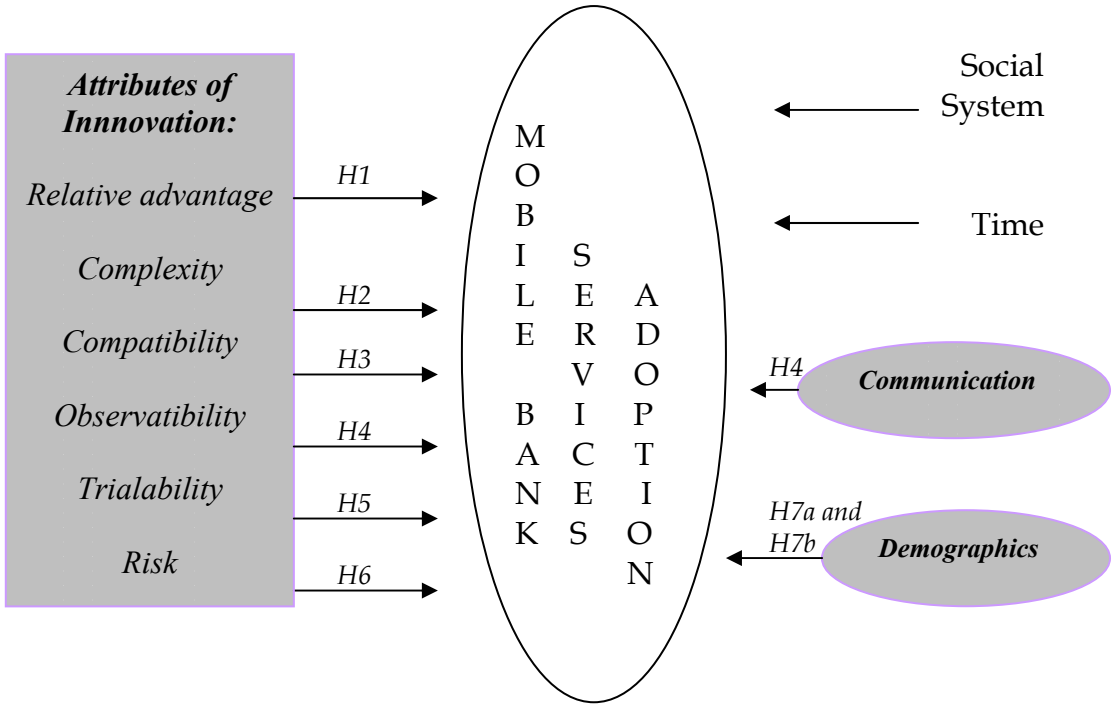


FIGURE 11 The framework of the dissertation

III RESEARCH METHODOLOGY AND DESING OF THE STUDY

3.1 Research design

A research design is more than just a method of data collection and analysis. It governs the overall configuration and organisation of the research activity. The research design determines the type of evidence that is collected and interpreted in order to provide acceptable answers to the research questions. In this endeavour, some understanding of the philosophy of science is needed, so that one can recognise which methodological approaches will be appropriate and applicable to the investigation in question. The suitability of the methodology ultimately stems from the research tradition of the discipline, and its scientific norms and principles, as much as from the research questions and problems to be addressed. Clearly, the whole area involves debates on underlying philosophies, schools, and concepts of epistemology, as well as on the categorisation of different research disciplines (e.g. Hall and Elliot 1999; Foxall 1995; Hirsjärvi et al. 2001).

Even though it would not be practical within this dissertation to examine the various schools of thought in minute detail, one can usefully refer to the general division of the philosophy of science into two major approaches, i.e. the positivistic approach and the hermeneutical approach (Riggs 1992). In the positivistic approach the researcher tries to explain and predict the phenomenon under investigation. This will often involve the formulation of a tentative theory of the phenomenon, working out the implied consequences, and controlling the events in a situation in such a way as to observe the validity of empirical deductions (Bonoma 1985). This type of research is typically based on obtaining data through surveys with a large sample size and analysing structured data quantitatively, using statistical methods. In the hermeneutical approach, the interest lies more in exploring and understanding the phenomenon than in explaining and predicting it. This approach involves reasoning from individual and naturally occurring but largely uncontrollable

observations towards generalisable inductive principles (Bonoma 1985). Research within this approach is typically based on unstructured data obtained through fieldwork studies and case research methods.

A further means of distinguishing research designs is in terms of deductive reasoning as opposed to inductive reasoning (Riggs 1992). Deductive reasoning is defined as working from the more general to the more specific. Inductive reasoning works the other way round, moving from specific observations to broader generalisations and theories. Inductive reasoning, by its nature, is more open-ended and exploratory, especially in its initial stages. In inductive reasoning, the researcher begins with various specific observations and measures, and continues by detecting patterns and regularities, formulating some tentative hypotheses that can be explored. Finally, the researcher may develop some general conclusions or theories. Deductive reasoning is narrower in nature and is concerned with testing or confirming hypotheses (Trochim 2000). Yet even though a particular study may look as if it is purely deductive or inductive, most social research involves both inductive and deductive reasoning processes in the course of the project. This is true in the present research also.

Methodological approaches are often distinguished with respect to the novelty of the phenomenon under study. If the area of investigation is new or vague, a researcher may need to carry out an exploration simply in order to learn something about the problem. In the exploratory research approach, the important variables may not be known or thoroughly defined; the emphasis is on the discovery of ideas and insights. Exploration relies more heavily on qualitative techniques. By contrast, the objective of a descriptive study is to learn the who, what, when, where and how of the topic in order to provide an accurate snapshot of some phenomenon, and to determine the relationships between variables. In descriptive research, hypotheses often exist but they may be tentative and speculative in nature; moreover the relationships under study may not be causal. A causal research design is concerned with determining possible cause-and-effect relationships. Causality involves but may not be proved by the strength of association between two or more variables that are measured; thus one may discover that a change in variable A appears to cause a change in variable B (Cooper and Emory 1995; Churchill and Iacobucci 2001; Aaker and Day 1983; Bagozzi 1980).

The present dissertation will, in the main, follow the path of a descriptive research design. Yet the fact that this is a descriptive study in no way means that it is simply a fact-gathering expedition. This argument will be discussed in detail in the next section.

3.1.1 Using a descriptive research approach

A descriptive research approach is justified in so far as one attempts to identify and explain the variables that exist in a given situation, and to describe the relationship that exists between these variables, the intention being to provide a picture of a particular phenomenon rather than to ferret out cause-effect relationships (Christensen 1991). The descriptive study is typically guided by initial hypotheses as in this research too. Descriptive research is used when the purpose of the study is to describe the characteristics of certain groups. For example, based on information gathered from known users of a service, it was attempted to develop a profile of the "average or typical" user with respect to demographic variables. Furthermore, an attempt was made to estimate and describe the proportion of people in a specific population who behave in a certain way and find out explanations for their behavioural patterns.

The phenomenon to be studied here, mobile banking, is comparatively new in the field of academic research, and for this reason the study aims at gaining insights into current consumer behaviour patterns in the electronic services era. It is with this in view when it can be said that an excursion into explorative research is taken to some degree. In concrete terms the brief exploratory part of this study was conducted when we sought information from persons experienced, both practitioners and academics, in the area of the study before designing the questionnaire variables. However, since research into the diffusion of technological innovation has a long tradition, and since electronic banking (especially Internet banking) has received a good deal of research attention in recent years, one cannot assert that the research area is totally vague or new. Given this situation, it did not seem appropriate to rely purely on exploratory research techniques. It might be argued that this research is also to some extent causal, since it was aimed at explaining relationships among the variables using regression analysis, and answering some of the "why" questions concerning the phenomenon. However, a study to be purely causal one, the relationships, causality, should have been studied by using even more rigorous analytical tools, such as structural equation modelling (Cooper and Emory 1995).

As mentioned previously, the objective was not simply to gather facts but rather to increase understanding. In this regard, the comment of Ferber et al. (1964, 153) seems appropriate:

> *"Facts do not lead anywhere… Anyone with a questionnaire can gather thousands of facts a day - and probably not find much real use for them. What makes facts practical and valuable is the glue of explanation and understanding, the framework of the theory, the tie-rod of conjecture. Only when facts can be fleshed to a skeletal theory do they become meaningful in the solution of problems."*

According to Churchill and Iacobucci (2001), descriptive studies can be divided into two types of studies: longitudinal and cross-sectional designs. A cross-sectional study, as in the present case, typically involves a sample of elements from the population of interest, the various characteristics of which are

measured once. In other words, it provides a snapshot of the variables of interest at a single point of time, in contrast to a longitudinal study, which examines the variables over a period of time. A great deal of emphasis is placed on selecting a representative sample of the phenomenon and this is often done, as in this study, by employing a probability sampling plan.

3.2 Data source and sampling

Often the research design is a combination of both qualitative and quantitative techniques. First an exploratory research is conducted, for example in form of interviewing in order to provide clarification of the research problem, or to assist with the formulation of a questionnaire. Then the formal study begins where the exploration leaves off. Methods of data collection can be distinguished for example between observational studies and the survey mode. The survey type of research gathers the data from interview or telephone conversations; self-administered or self-report instruments via the mail, left in convenient locations, or transmitted electronically; or instruments presented before and after a treatment in an experiment (Cooper and Emory 1995).

In this study the survey method, a large postal survey, was selected for its ability to encompass the phenomenon on a larger scale. Additional justifying reasons in comparison with observational studies were the possibility for improved geographical accessibility of customers (in Finland), increased flexibility for the availability of the respondents' time, ability to maintain the anonymity of the respondent, and comparative inexpensiveness and efficiency besides allowing for a larger sample size to be selected (Zikmund 1991). Typically, questionnaire survey method sacrifices some of the depth of the research results as compared to more qualitative methods, but in this case breadth was more of interest since the aim was to obtain findings that are generalisable. Traditionally, qualitative research has said to often have just the bias, such as subjectiveness and nonpresentativeness, which would have been non-acceptable (e.g. Cooper and Emory 1995). Questionnaire surveys are particularly widely used in large scale investigations of both management practices, and of consumer beliefs, preferences and behaviours (Easterby-Smith 1993; Tull and Albaum 1973).

Interviewing the bank customers in a large scale might have been an option, but the constraints of budget and time impose the need for self-administered instrument sent through the mail, and for the same reason the study was conducted as a single cross-sectional study. Obviously delivering the questionnaire in the bank branches (informed questionnaire) would have overcome the low response rate problem faced often in postal surveys.

A problem in postal surveys is often a low response rate and a non-response bias. However, in this study the response rate was satisfactory; obviously the steps taken in the design process had had a positive effect. The

response rate was increased by sending a covering letter informing respondents about the content, the purpose of the survey and a guarantee that responses would be confidential; however, no incentives were offered to encourage participation in the survey. Follow-up mailing can further increase the response rate, as noted in the literature (Churchill and Iacobucci 2001). No significant non-response bias was detected during the analysis of the survey data. Possible response biases resulting from response style (meaning, for example, non-contingent or extreme responding), or response set (meaning responding according to what is considered to be desirable and acceptable), were taken into account when checking for indiscreet questionnaires prior to data analysis.

The research data was collected during the summer of 2002. Pre-tested questionnaires with a covering letter from the University of Jyväskylä and a postage-paid return envelope were sent to a cross section of 3000 bank customers in Finland. The questionnaire was administered to a stratified sample of Finnish bank customers, selected in terms of their banking habits. The use of stratified sampling meant first dividing the parent population into mutually exclusive and exhaustive subsets, then drawing a simple random sample independently from each stratum. The reasons for using stratified sampling stemmed from the research objectives: stratification also allowed the separate investigation of characteristics of interest for particular user segments. The sampling frame from which the sample elements were drawn was the customer database of one major Finnish bank, OKO Bank Group. After two follow-up mailings, 1303 responses were received, of which 1253 were usable. The usable response rate amounted to 41.8 percent, which was highly satisfactory, and above the 20-30 percent rate considered acceptable in economics research.

