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The Mobile Commerce Prospects:

A Strategic Analysis of Opportunities
in the Banking Sector



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Research Project Mobile Commerce

in collaboration with

Institute of Technology & Innovation Management
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&

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The Mobile Commerce Prospects:
A Strategic Analysis of
Opportunities in the Banking Sector

by

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Executive Summary

Mobile Commerce has gained increasing acceptance amongst various sections of the society in previous years. The reasons for its growth can be traced back to technological and demographical developments that have influenced many aspects of the socio-cultural behaviour in today's world. The need (and/or wish) for mobility seems to be the driving force behind Mobile Commerce. The launch of UMTS technology has provided Mobile Commerce with the necessary verve.

Mobile Financial Services build a cornerstone of Mobile Commerce. They comprise of Mobile Payment and Mobile Banking. Mobile Banking, the primary research object of this study, in turn consists of the following sub-applications:

1. Mobile Accounting
2. Mobile Brokerage
3. Mobile Financial Information

Mobile Financial Information can be considered as an independent module and offered as a stand-alone application. Each of the first two sub-applications is offered, in contrast, invariably in combination with information services.

An empirical survey of the customer acceptance conducted under the ambit of this study reveals large-scale interest in Mobile Banking. The customer interest and the willingness to pay however vary for individual services. It is therefore necessary to design offers taking cognizance of the needs and wishes of relevant target groups.

Mobile Banking presents an opportunity for banks to retain their existing, technology-savvy customer base by offering value-added, innovative services and to attract new customers from corresponding sections of the society. The customer survey provides evidence that such sections in the meanwhile include the affluent and financially relevant groups of the society in Germany. The time seems to be ripe to convert this non-negligible customer interest into business-driving customer demand. A proactive attitude on the part of the banks therefore seems to be recommendable.

Many banks in Germany have come to regard Mobile Banking as a necessary tool for thwarting negative differentiation vis-à-vis rivals and to

foster/retain an innovative image. This self-reinforcing dynamism is expected to gain currency in near-future so that Mobile Banking services could soon advance to a standard product – on the lines of Online Banking – offered by more or less each and every bank.

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Abbreviations

1G	First Generation of mobile telecommunication standards [<i>and so forth</i>]
a.o.	amongst others
AMPS	Advanced Mobile Phone System
ATM/s	Automatic Teller Machine/s
CDMA	Code Division Multiple Access
CLDC	Connected Limited Device Configuration
CRM	Customer Relations Management
DCS	Digital Cellular System
DECT	Digital European Cordless Telephone
e.g.	for example [<i>Latin: exempli gratia</i>]
E-Business	Electronic Business
ECB	European Central Bank
E-Commerce	Electronic Commerce
EDGE	Enhanced Data-rates for Global Evolution
Eds.	Editors
EEA	European Economic Area
EITO	European Information Technology Observatory
et al.	and others [<i>Latin: et alii, et alia, etc.</i>]
ETSI	European Telecommunications Standard Institute
EU	European Union
Govt.	Government
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile Communication
HBCI	Home Banking Computer Interface
HRM	Human Resources Management
HSCSD	High Speed Circuit Switched Data
HTML	Hypertext Mark-up Language
i.e.	that is to say [<i>Latin: id est</i>]
IPR	Intellectual Property Rights
IT	Informational Technology
ITS	Intelligent Transport System
IuKDG	Information and Communication Services Act [Germany]
J2ME	Java 2 Platform, Mobile Edition
JDC	Japan Digital Cellular
kbps	Kilobits per second
KWG	The Bank Act [Germany]

LAN	Local Area Network(s)
M-Business	Mobile Business
M-Commerce	Mobile Commerce
MIDP	Mobile Information Device Profile
MMS	Multimedia Messaging Service
n.a.	not available
NMT	Nordic Mobile Telephone
OECD	Organisation for Economic Co-operation and Development
p./pp.	page/pages
PACS	Personal Access Communication Systems
PC	Personal Computer(s)
PDA	Personal Digital Assistant(s)
PIN	Personal Identification Number
RRR	Real Rate of Rejection
SIM	Subscriber Identification Module
SMG	Special Mobile Group
SMS	Short Message Service
STK	SIM Toolkit (SIM = Subscriber Identification Module)
TACS	Total Access Communications System
TAN	Transaction Number
TDMA	Time Division Multiple Access
UMTS	Universal Mobile Telecommunications System
UN/UNO	United Nations / United Nations Organisation
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
US/USA	United States / United States of America
VIP	Very Important Person
VRM	Virtual Runtime Machine
vs.	versus
WAP	Wireless Application Protocol
WIPO	World Intellectual Property Organisation
WLAN	Wireless Local Area Network (also: W-LAN)
WML	Wireless Mark-up Language
WTLS	Wireless Transport Layer Security
WTO	World Trade Organisation
xHTMLMP	eXtensible Hypertext Mark-up Language Mobile Profile