The survey sample consisted of three equal-sized groups (1000 questionnaires to each segment) that were selected according to mobile banking usage experience and density. When deciding on the sample size we had to take into account the need for subgroup analysis, and the need for precision when analysing separately just one user segment. Generally speaking, the larger the population, the greater the potential for variation in the characteristics of the sample. Churchill and Iacobucci (2001) suggest some typical sample sizes: in a national study of a human population, where many subgroup analyses are needed, the recommended sample size is over 2500. Furthermore, Thornton and White (2001) cite to Sudman's (1976) guideline of sample sizes which suggests that a study's sample should be large enough so that there are at least 100 units in each category of the major breakdowns. The major breakdowns for this study relates to the three user groups.

Considering the user groups in the survey, the *non-users* had never used any form of mobile banking service on a permanent basis, the *occasional users* had started to use some form of mobile service, and the *regular users* had been using the services for a longer period of time. The questionnaires were partly tailored according to the characteristics of each group. The first round of mailings was conducted in May 2002, and the follow up mailings were mailed

in June and July. The regular users returned 351 responses, giving an overall response rate of 28 percent for this group. From the occasional users 416 responses were received giving response rate of 33.2 percent. The largest number of responses came from the group of non-users. They returned 486 responses with a 38.8 percent response rate. Figure 12 depicts this distribution. The objective was to gather responses from every part of Finland; this was indeed achieved, since the sample proved to be geographically representative of the entire country.

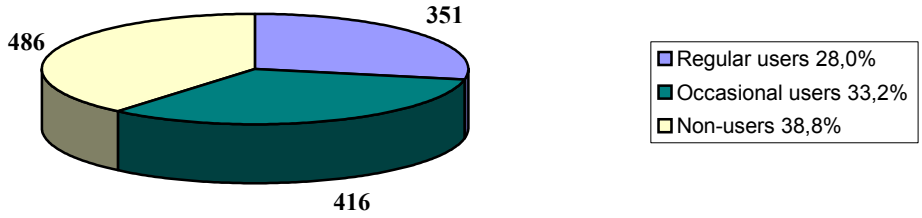


FIGURE 12 Distribution of the respondents according to user group

3.2.1 Questionnaire design

Questionnaire design may have significant effect on the reliability and validity of the responses obtained, and a number of steps were taken with this aspect in mind. As mentioned above the questionnaire was designed in a close cooperation with experts involved both in practice and research. Before mailing, the questionnaire was pre-tested on a reference group who did not participate in the real survey, but who matched the composition of the true sample. During the pre-testing each question was discussed and analysed in order to check the readability and comprehensibility of the questionnaire. In most of the questions the points on the scales were labelled with words; it has been found that the use of such labels can significantly improve reliability and validity, since they clarify the meaning of the scale points (Krosnick 1999).

Most of the questions were multichotomous questions; only the questionnaire designed for the regular users included four open-ended questions. The questionnaire designed for regular users included 25 questions and four open-ended questions, whereas questionnaires for occasional and non-users included 26 standardised questions. All of the questions were not relevant for academic purposes of this dissertation, thus they were excluded from the analysis.

The variables presented in the research framework were operationalised following the methodological approach outlined for example by Kerlinger (1973), Peter (1981), DeVellis (1991) and Fishbein (1967). The recommended

statistical tests were conducted before final variable/question construction. As Bagozzi and Baumgartner (1994) suggest it is useful to make a clear distinction between issues relating to the measurement of the constructs in a theory and issues relating to the investigation of patterns of relationships among construct. The research instrument was assessed for its reliability as well as construct validity. In Table 1 Cronbach's alpha is reported for scale reliability. Nunnally (1967) has suggested that a minimum alpha of 0.6 sufficed for early stages of research. Furthermore, the choice of variables that had been validated by other researchers and pre-tested with practitioners establishes the construct validity for the items.

TABLE 1 Reliability analysis for scale items

Variable	Cronbach's Alpha
Relative advantage	.860
Complexity	.953
Compatibility	.622
Observability/Communication	.711
Trialability	.644
Risk	.630
Technology perceptions	.778

The theories and constructs behind the variables, each antecedent behind the framework are described and justified in detail in the literature review in Chapter II and in the research articles. Multiple-item measures were developed by generating item pools based on instruments published in the literature on innovation adoption, technology-based services as well as on proper empirical findings in electronic banking literature. Examples of the main literature references and sources for the constructs that justified and supported our variable decisions and operationalisations are summarised in Table 2. Besides those references prior literature, such as Swaminathan at al. (1999), Vankatesh and Davis (1996), Agarwal and Prasad (1997), has supported this kind of measurements with regard to technology adoption. The items were modified and reworded to relate specifically to the context of mobile banking.

The number of the items comprising a variable ranged from two to fifteen. The five to seven point Likert scale was used to elicit responses on the questionnaire. Since the actual questionnaires have been decided to keep confidential no detailed description of the gauges for different variables, or exact number of items composing the variables is presented herein. Nevertheless, Table 2 presents the variables and examples of items and their descriptions. Furthermore, the framework of the dissertation is presented in a form as in Figure 13 in order to provide an approximate sample of the items – a model how the variables were operationalised.

TABLE 2 Summary of the operationalisation of the variables

Variable	Item example	Description example	References
Relative advantage	Driver1	Conducting mobile banking is fast and effortless	Moore and Bensabat (1991), Tan and Teo (2000)
Complexity	Usage barrier1	Mobile phone is an unpractical device for banking	Moore and Bensabat (1991), Tan and Teo (2000), Ram and Shet (1989)
Compatibility	Change1	I do not like changes from the usual way I do things (R)	Moore and Bensabat (1991), Tan and Teo (2000), Thornton and White (2001)
Observability	Communn1	I have heard about mobile banking from bank's personnel	Lee et al. (2002), Lievens and Moenaert ((2000), Mahajan et al. (1990a)
Trialability	Trial1	I like to have an opportunity to try mobile banking services	Moore and Bensabat (1991), Rogers (1995)
Risk	Trust1	Using mobile phone in banking is trustworthy	Gerrard and Cunnungham (2003), Mattila (2001)
Individual differences	Technology perception1 Demographic1	I feel comfortable using PC Age	Agarwal and Prasad (1999), Morris and Venkatesh (2000)

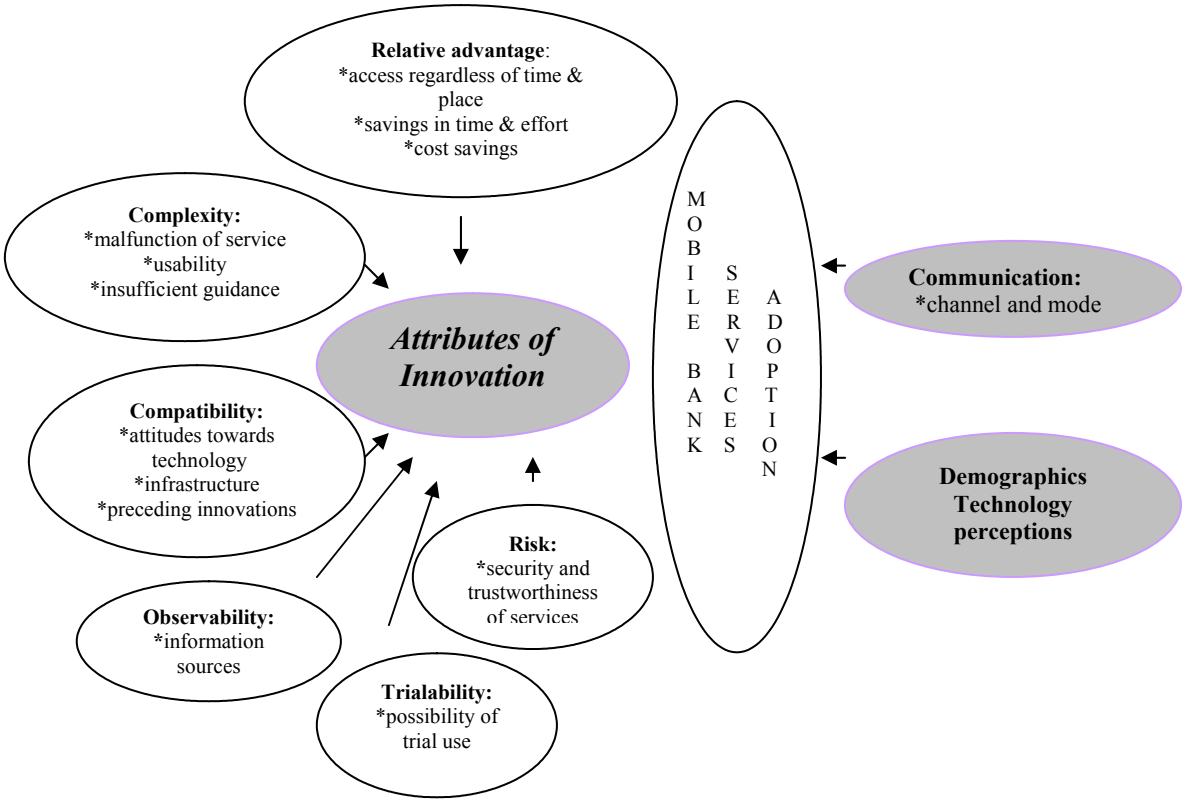


FIGURE 13 Operationalisation of the variables

Each of the questionnaire consisted of three sections. Section one gathered information about the respondents' banking habits; which services do they use, how often they use certain services etc. Section two solicits respondents' views on their feelings towards the different technological products and services. There were some questions concerning various delivery channels and banking mode choice, information source preferences and mode of communications used. Questionnaires included questions on future use of financial services and use of mobile services in general. The last section in the questionnaire gathered demographic information about respondents' gender, age, marital status, education level, household income, occupation and line of business.

A tailored questionnaire made it possible to put slightly different questions to the different user segments, i.e. questions that only individuals in that segment were able to answer. Thus, for example, non-users gave information on factors inhibiting the adoption of a service. The specific questions cannot be discussed herein in more detail due to the confidential nature of the questionnaire.

3.3 Method of analysis

In accordance with the methodological approach that was chosen, the quantitative data were statistically analysed using the SPSS-program. In addition to written explanations of the analyses, the results were incorporated into tables and figures which readers would probably find easier to comprehend. Statistical methods such as means, standard deviations, ANOVA, rotated exploratory factor analysis, correlation and regression analysis were found to be suitable for the data (e.g. Steward 1981; DeVellis 1992), and for reaching the answers to the research questions, with most of the data consisting of interval scale variables on a seven-point Likert attitude scale.

The simplest form of analysis of variance (ANOVA) was used, namely a one-way analysis of variance which is an appropriate statistical test for analysing data collected on the basis of randomised subject designs. This statistical procedure makes it possible to estimate the probability that the observed difference between the means of groups is the result of chance factors (Christensen 1997). By contrast, exploratory factor analysis is appropriate in cases where the underlying dimensions of the data set are not known, and where one seeks to find a new set of variables, fewer in number than the original variables, which express that which is common among the original variables (Steward 1981). In the present study, factor analysis was used as a way of determining the nature of the underlying variables among a large number of measures (Cohen and Manion 1986).

Exploratory factor analysis was also used, due to newness of the phenomena under investigation. Even though there are several studies on electronic banking in the context of Internet banking, there was almost no knowledge or theory available in advance concerning the factor structure of mobile banking. Thus there was nothing that would enable one to determine, for example, the number of factors or dimensions, or the number of indicators of each factor, or which indicators might be connected with which factor. Given this situation, it seems reasonable to use exploratory factor analysis in the search for a factor structure which could explain the correlations among the indicators; clearly we are not in the domain of confirmatory factor analysis and structural equation modelling, which would assume that the factor structure is known or can be fully hypothesised a priori.

To further elaborate and measure the relationships between variables in the framework regression and correlation analyses were applied. Correlation analysis involves measuring the closeness of the relationship between two and more variables; it considers the joint variation of two measures (Churchill and Iacobucci 2002). Although the correlation analysis provides a measure of the strength of the association between two variables, it tells little about the nature of the relationship. Hence, the regression analysis was used in this research to understand the nature of the relationships between the variables (Aaker et al. 1995).

Regression analysis refers to the techniques used to derive an equation (a relationship of the type $Y=a+\beta X+\epsilon$) that relates the criterion (dependent) variable to one or more predictor (independent) variables (Zikmund 1991). Regression analysis is appropriate when a tool for quantifying relationships and having still statistical control is needed. Furthermore, unlike cross-tabulation or other association measures, which deal only with two variables, regression analysis can integrate more variables simultaneously, then the regression analysis is termed multiple regression. Another type of regression worth mentioning is hierarchical regression applied for example in Morris and Venkatesh (2000) and Thompson (2001), which allows to keep a variable in a continuous form, while statistically evaluating the influence of potential confounds.

The objective in regression analysis is to build a regression model or a prediction equation relating the dependent variable to one or more independent variables. The model can then be used to describe, predict and control the variable of interest on the basis of the independent variables (Aaker et al. 1995). A presentation of alternative methods to quantify relationships between dependent and independent variables, i.e. to analyse dependence can be found for example in Zikmund (1991, 564-565), which shows that the selection of a technique requires considerations of the number of dependent variables (one or several) and whether the scales are metric (multiple regression) or nonmetric (multiple discriminant analysis). As in the other forms of data analysis, the nature of the measurement scales will determine which technique is appropriate for the data.

3.4 Reliability and validity of the study

Reliability has to do with the accuracy and precision of a measurement procedure. It refers to the degree to which a measure is free of variable error (DeVellis 1991; Kerlinger 1980) and to the accuracy, consistency and reproducibility of a measuring instrument. The most common type of reliability measurement evaluates the internal consistency, which is concerned with homogeneity of items comprising a scale (DeVellis 1991). The scales used in the present research in order to measure beliefs were based on previous research, and on existing scales (see section 2.2 above). Previous research suggests that the seven-point bipolar scales used in the semantic differential have relatively high reliabilities. Thus, responses to the probability scales of the semantic differential (for example, likely-unlikely), tend to yield highly reliable measures of strength of belief and intention (Fishbein 1967).

Internal consistency is typically determined through a statistical examination of the results obtained, equated with Cronbach's coefficient alpha (DeVellis 1991). Thus, the present research uses Cronbach's alpha to determine the reliability of the scales and the results. According to Nunnally (1967) the

alpha of a scale should be greater than 0.7 for items that are to be used together as a scale. Considering the present study as a whole, Cronbach's alpha varied from 0.6209 to 0.9538, which is considered acceptable for this type of research. The alpha values are presented along with the research results in the relevant research articles. Kerlinger (1981) suggests various means to improve the reliability of results, such as phrasing the measuring instruments unambiguously, determining carefully the number of items (adding more items of the same type and quality decreases the change error , and adding to the number of items increases the probability of accurate measurement), and providing clear and standard instructions for questions. These strategies were taken into consideration in designing the questionnaire. Reliability has been identified as a contributor to validity, and is a necessary but not sufficient condition for validity (Nunnally 1967; Cooper and Emory 1995).

Historically, the most common definition of validity is that it refers to the extent to which a test or a set of operations measures what it is supposed to measure (Chiselli et al. 1981). Internal validity refers to the results of the study being a consequence of the studied systems or phenomena, or being true (Tuckmann 1988). External validity refers to possibilities for generalising the results to other situations or groups. This validity can be ensured by scrutinising the effects of testing, of selection bias, of experimental arrangements and of multiple treatment interference (Lynch 1999). Internal validity has been enhanced in the present study by a careful review of the relevant literature. The external validity can be considered to be high as a result of the large sample size.

A number of other forms of validity are mentioned in the literature on research methodology. The categories most relevant to this study are touched on below, namely content, criterion-related and construct validity (DeVellis 1991).

Content validity concerns item sampling adequacy – that is, the extent to which a specific set of items reflects a content domain. In behavioural research, when one is measuring attributes such as beliefs and attitudes, the issue of content validity is more subtle, since it is difficult to determine exactly what the range of potential items is. Nevertheless, one recommended method (e.g. Chiselli et al. 1981) of enhancing content validity was employed in the survey. The items were viewed and judged by colleagues familiar with the context of the research; these experts judged the extent to which each item was representative of the domain of interest, and the extent to which the item pool adequately sampled all the relevant parts of the domain.

In order to achieve criterion-related validity, an item or scale is required only to have an empirical association with some criterion or "gold standard"; this aspect is not concerned with understanding a process but merely with predicting it. Thus, criterion-related validity is often referred to as predictive validity when it reflects the success of measures used for prediction of estimation. Criterion validity is studied by comparing scores with one or more external variables, or criteria, that are known or believed to measure the attribute in the study.

Construct validity is defined by Peter (1981) as the degree to which the scores achieved by a measure perform as they should, according to a substantive theory postulate. In other words, construct validity is directly concerned with the theoretical relationship of a variable with respect to other variables. Through construct validation, an attempt is made to identify the underlying constructs that are being measured and to determine how well the test represents them. Cooper and Emory (1995) present methods for achieving this kind of validation, including factor analysis and multitrait-multimethod analysis. In this study the former was used.

IV REVIEW OF THE SURVEY DATA

The chapter reviews some results of the survey data, concentrating on providing statistical descriptions of the survey participants and their electronic banking usage. In addition to demographical profiles and a comparison of different user groups, some interesting data are presented concerning current usage of various service delivery channels. However, it does not at this point go into an exhaustive analysis of the empirical implications, or the linkages that exist between the survey variables. This is because these more detailed considerations are given in-depth treatment in the research articles and additionally in the concluding Chapter V.

4.1 Descriptive statistics

The questionnaire was sent to a sample of 3000 banking customers. The sample was further divided into three user segments, each of which received 1000 questionnaires. The user segments were based on the customer database information received from the OKO Bank Group, each segment being defined in terms of experience with mobile banking services. Thus, the segments were labelled as regular users, occasional users and non-users of mobile banking.

Altogether 1301 responses were received, out of which 1253 were accepted for analysis. The greatest number of responses came from the group of non-users. Among the non-user segment, the response rate was 38.8 percent, among occasional users it was 33.2 percent and among regular users it was 28 percent. This kind of distribution among respondents appears to be typical, since research has indicated (e.g. Mattila 2001) that customers who prefer personal services and personal contact in service encounters are more willing to respond to survey questionnaires. In contrast, current users of technology-based services are described as being 'homing'; respondents in this category have even stated that avoiding contact with service providers is a reason for

choosing the electronic banking delivery channel – which could also indicate an unwillingness to respond to questionnaires.

The structure of the questionnaire made it possible to analyse and compare mobile banking users according to whether they used SMS or WAP services; these users are here referred to as SMS or WAP customers. In the present study, they are compared in relation to age distribution (see Figure 15), and later in relation to the channels they are using (Figures 24 and 25). In addition, some correlation coefficients were studied between using SMS or WAP service and the demographic variables.

Respondents indicated the postal code of their home address. They were dispersed geographically as shown in Figure 14. Most of the respondent came from the Southern part of Finland; Oulu and Lapland counties are in Northern Finland. This distribution of respondents is geographically consistent with the population distribution of Finland. It is interesting to notice that there are more customers using mobile banking services via the WAP service in Southern and Western Finland, whereas in Northern Finland SMS services are more commonly used.

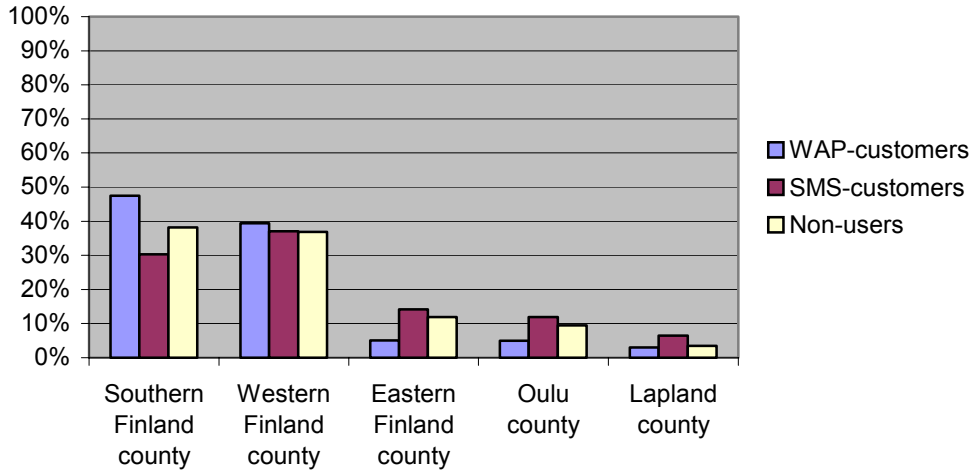


FIGURE 14 Geographical distributions of the respondents

Figure 15 depicts the age distributions of mobile banking users. As can be seen from the figure, the distribution is not consistent with mean age distribution in Finland. This can be partly explained by the fact that certain age groups are traditionally more responsible than others for taking care of the financial issues in a household. According to these results they are persons belonging to the age group 25-34 years. The distribution is also to some extent biased, since in the sample, the proportion of current users of mobile banking services is higher. The only correlation found was between age and the use of WAP services ($r^{wap}=0.107$, $p<0.01$); this can be interpreted as an indication that customers in the 25-34 age group are more likely to use these services.

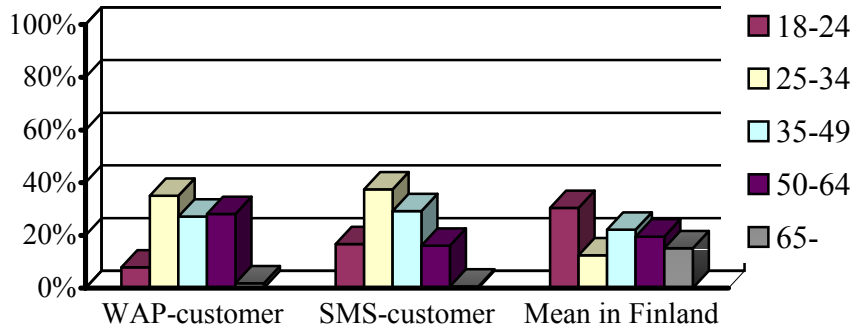
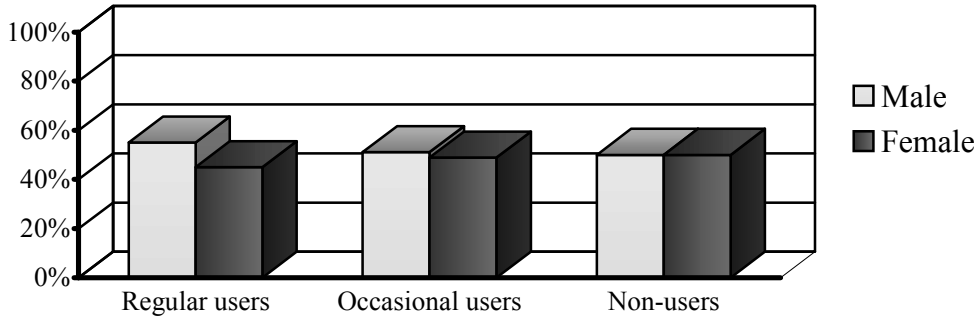


FIGURE 15 Age distributions of mobile banking users in relation to Finnish mean

Slightly over half (51.6 %) of the respondents were male and 47.1 percent female. Figure 16 presents the gender distribution of each user group. In the regular users group there were 10 percent more men than women, and also slightly more men in the occasional users group, but this difference was not statistically significant ($X^2 = 2.15$, $p = .341$). However, the results of the survey are consistent with the common belief that the early adopters of new products are male in most technology-led markets (Lu et al. 2003). No correlation was found between gender and the use of SMS services; however, there was a correlation between gender and the use of WAP services ($r^{wap} = -0.057$, $p<0.05$), indicating that men are more likely to use WAP services.



$X^2 = 2.15$, $p = .341$

FIGURE 16 Gender distributions of the user groups

4.2 Demographics of the study participants

Previous studies on electronic banking as well on theories of consumer behaviour have shown demographics to be a factor influencing the adoption of technology-based products and services (e.g. Agarwal and Prasad 1999). One of the major interests in the survey was to study the differences between the users and current non-users of mobile banking, and this was made possible by the stratified sampling method employed. At first, an overview of all the study participants is presented, and then this will be followed by a more detailed description of the differences between the three user groups. The demographic profile of the respondents is summarised in Table 3.

TABLE 3 Summarised profile of the respondents

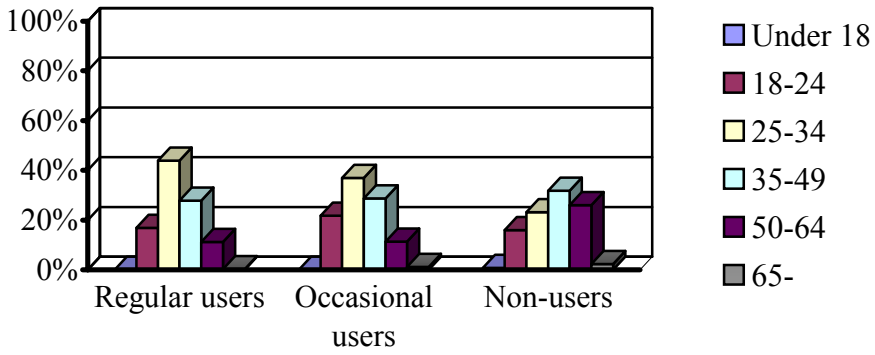
Demographic Characteristics	**Frequency**	**Percentage**	**Cumulative percentage**
Gender			
Male	634	50.6	50.6
Female	590	47.1	97.7
Missing	29	2.3	100
Standard deviation 0.499			
Age			
Under 18	4	0.3	0.3
18-24 years	226	18	18.3
25-34 years	418	33.4	51.7
35-49 years	370	29.5	81.2
50-64 years	212	16.9	98.1
65 years and over	17	1.4	99.5
Missing	6	0.5	100
Standard deviation 1.026			
Marital status			
Married	488	38.9	38.9
Cohabitation	337	26.9	65.8
Single	322	25.7	91.5
Widow	13	1	92.5
Divorced	75	6	98.5
Missing	18	1.5	100
Standard deviation 1.113			
Occupation			
Executive	70	5.6	5.6
Worker	503	40.1	45.7
Not at work	84	6.7	52.4
White-collar worker	246	19.6	72
Student	132	10.5	82.5
Farmer	29	2.3	84.8
Pensioner	54	4.3	89.1
Entrepreneur	74	5.9	95
Public servant	49	3.9	98.9
Other	5	0.5	99.4
Missing	7	0.6	100
Standard deviation 2.183			

(continues)

TABLE 1 (continues)

Education			
Elementary school	196	15.6	15.6
Commercial school	163	13	28.6
Vocational school	316	25.2	53.8
Technical school	113	9	62.8
Polytechnic	119	9.5	72.3
University	169	13.5	85.8
Secondary school	135	10.8	96.6
Other	27	2.2	98.8
Missing	15	1.2	100
Standard deviation 2.094			
Household income			
Under 10.000 euros	109	8.7	8.7
10.001-20.000 euros	191	15.2	23.9
20.001-30.000 euros	239	19.1	43
30.001-40.000 euros	195	15.6	58.6
40.001-50.000 euros	181	14.4	73
50.001-60.000 euros	130	10.4	83.4
60.001-70.000 euros	67	5.3	88.7
70.001-80-000 euros	34	2.7	91.4
Over 80.001 euros	33	2.7	94.1
Missing	74	5.9	100
Standard deviation 1.988			
Field of employment			
Industry	237	18.9	18.9
Administration	158	12.6	31.5
Logistics	82	6.5	38
Services	267	23.7	61.7
Banking /insurance	14	1.1	62.8
IT	73	5.8	68.6
Trade and commerce	73	5.8	74.4
Primary production	45	3.6	78
Other	2	0.2	78.2
Missing	273	21.8	100
Standard deviation 2.084			

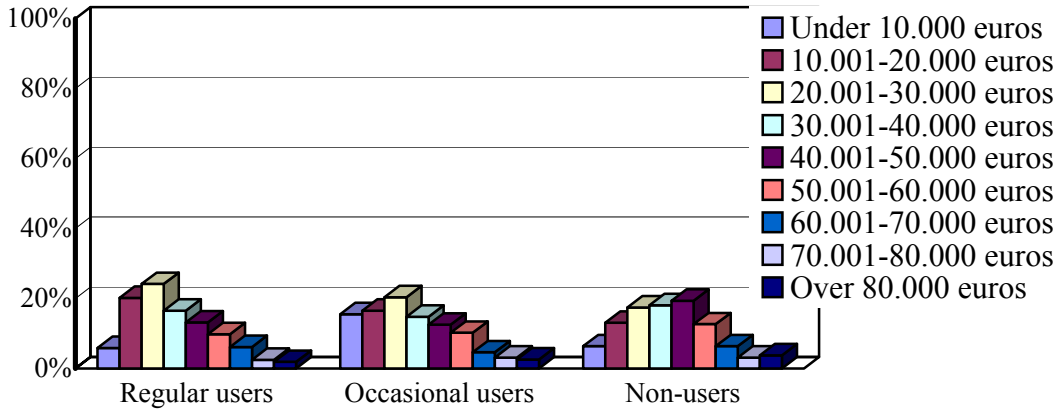
Figure 17 depicts the age distributions of the respondents according to the three user groups. As the figure indicates, the majority of the regular users belonged to the 24-34 age group, as did the majority of the occasional users. Non-users were somewhat older with about one third (31.7 %) of them belonging to the 35-49 age group. It has often been suggested that the adopters of technology-based services are relatively young, even though Internet banking studies (e.g. Mattila 2001) have shown that the typical Internet banking user is more likely to be middle-aged. In this study there was no predominance of middle-aged users.



$X^2 = 84.22$, $p = .000$

FIGURE 17 Age distributions of the user groups

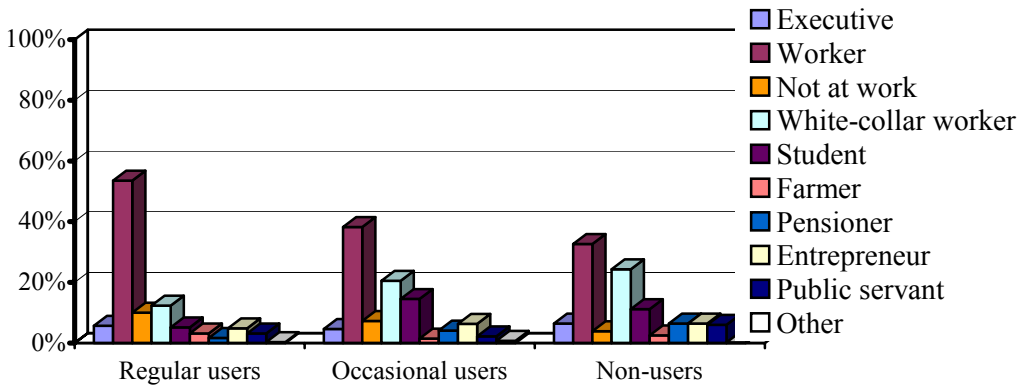
The questionnaire asked about income level, in terms of annual household income. In this connection one must remember that household size may affect the overall household income per year (see Figure 18). Almost a fifth (19.1 %) of all respondents belonged to the annual household income category of 20 001-30 000 euros, and 16.5 percent of the respondents had an income of over 60 000 Euros. The respondents were distributed fairly evenly over all the income categories, and there were no striking differences in the size of the user groups. Surprisingly, the respondents earning most (18.3 % have annual income of 40001 to 50000 euros) can be found in the user group of non-users, which may be considered as an interesting finding. When correlation coefficients between household income and the use of SMS or WAP services were calculated, it was found that the use of WAP services correlates with income ($r^{wap}=0.076$, $p<0.01$).



$X^2 = 50.78$, $p = .000$

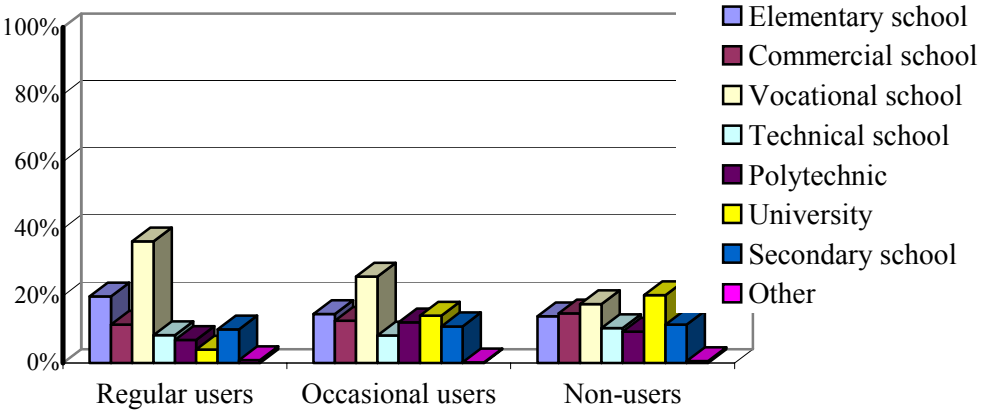
FIGURE 18 Annual household income distributions of the user groups

The other interesting variables in tracing the demographic characteristics of the different user groups are occupation, education and field of employment. Figure 19 depicts occupation distribution; it shows that worker was the largest occupational category in each user category (53.3 % of regular users, 38 % of occasional users, 32.5 % of non-users). The second largest category was that of white-collar workers; in the non-users group as much as 24.3 percent of the respondents belonged to this category. This result is consistent with the picture that emerges from Figure 20, which depicts the educational background of the respondents. In most cases this was vocational school (35.9 % of regular users, 25.5 % of occasional users), but 20 percent of the non-users had a university degree. Traditionally, the innovators in the use of technological products are often characterised as being at a higher professional and educational level, and it has been found, for example, that the non-users of Internet banking are often pensioners (e.g. Rogers 1995; Polatoglu and Ekin 2001). However, the results of this survey would appear to contradict this characterisation.



$X^2 = 90.88$, p = .000

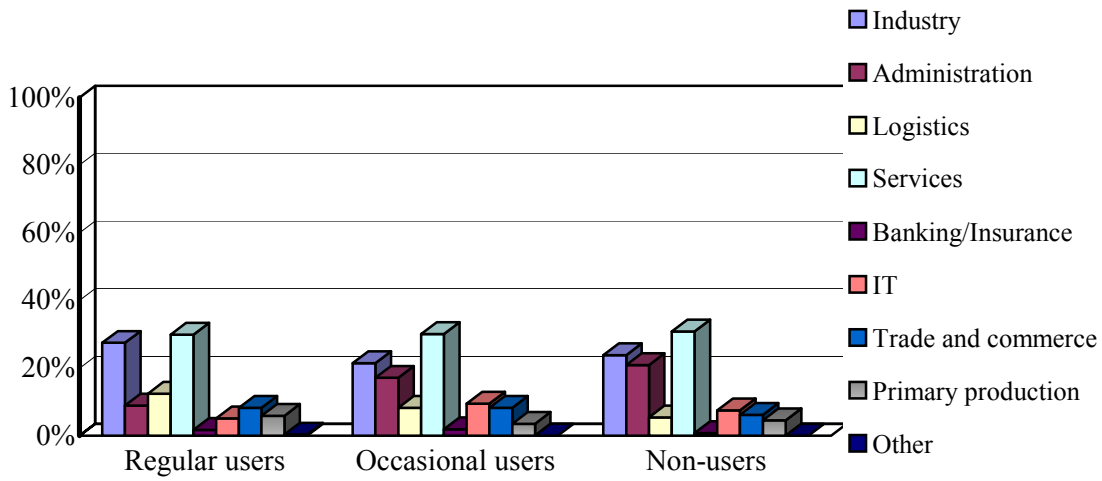
FIGURE 19 Occupation distributions of the user groups



$X^2 = 86.43$, p = .000

FIGURE 20 Education distributions of the user groups

Most of the respondents worked in services (23.7 %), as can also be observed from Figure 21. The next largest fields of employment were industry (18.9 %) and administration (12.6 %). In relation to this variable there was no significant difference between the user groups.



$X^2 = 37.78$, $p = .002$

FIGURE 21 Field of employment distribution of the user segments

Summarising the descriptions in the paragraphs above, one can say that demographics do have an impact on the use of mobile banking, even though the variances between the user groups were not as high as one might have expected from previous research (see Chi square statistics). Nevertheless, the review yielded an explicit description of the users of mobile banking in term of demographical variables. There were 10 percent more men in the regular users' group. Users of mobile banking services typically belonged to the 25-34 age group. The majority of regular users (43.6 %) were aged 25-34 years, as were the majority (36.8 %) of the occasional users. Non-users tended to be older than the other two groups, with a third being in age group 35-49, and 25.9 percent in age group 50-64.

Married persons comprised 38.9 percent of the respondents. The majority of the respondents (19.1 %) belonged to household income category 20 001-30 000 euros per annum, a figure in line with the average yearly income for two persons in Finland. The majority of the respondents were workers (40.1%), the second largest category being that of white-collar workers (19.6 %) and the third largest that of students (10.5 %). These results are compatible with the background education of the respondents, which in most cases (25.2 %) was secondary level vocational school. However, the results differ from previous findings on electronic (Internet) banking users, who have previously been found to have had a university level education and to belong to the higher professions (e.g. Jayawardhena and Foley 2000).

4.3 Current usage of mobile banking services

The survey also viewed the participants' ways of conducting their banking: how often, via which mobile banking mode, usage of several services in parallel, preferred channels for certain banking services. As shown in Figure 22, the majority of the respondents (58.3 %) reported that they conducted banking 1-3 times a week. For 32 percent the figure was less than once a week and for a very small minority more than 7 times a week.

At the present moment, mobile banking essentially means using the SMS services. This, the "simplest" mode of mobile banking services, is still the one most used (by 71 % of the respondents, see Figure 23).

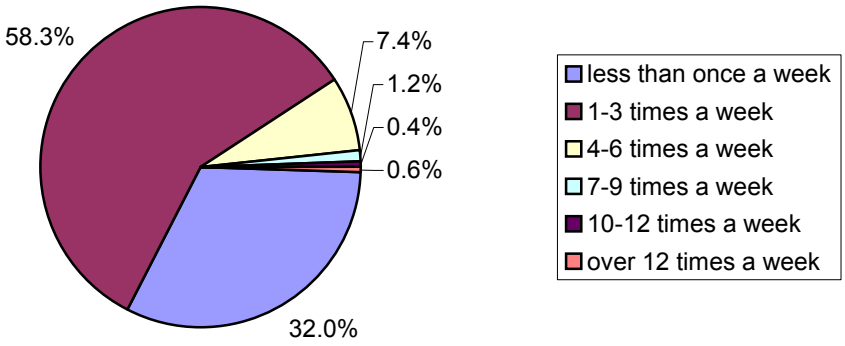


FIGURE 22 Distribution according to banking frequency

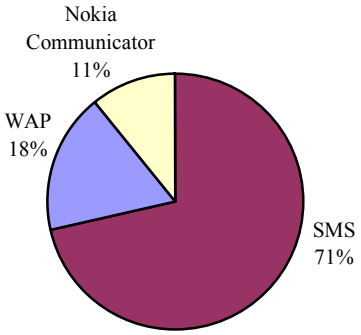


FIGURE 23 Distribution of mobile banking service mode

The following Figures (24 and 25) shed light on the distributions of usage of different service delivery channels. The WAP customers use the Internet banking channel (80.5 %) and also SMS services (73.6 %). These two service delivery channels are thus alternatives for this customer group, with considerable usage for both channels. By contrast, customers who use SMS services use both Internet banking services (72.2 %) and ATM services (41.3 %). This group does not use WAP services as an alternative channel. These findings are a clear indication that multi-channel management is needed by banks already today!

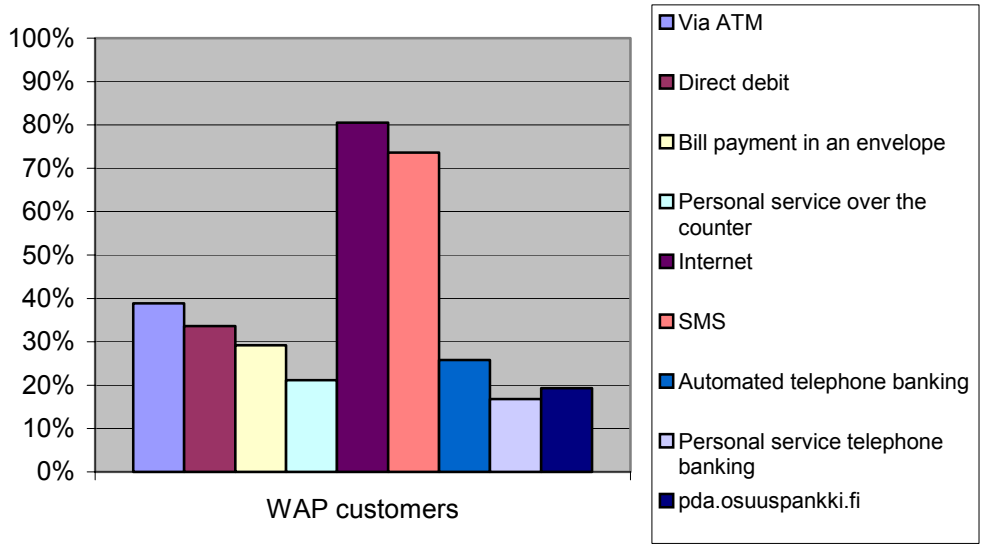


FIGURE 24 WAP customers: usage of different service delivery channels

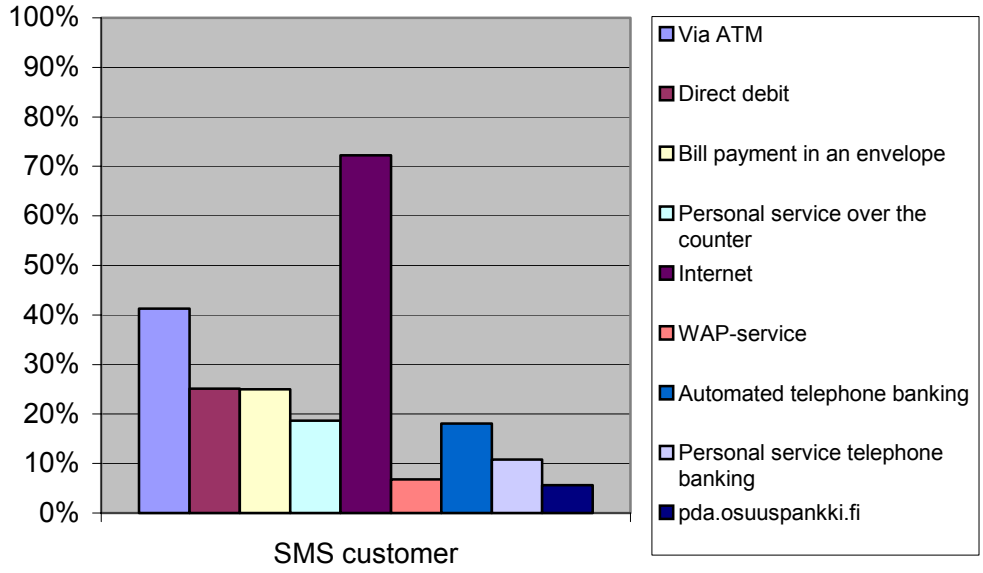


FIGURE 25 SMS customers: usage of various service delivery channels

Figure 26 below gives an overview of respondents' perceptions of the suitability of different channels for different banking services. In branch offices, consumers would be most willing to deal with a loan application (86.5 %), obtain legal advisory services (80 %) and order currency (78.4 %). Given the nature of these services these results were not surprising. Services such as making an account balance inquiry (35.7 %), making a transaction inquiry (15.9 %), paying a bill (7.2 %) and making a card credit balance inquiry (5.2 %) are regarded as suitable also for mobile banking services. Notice that these services are precisely those which are used in everyday routines, i.e. in cases where the advantage of mobile banking "access while on road" becomes more noticeable. Furthermore, the findings emphasise the fact that, along with traditional branch banking, Internet banking has a firm foothold in Finnish banking habits.

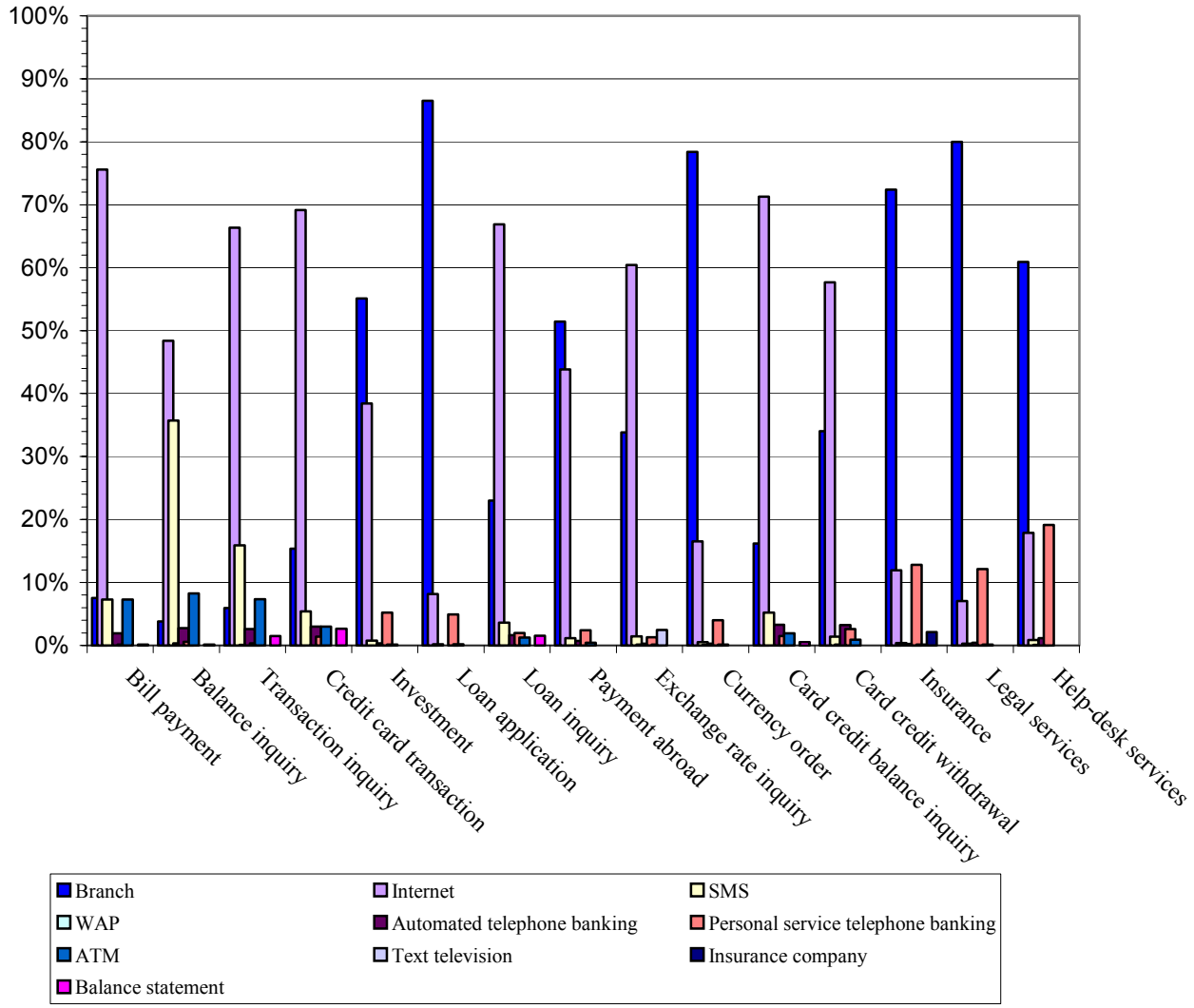


FIGURE 26 Channels used for particular banking services

V RESULTS AND CONCLUDING DISCUSSION

This chapter discusses the results from hypotheses testing, the general contributions of the present study, together with its limitations, and the future avenues for research arising from it.

5.1. Testing the hypotheses

The hypotheses arrived at from theoretical considerations were formulated and tested using linear regression analysis. Applying the regression analysis in investigating factors influencing a certain behaviour of consumers follows the research path chosen for example in Swaminathan et al. (1999), Morris and Venkatesh (2000), Venkatesh and Davis (1996). The independent variables were regressed on dependent variable "adoption of mobile banking services". Dependent variable "adoption" was measured as current usage of SMS-, WAP- and PDA-services adapted and modified from Davis (1989). The idea and rationale of the independent variables used to test each hypothesis is provided in the model described in Figure 13 in Section 3.2.1. Variables observability and communication were integrated and tested as one independent variable regressed on the dependent variable. Multicollinearity was ruled out since the VIFs (variance inflation factor) were all less than 10. The scatter plots were drawn and examined in order to avoid the problems of non-linear relationships, extreme scores and combined groups. All the hypotheses, with the exception of H2 (complexity) and H6 (risk), were supported (see Table 4).

Previous literature (e.g. Tan and Teo) has consistently shown that relative advantage (H1) has a significant and positive influence on the adoption electronic banking. This was also the case in the present research (β= .212, p=.000). On the other hand, the lack of support for H2, complexity, (β= -.049, p=.218) is in contrast with previous findings, which have indicated that the more complex an innovation is to use, and the greater the skill and effort needed to adopt it, the less likely it is that the innovation will be adopted.

Nevertheless, it should be noted that in regard to Internet banking, a similar result was obtained by Tan and Teo (2000). They explained their finding by referring to Moore and Bensabat (1991), who suggested that this attribute starts to take effect only after hands-on trials have begun. In the Finnish setting, an explanation could lie in the fact that the diffusion of mobile banking is still at a relatively early stage; those consumers who have already adopted mobile banking can be categorised as innovators in terms of Rogers' continuum of adoption. Innovators are often technology enthusiasts; they are willing to tolerate the initial glitches that typically accompany a technology-based innovation when it has just come onto the market.

The support we found for H3, compatibility with values and earlier experiences (β= .215, p=.000) is similar to previous findings. Consumers who feel that conducting banking via wireless channel is compatible with they values and way of life are more inclined to adopt. In this connection, infrastructural developments in Finnish society have been very favourable to an increasing acceptance of technology-based services. The idea of "Nokia-land" is not just something that foreign journalists have invented.

Hypothesis H4, concerning observability/communication, was supported (β= -.118, p=.005). It therefore appeared that the assumptions of the Bass communication model were pertinent in the context of this phenomenon. In a similar vein, H5, trialability, was supported (β= .169, p=.000). As argued by Rogers (1995), it seems to be the case that potential adopters who are able to experiment with an innovation are more likely to adopt the innovation. In the present study, it emerged that those respondents who had already tried mobile banking services were more likely to be current users of the services.

The fact that H6, risk, (β= .017, p=.655) was not supported might be considered surprising in the light of previous findings and generally-held opinion. Indeed, previous literature has suggested that this construct could be of considerable significance for banking service adoption, and particularly in relation to the "new" electronic environment (e.g. Black et al. 2001). Yet the non-significant effect of perceived risk on the adoption of mobile banking services appears to indicate that users are not in fact so seriously concerned about the risk of conducting banking via a wireless channel, measured in terms of the overall security and trustworthiness of the services offered.

The support for H7 a, technology perceptions, (β= .154, p=.000) is in line with e.g. Gatignon and Robertson (1985). It seems that users will look on mobile banking more positively if they are accustomed to mobile phones, computers and other technology-based products and services, and if they have a positive attitude towards technology as a whole.

TABLE 4 The results of the regression analyses

	β	*p*	*Support(yes/no)*
H1	.212	.000	Y
H2	-.049	.218	N
H3	.215	.000	Y
H4	-.118	.005	Y
H5	.169	.000	Y
H6	.017	.655	N
H7 a	.154	.000	Y

Hypothesis H7 b, concerning demographics, was tested using correlation analysis. The results are outlined in Table 5. The variables under study were included on the basis of previous research suggesting that demographic variables may very well have an influence on the adoption of electronic banking services. Only the hypotheses concerning age (number 2) and education (number 4) were supported in the analysis. The positive coefficient on age (r=.085**) is consistent with the finding presented in Chapter IV since the adoption of mobile banking services was measured among other as the usage of WAP-services. Positive correlation on age indicates that older customers are more likely to adopt the services, which is not in line with prior empirical research on electronic banking (e.g. Howcroft et al. 2002). However, Rogers' (1995) suggests that earlier adopters are no different from later adopters in age.

Interestingly, the only other significant demographical variable in this analysis was education (r=-.183**). The negative correlation coefficient could be interpreted as indicating that consumers with lower levels of education are especially likely to adopt mobile banking services. This finding is not in line with previous banking research (e.g. Polatoglu and Ekin 2001; Mattila 2001), but it supports the descriptive analysis presented in Chapter IV.

TABLE 5 H7 b: Demographics. Correlation coefficients

	1) Gender	2) Age	3) Marital status	4) Education	5) Household income
Adoption of mobile banking services	-.038	.085**	.010	-.183**	.052
Sig.	.190	.003	.731	.000	.077

Notes: ** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed)
(measured by using Pearson's Rho)

5.2 Contributions

If banks are to successfully integrate new technology into their service delivery platform, it is essential that they should understand the impact of technology-based delivery channels on customer perceptions and behaviour. The present research provides without dispute new information on consumer behaviour and on the changes taking place in the sector. The dissertation makes a contribution to electronic banking research; however, the findings can also be applied to other similar types of innovations.

Despite all the possibilities offered by the new electronic channels for banking services, there are various psychological and behavioural issues which appear to influence the acceptance of mobile banking, and these need to be better understood. In addition to extending our understanding of consumer behaviour in mobile banking context and innovation adoption from a theoretical stance, the research presented also has practical implications for managers who have to make decisions about the new technology-based services.

5.2.1 Theoretical contributions

As Poincare (1983) so aptly noted: "*Science is just facts, just as houses are made of stone… But a pile of stones is not a house, and a collection of facts is not necessarily science*" (Whetten 1989). Thus, theoretical insights come from demonstrating how the addition of a new variable significantly alters our understanding of a phenomenon. The new information stems from inconsistencies between the quantitative or qualitative data gathered and conventional wisdom. This holds true in the present research also.

The theoretical relationships outlined in innovation diffusion research, between perceived innovation attributes and adoption behaviour, were in fact supported by the survey findings. In line with previous studies, the present research gave support to Rogers' model as an adequate and parsimonious conceptualisation of adoption behaviour in the mobile banking domain. However, the model used, which was based on Rogers' work, and the results obtained from it, yielded some new insights into consumer behaviour patterns. For example, the issues of complexity, trialability and perceived risk are not as straightforward as might have been expected in this domain. Furthermore, some aspects of the Rogers model may call for refinement: Rogers (1995) viewed many innovation attributes as being conceptually unique and unidimensional; by contrast, the empirical evidence of this study suggests that certain innovation attribute constructs might usefully be sub-divided. Furthermore, not all innovation characteristics exert a similar steady influence on adoption, although this might have been the a priori assumption. As in many other studies, relative advantage appears in the present survey to be overwhelmingly important for user acceptance (e.g. Agarwal and Prasad 1997).

In terms of advancing theoretical perspectives, the study provides empirical support for a theory of how individual differences drive the adoption of new technology-based products. The results suggest that certain demographical variables have an impact on adoption behaviour; they also suggest that the use of certain communication styles and modes makes consumers more receptive to information concerning an innovation. Overall, the conclusions drawn from the results suggest that it is not simply the paradigm of service environment that is changing, but also the typology of the electronic service user. It appears that the profile of a typical mobile banking user differs from that of an Internet banking user.

From the theoretical point of view, the study confirmed that the traditional models used in adoption research require a degree of modification and extension. The findings indicated herein are consistent with those of Petersen and Ling (2002), in the sense that there appears to be a need to develop different versions of adoption models; the constructs in these models will have to be specific to the service or user segment in question. The results suggest that models of technology adoption should take the nature of the technology into account, since commonly-held perceptions may not in fact be applicable to every technology.

In consumer research it is generally believed that past experience of using a similar technology contributes greatly to favourable attitudes to a new technology, and to the actual adoption of this technology (e.g. Dabholkar 1996). The findings in the present research revealed that positive technology perceptions may also enhance the adoption of mobile banking; nevertheless, the adoption framework that emerged in the context of the study implies that experience with Internet banking services – which can be regarded to some extent as similar to mobile banking services – do not necessarily encourage mobile banking. Internet banking is apparently not a related service product in the ways suggested by Gatignon and Robertson (1985). It seems that the typical Internet banking user will continue to use a wired delivery channel, whereas customers who currently pay bills by automatic means and via branch offices are more likely to make the "leap" to mobile banking. Extrapolating from this, it can be argued that banks should not invest large sums of money in order to convince regular Internet banking users to change from one electronic channel to another; instead, they should try to convince customers outside this segment about the advantages of mobile banking. And on a general level, the conclusion provides further reasoning why strategies and services designed for the Internet cannot be directly converted into the mobile service environment: differentiation is needed.

In addition to these considerations, the findings give some interesting insights into marketing and management practice. The implications drawn from the findings could help service providers to understand consumers better and to make more rationally-based decisions. The results provide concrete tools for managers concerning the ways in which mobile banking services should develop in order to meet customers' needs. Thus, for example, the study

provides data on the service attributes that will be most valued in the future, and on the optimal modes and styles of information dissemination.

5.2.2 Implications for practitioners

According to Lievens and Moenaert (2000) the study of innovation in the financial service industry is a relatively new area of business research; they date the research on this topic as having got under way around the mid-1980s. Admittedly, this could be seen as a factor that may increase the interest of the findings of the present study. Given the "newness" of the phenomena under study, the present research is itself fairly unique, providing results which, for the most part, have not been obtained before. Academic research on the factors affecting the adoption of mobile banking has been sparse, and has tended to be limited in scope (see e.g. Deutsche Bank Research 2002). It was for this reason that, in attempting to close the knowledge gap, the initial approach largely involved extrapolating from knowledge acquired about other modes of electronic banking.

Identification of the demographic and psychographic profiles of adopters provides a number of implications for services marketing managers (see Research Article. While such information is important in planning each element of the marketing mix, it is especially important in developing the promotional activities and media plan. When innovations are introduced, the most desirable outcome from a financial institution's point of view might well be to make the innovation a routine part of the adopter's life. Rogers (1995) argues that the final phase in the adoption of an innovation is that of routinisation, which occurs when the innovation has become incorporated to regular activities of the adopter. Novelty and curiosity regarding the use of mobile banking services was mentioned in the survey as one trigger for adoption. The present results reflect the fact that mobile banking services are at a relatively early stage in the path of diffusion (see Research Articles II and IV). It is often the case that the first adopters of an innovation are motivated simply by the desire to get their hands on the latest and greatest innovation; the stimulus is curiosity regarding anything that is truly brand-new. Mobile banking has not yet gone beyond this phase, indicating clearly that mobile banking services are not yet fully institutionalised; they have not entirely become part of the ongoing practice and way of life of the adopters.

Mobility-specific factors were shown to be the most significant triggers for mobile banking adoption, meaning accessibility and availability of services regardless of time and place (see Research Article III). From the point of view of mobile banking adoption, the accelerating pace of development entails both encouraging and discouraging aspects. On the one hand, customers like the idea of being technologically up-to-date; on the other hand, being an early adopter means having to tolerate possible initial glitches and investing time and effort in learning. One negative effect of the accelerating pace of development is manifested in services that are launched at too early a stage of development, due to pressures of competition and cost.

It is encouraging that even though the security of the services was found to be a significant factor in channel choice, the wireless channel was viewed as being trustworthy. This would predict a positive future for mobile banking. Moreover, as mentioned above, enthusiasm for technological development itself is obviously a driver for the adoption of mobile banking. And there are advantages in mobile banking also in the savings made in time and effort. The main impediments to the adoption of mobile banking are functional-specific in nature. Examples of these include problems regarding the supplier side of the services: too slow data transmission, a complicated user interface, malfunctions in the service, and insufficient guidance. Drawing on these findings it can concluded that the consumers conceive the various electronic delivery channels as having clearly different features which then may or may not fit to the needs of a consumer. However, it is evident that decisions made on the development of the distributions channels represent a central issue in future development of the whole financial services industry (Howcroft and Kiely 2000).

The research findings provide some indications as to who could be the next mobile banking customers, and what their characteristics might be. These aspects emerge from the questions asked of all three users groups regarding their intentions. The results are discussed in more detail in Research Article IV. The examination of intention has met with some criticism among researchers on consumer behaviour; however, research on technology-based products has employed questions on intention as a useful empirical procedure. For example, Lu et al. (2003) studied intention to use wireless internet via mobile devices rather than the actual use of these devices, or Molesworth and Sourtti (2002) had the focus on initial trial-adoption of online car buying. This was due to the novelty and the fact that the services were (and are) still at an early stage of the diffusion process. It was nevertheless argued that an investigation into the intention to use would enhance the predictive power of the model in question.

5.2.3 The revised model

As part of its primary academic goal, this chapter sets out a model which responds to the initial question raised in the study: *What are the dimensions affecting the adoption of mobile banking services in Finland*? In so doing, it draws on the theoretical as well as the practical contributions of the study; it also makes use of the answers to the research questions that were discussed in the previous chapters and in the research articles.

The framework of the dissertation was first outlined in Section 2.4. The revised model highlights and summarises the findings and the effects of the dimensions on adoption of mobile banking. The results from hypotheses testing are also presented. The reader will have observed that the dimensions presented were validated and justified as the dissertation progressed. Rogers' model and the five (six) innovation attributes were further validated and are given an in-depth treatment in Research Article II.

At this point it may be of interest to explain certain changes that occurred in the framework as the research progressed. These changes involved the

dimensions *time* and *demographics*. Initially, time as a diffusion element was not included in the study as a core construct. However, the empirical findings, discussed in detail in Research Article III, indicated that time has a significant effect on the adoption of mobile banking. In fact, it was found that time (which was defined herein as the rate of technological development of the surrounding social system, and the constituting of a variably accelerating pace of development) has both a positive and a negative effect on adoption behaviour. In addition, following a more precise review of the theoretical base underlying the research, together with support given by the empirical survey, the researcher was led to incorporate the dimension of demographics within consumer characteristics. Re-labelling the dimension this way was found to increase the comprehensiveness of the model.

In addition to the demographics, such variables as the beliefs and perceptions of consumers, personality traits, and intentions to use can be now included in this dimension. Thus, a new, more general label is appropriate better describing the nature of the dimension (see Consumer Characteristics in Figure 27).

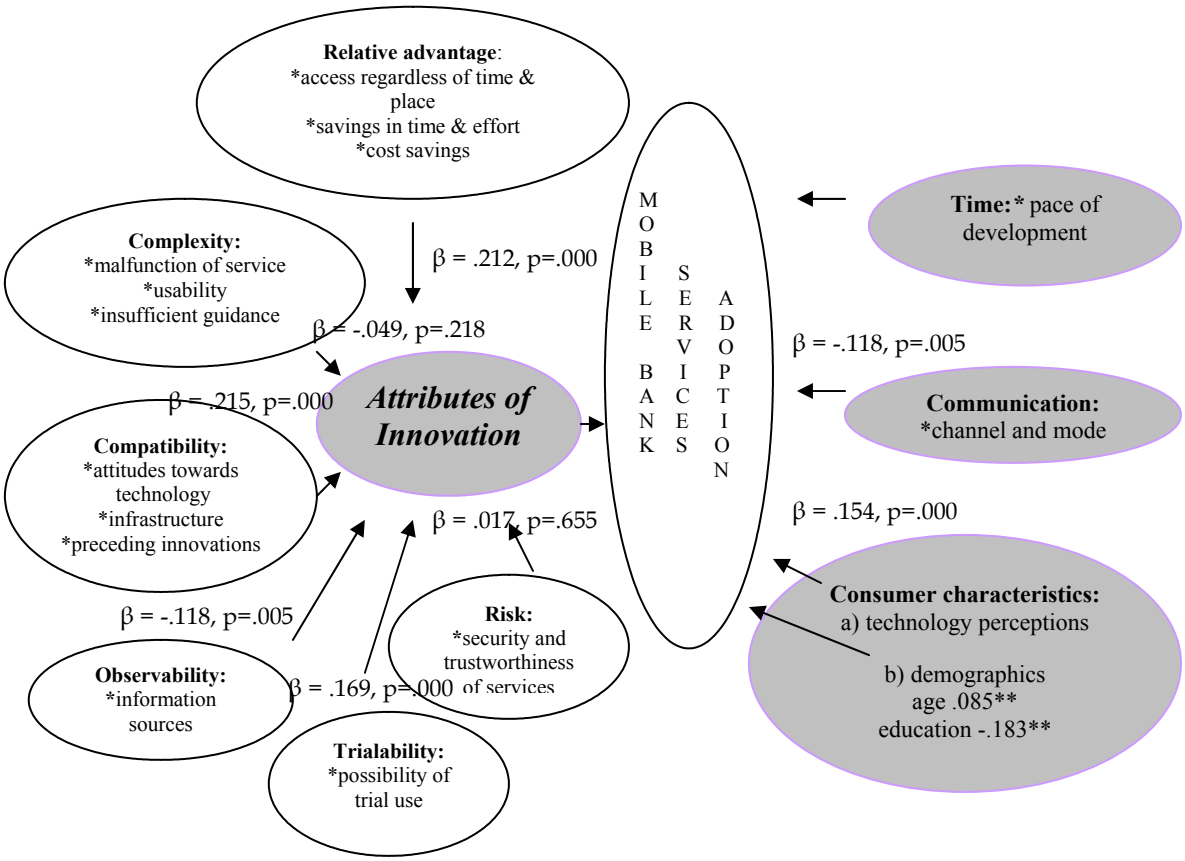


FIGURE 27 Dimensions affecting mobile banking adoption

5.3 Limitations of the study

Notwithstanding the contributions discussed every piece of research has its limitations, and the limitations of this study arise from its relatively narrow research focus. Even though the dissertation highlights various research areas within consumer behaviour research, it does not attempt to propose a model that would be fully comprehensive or universally applicable. Rather, it should be viewed to some extent as a preliminary insight into the relatively unexamined and unknown territory of mobile banking. The research focus was almost entirely on the consumer, with scrutiny of a certain limited number of adopter characteristics and perceived attributes of innovation. These elements narrow the scope of generalisations from the findings. It should be noted, however, that one of the research articles (see Research Article I) examines the usage of mobile services more generally. Admittedly, the findings are bound by the selection of one research context – mobile banking services – and by the particular operationalisation of the variables.

It should also be noted that the study examined mobile banking only in Finland. Clearly, Finland can be regarded as one of the most technologically advanced countries, and this technological advancement extends also to banking services within the country. Overall caution must be considered in regard to the generalisability of this study to the application of results across countries. The findings are representative of only the Finnish customers.

Another point to take into consideration is that the majority of the respondents in the study were technologically oriented. The consumers investigated in this research might present more of the innovator type of a consumer than presenting the majority. Within innovative high technology products or services it is often the case that products will initially enjoy a warm welcome in an early market made up of technology enthusiasts, but then fall into a chasm as defined by Moore (1999). And yet, the service providers are interested to gain acceptance within a mainstream market. It may be that the stratified sampling technique that was used led to the sample being too homogeneous, and the statistical efficiency might have been reduced as a result. This could have had an effect on the validity and reliability of the results.

Methodologically speaking, the present research was in the main a descriptive study: it defined and explained the variables and their relationship within a given situation, and in the end aimed at forming a model of consumer behaviour patterns in relation to the phenomenon. No doubt a better understanding would have been gained of the strength of association between the variables if a more rigorous statistical analysis had been used. This could have included, for example, structural equation modelling. It would also be possible to extend the study, using for example data collection methods other than just the survey. By this means one might obtain additional evidence to support and expand the findings. The results are limited mainly to one research method for testing cross-sectional effects. However, using confirmatory factor

analysis and structural equation modelling would have presupposed that prior studies had indicated which measures validly and reliably tap a given construct explicitly with regard to the phenomenon under investigation, or that pre-studies had been conducted to resolve these issues (Bagozzi and Baumgartner 1994).

Like every other investigation of human behaviour, descriptive or causal, the study is also open to the criticism that the model arrived at cannot be more than a condensed and inadequate representation of the complex real world (Bagozzi 1980). This is particularly evident in a study such as the present one, which aims to move from hypotheses towards a model of a "hypotheticalised" world – one which has only doubtful claims to being an analogue of our own world. The problem is especially acute in cases where the hypotheses in a study have not been confirmed. Nevertheless, hypotheses such as those in the present study, whether confirmed or not, are a means by which our own world can be better understood. The point has been aptly made by Kerlinger (1973, 26), who laid stress on the importance of hypotheses in investigations:

> *"Even when hypotheses are not confirmed, they have power. Even when y does not covariate with x, knowledge is advanced. Negative findings are as important as the positive ones, since they cut down the total universe of ignorance and sometimes point op fruitful further hypotheses and lines of investigation. But the scientist cannot tell positive from negative evidence unless he uses hypotheses."*

5.4 Future research

Considering simply the geographical scope of the present study, there is clearly a need for further search. In the present survey the sampling frame was limited to Finland. One would wish to do more than investigate the diffusion of mobile banking services within a single "pioneering" land of mobile communications; in so doing, one would probably gain valuable new insights into consumer behaviour patterns. Replicating this kind of research in a multicultural, cross-border context would reveal which adoption factors are culturally bound. Extension of the study this way would advance our understanding for example in strategic positioning of mobile banking services in different markets.

Additionally, this research was cross-sectional. It would be interesting to discover the kind of information a longitudinal study might produce regarding the real rate of adoption of mobile banking. In most studies of adoption, both the technology and the consumer are seen as static entities, i.e. they are not perceived as undergoing change during the adoption process. However, some studies (e.g. Carlell 2001) indicate that both the consumer and technology change as time passes, and a longitudinal study would provide evidence on this point. The findings of this kind of study investigating technological innovations will need to be updated regularly to keep pace with the changes occurring within the financial services industry.

Another interesting and almost totally ignored area in diffusion research is the study of rejection and its determinants and not just adoption of an innovation. Even though one of the objectives in this research was to find out the drivers *and* inhibitors of mobile banking, the focus was still on adoption. Though given that the long-run success of an innovation depends on both adoption and rejection as stated by Gatignon and Robertson (1989).

Based on the findings of this study, certain assumptions were made regarding future mobile banking users. It would obviously be interesting to see whether these assumptions proved to be true. A further point to note is that this research concentrated on the adoption of mobile banking purely from the consumer perspective. However (as discussed briefly in Research Article III) there are a number of what might be called supplier-side factors boosting the adoption of mobile services. This organisational perspective has been studied to some extent within Internet banking research, but not extensively in the mobile banking context.

Bissola (2003) argues that in the near future banks should be able to offer each customer a set of products best suited to her personal situation, in order to cope with and stimulate her financial needs. Clearly, to prevail over competitors, banks should be aware of this strategic option and be pro-active: empirical research is, in fact, a means of providing tools for practitioners. One interesting area of research would be to compare within the same study the use of various electronic channels and services: one would hope to discover the reasons that led to a preference for one channel over another, or for using several channels in parallel. Even though it seemed in light of the results from this survey that multi-channel distribution management should play already today a large role in banking. This is something that one would wish to investigate further.

One possible way to approach the mobile banking phenomenon could be to determine how quality-value-loyalty chains are built up in mobile banking services, possibly in comparison to other modes of electronic banking. The questions raised in Research Article IV (concerning whether a critical mass in mobile banking will be reached, and whether a mobile banking mass market will be developed) would provide a useful avenue for further research.

One particularly interesting finding from the present survey was that current regular users were not really keen on increasing their usage of banking services via a wireless channel. This raises the question of whether it is worthwhile to increase the number of different services offered through this channel, or whether it would be more valuable to pursue a more concentrated strategy. However, many banks have continued to announce investments in mobile banking projects. No doubt the programmes the banks are undertaking will lead to plenty of challenges for research in the future.

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YHTEENVETO (FINNISH SUMMARY)

Mobiilipankkipalveluiden adoptio Suomessa

Nopeat muutokset pankkien toimintaympäristössä - kilpailun kiristyminen uusien, perinteisen pankkiliiketoiminnan ulkopuolelta tulevien toimijoiden taholta, tuoteinnovaatiot, pankkitoiminnan globalisaatio ja teknologinen kehitys - ovat johtaneet siihen, että kilpailu asiakkaista on entistäkin kovempaa. Seurauksena pankit ovat siirtyneet tarjoamaan palveluitaan yhä useampien jakelukanavien kautta. Innovatiivisten palvelutuotteiden, laajemman palveluvalikoiman ja useiden jakelukanavavaihtoehtojen kehittämisen tavoitteena on ollut tyytyväisempi asiakas ja parantunut tehokkuus. Elektronisten jakelukanavien luominen on ollut osa kehitystä kohti tuota tavoitetta.

Tässä tutkimuksessa keskitytään tutkimaan yhtä näistä elektronisista kanavista, mobiilin päätelaitteen välityksellä käytettäviä palveluita ts. mobiilipankkipalveluita. Tarkoituksena on selvittää mobiilipalveluiden käyttämistä yleisesti, pankkipalveluiden käyttämistä langattoman kanavan kautta, ja erityisesti palveluiden käyttöönoton tai käyttämättömyyden syitä ja uskomuksia kuluttajakäyttäytymisen taustalla. Mobiilipankkipalvelut nähdään innovaationa pankkitoimialalla, siksi teoreettisena lähtökohtana tutkimuksessa on käytetty perinteistä innovaation diffuusion teoriaa ja toisaalta, kuluttajanäkökulmasta tarkasteltuna, on kysymys innovaation omaksumisesta, adoptiosta. Tutkimuksen viitekehyksen muodostamiseksi on tutustuttu aikaisempaan empiiriseen tutkimukseen koskien teknologiapohjaisen palvelutuotteen erityispiirteitä, diffuusiota ja adoptiota, sekä elektronista pankkitoimintaa, joka useimmiten on tutkinut Internet-pankkia. Lähtökohdiltaan tutkimuksen kontribuutio on soveltaa näitä teoreettisia näkökulmia uuteen tutkimusaiheeseen, mobiilipankkipalveluihin.

Mobiilipankkiliiketoimintaa käsitteleviä tutkimustuloksia tai tieteellisiä selontekoja ei ole toistaiseksi juurikaan julkaistu, mikä edelleen lisää tutkimusalueen kiinnostavuutta. Kansainvälisesti mobiilipankkipalveluiden käyttäjämäärät ovat olleet vielä vähäisiä. Kuitenkin kilpailulliset ja kustannustehokkuuspaineet, samoin kuin langattoman tiedonsiirron nopeutuminen ja kolmannen sukupolven matkapuhelinten käyttöönotto muuttavat mobiilia toimintaympäristöä parhaillaan, ja siten tulevat lisäämään erilaisten mobiilipalveluiden käyttöä, niihin kohdistuvaa kiinnostusta ja tutkimustulosten hyödyntämisen mahdollisuuksia. Metodologiselta taustaltaan tutkimus luokitellaan positivistiseksi, kuvailevaksi tutkimukseksi, jolle on tyypillistä, että tutkimusilmiötä pyritään selittämään ja ennustamaan; siitä pyritään luomaan kuva tai malli, jossa eri tekijöiden väliset vaikutussuhteet tulevat ilmi.

Tutkimusaineisto koottiin touko-heinäkuussa 2002 postikyselyn avulla, jonka yhteydessä lähetettiin 3000 kyselykaavaketta pankin asiakkaille. Otos koostuu tasaisesti ympäri Suomea asuvista asiakkaista, eikä otosta ollut rajoitettu demograafisten muuttujien suhteen. Sen sijaan otos oli jaettu kolmeen yhtä-

suureen osaan mobiilipankkipalveluiden käytön suhteen (1000 kyselykaavaketta kullekin ryhmälle). Ns. ei-käyttäjät eivät olleet koskaan hoitaneet pankkiasiointiaan mobiilikanavan välityksellä, satunnaiset käyttäjät olivat aloittaneet mobiilipankkipalveluiden käytön ja säännölliset käyttäjät olivat hoitaneet pankkiasiointiaan tätä kanavaa käyttäen jo pidemmän aikaa. Kyselykaavake oli osittain räätälöity nämä käyttäjäryhmät huomioiden. Vastauksia palautettiin yhteensä 1303 kappaletta, joista 1253 hyväksyttiin analysoitavaksi tutkimusaineistoksi. Vastausprosentiksi saatiin 41,8 prosenttia. Valitun tutkimusmetodologisen lähestymistavan mukaisesti kvantitatiivista aineistoa analysoitiin tilastotieteellisillä menetelmillä.

Tutkimuksessa kehitetty mallia testattiin hypoteesien avulla, joiden mukaisesti mobiilipankkipalveluiden adoptioon vaikuttavia tekijöitä ovat: omaksumisesta seuraava suhteellinen hyöty, innovaation monimutkaisuus, innovaation yhteensopivuus kuluttajan arvojen ja aikaisempien kokemusten kanssa, havainnollisuus, testattavuus ja adoptioon liitettävä havaittu riski. Lisäksi palveluiden omaksumiseen vaikuttavat käytetyt kommunikaatiokanavat, sekä kuluttajan ominaisuudet, kuten demografiset tekijät ja teknologiasuhtautuminen.

Tutkimuksen empirian tuloksista nousi esille mielenkiintoisia uusia näkökulmia pankkipalveluihin liittyvään kuluttajakäyttäytymiseen. Keskeinen tavoite tutkimuksessa oli määrittää mobiilipankkipalveluiden käyttäjän tyypillinen profiili. Aineiston mukaan mobiilikanavaa käyttävä henkilö on naimisissa oleva mies tai nainen, 25 – 34 –vuotias, keskiasteen koulutuksen omaava, keskituloinen ja työskentelee työntekijänä palvelusektorilla. Muuttujista iällä ja koulutustaustalla havaittiin olevan suuri merkitys mobiilikanavan kautta tapahtuvan pankkiasioinnin suhteen. Tämä tulos poikkeaa aikaisemmista tutkimustuloksista, joiden mukaisesti innovaatioiden, ja erityisesti mobiilipalveluiden, omaksujat ovat korkeasti koulutettuja, suhteellisen suurituloisia ja usein johtavassa asemassa olevia.

Näiden tulosten perusteella voidaan tehdä eräs tutkimuksen mielenkiintoisimmista johtopäätöksistä. Yhä useampi mobiilipankkipalvelut omaksuva kuluttaja ei otakaan ensin käyttöönsä Internet-pankkipalveluita ja siirry sitten mobiilikanavan käyttäjäksi, kuten adoptioteoriat olettavat, vaan he ikään kuin ”hyppäävät” tämän vaiheen ohi ja siirtyvät suoraan mobiilipankkipalveluiden käyttäjiksi. Kuluttajat, joilla ei ole minkäänlaista kokemusta pankin elektronisista palvelukanavista, aikovat siis ottaa ensimmäisinä elektronisen pankin kanavana käyttöönsä mobiilipalvelut. Sitä vastoin vakiintuneet Internet-pankin käyttäjät ovat haluttomampia vaihtamaan palvelukanavaa, he hoitavat pankkiasioitaan vain satunnaisesti matkapuhelimella. Ikä ei näyttäisi olevan myöskään este palveluiden käyttämiselle. Tämänhetkisistä ei-käyttäjistä innokkaimpia kokeilemaan mobiilipalveluita ovat yli 50-vuotiaat asiakkaat.

Mobiilipankkipalveluiden omaksumista vauhdittavina tekijöinä esille nousivat mm. pankkiasioinnin nopeus ja vaivattomuus, palvelun saatavuus ajasta ja paikasta riippumatta, itsenäisyys, säästöt vaivassa ja rahallisissa kustannuksissa, sekä palveluiden jatkuva kehittäminen. Mobiilipankkipalvelut koettiin yhteensopiviksi kuluttajien arvojen ja aikaisempien kokemuksien kanssa. Osaltaan tähän tulokseen vaikuttaa se seikka, että teknologiaan suhtauduttiin

kaikissa eri käyttäjäryhmissä yleisellä tasolla positiivisesti, sekä se että suomalaiset pankkiasiakkaat ovat tottuneita matkapuhelimen käyttäjiä. Innovaation monimutkaisuus ei osoittautunut merkittäväksi tekijäksi; käyttäjät eivät muistaneet kohdanneensa huomattavia ongelmia palvelun käyttöönottovaiheessa.

Mobiilipankkipalveluita ei käytetty mm. siitä syystä, että niitä ei pidetty riittävän monipuolisina ja matkapuhelin koettiin epäkäytännölliseksi pankkiasioinnin välineeksi. Mahdollisuudesta käyttää pankkipalveluita mobiilikanavan kautta vastaajat olivat kuulleet sekä massamedian että henkilöidenvälisten kommunikaatiokanavien välityksellä, mikä vastaa esim. Bass'n (1969) teorian olettamuksia. Tärkein informaationlähde satunnaisille käyttäjille oli ollut pankin henkilökunta ja ei-käyttäjille mainokset. Sitä vastoin vastaajat eivät kokeneet merkittävänä riskinä mobiilikanavaan liittyviä turvallisuuskysymyksiä, vaan mobiilipankkipalvelut nähtiin luotettavana tapana hoitaa pankkiasiointia. Rutiininomaiset, yksinkertaiset pankkipalvelut, kuten saldo- ja tilitapahtumakysely ja laskunmaksu, koettiin soveltuvimmiksi käyttää mobiilipankkipalveluina, kun taas lainahakemukset, valuutan tilaus ja lainopilliset palvelut hoidetaan mieluummin pankkikonttorissa. Pääsääntöisesti WAP-palveluita käyttävät asiakkaat käyttävät lisäksi asiointikanavanaan Internet-pankkia ja pankin tekstiviestipalveluita, SMS-asiakkaat puolestaan käyttävät rinnakkaisena palvelukanavanaan Internet-pankkipalveluita, mutta eivät WAP-palveluita.

Tutkimuksessa saatiin konkreettisia tuloksia mobiilipalveluiden käyttämisestä yleisesti nyt ja tulevaisuudessa, sekä mobiilipankkipalveluiden adoptioon positiivisesti että negatiivisesti vaikuttavista tekijöistä. Näiden tulosten perusteella voidaan tehdä päätöksiä siitä miten mobiilipankkipalveluita tulisi kehittää, jotta ne paremmin vastaisivat kuluttajan tarpeisiin. Tuloksia voidaan hyödyntää sekä uusien kohderyhmien löytämisessä nykyisille palveluille, että mahdollisten uusien tuotekonseptien ominaisuuksien määrittämisessä. Siten saadaan työkaluja parempaan asiakkuuden hallintaan. Näiden käytännönläheisten kontribuutioiden lisäksi, tutkimus tarjoaa uusia näkökulmia teoreettiseen keskusteluun koskien kuluttajan käyttäytymistä uudessa, mobiilissa ympäristössä.

Tutkimuksen kuluessa uusia ajatuksia on herännyt ja kysymyksiä noussut esille, mikä antaa aihetta jatkotutkimuksille. Olisi mielenkiintoista nähdä, millaisia tuloksia pitkittäistutkimuksen suorittaminen toisi esille tutkimusilmiöstä; eteneekö mobiilipankki-innovaation diffuusio näiden tutkimustulosten perusteella tehtyjen olettamusten mukaisesti? Eräs jatkopohdiskelun kohde voisi olla myös kansainvälisen näkökulman lisääminen otokseen ja tutkimuksen suorittaminen eri kulttuuritaustat ja teknologisen ympäristön omaavien kuluttajien keskuudessa.

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