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Rajnish Tiwari & Stephan Buse

1 Introduction

Mobile Commerce has staged a remarkable comeback. Rising from the ruins of a failed first stint, it has surprised many pundits busy writing its obituaries. Mobile Commerce is slowly, but surely, showing signs of a healthy recovery.

According to *European Information Technology Observatory* (EITO), the total revenues generated by Mobile Commerce in Germany in the year 2003 amounted to €280 million, reports the *German Association for Information Technology, Telecommunications and New Media* (BITKOM).¹ The revenue was generated primarily by paid-for services sold to subscribers of mobile phones. The Mobile Commerce turn-over in Great Britain was reported to be €212 million, in France €127 million. Germany reportedly had a market share of 25% in Western Europe [BITKOM, 2004, p. 27].²

These revenues are, no doubt, a far-cry of the euphoric estimates made at the height of the dotcom boom: Mobile Commerce revenues were estimated to cross the mark of €23 billion by year 2003.³ But then growth estimations are known to generally contain a “substantial” portion of optimism. Anyway at risk of unforeseen changes in environmental conditions they should be enjoyed with a healthy scepticism.

Nevertheless, mobile services have registered an impressive growth in the previous years. The total amount of revenues generated by Mobile Internet and Mobile Content services, combined together, were reported to be less than €19 million in whole of Western Europe in year 2001 [EITO, 2002, pp. 18-19]. In this context, the 2003 figures indicate towards a positive development of an enormous magnitude. Even as we prudently main-

¹ EITO [2004, p. 29] defines Mobile Commerce as “all purchases of products and services that occur across a mobile data platform as a result of some interaction with the subscriber”. The definition issues are discussed in detail in section 2.1.

² Latest data for year 2004 is not available as yet; status 17.10.2005.

³ See for example [Müller-Veerse, 2000, p. 5].

tain a healthy distrust of growth estimates, it would be useful to have a glance at new estimations: They suggest that Mobile Commerce revenues could cross the mark of €5 billion in Germany by the year 2007 [BITKOM, 2004, p. 27].

The reasons for this development can be traced back primarily to the technological innovations and some other factors, listed below:

1. The penetration of the society by mobile phones has reached an all-time high. Over 72 million of Germany's residents reportedly owned a mobile phone at the year-end 2004. This means that effectively 87% of all German residents possess a mobile device [FTD, 2005, p. 1].
2. The integration of world economies is leading to more mobility so that mobile services are no more just a luxury but a necessity for many.
3. The younger generations of the society seem to be fascinated by modern data and telecommunication services.
4. Mobile devices have become more powerful. Data transmission has become faster with the launch of the Universal Mobile Telecommunications System (UMTS).

The scope of Mobile Commerce encompasses therefore almost every walk of life. Mobile services are reported, amongst other, from the fields of informational content, entertainment, travel, banking, marketing and shopping.

1.1 Statement of Objectives

This study, part of a research project at Chair of International Management at the University of Hamburg, was conducted in cooperation with the Institute of Technology and Innovation Management at Hamburg University of Technology. It is primarily concerned with the scope of Mobile Commerce services in the field of banking.

The overall research project led by Dr. Stephan Buse and titled "Prospects of Mobile Commerce in Germany" examines chances and scope for Mobile Commerce in various business fields in Germany. Altogether five Mobile Commerce applications are being examined under this project:

1. Mobile Banking
2. Mobile Entertainment
3. Mobile Information Services
4. Mobile Marketing
5. Mobile Ticketing.

This project is an update of a similar research project conducted by Dr. Buse and his then team members in year 2001. The new study intends to identify changes and developments in the landscape of Mobile Commerce since then.

A primary aim of this project, and consequentially of this study, is to undertake an objective and critical examination of the phenomenon of Mobile Commerce in a given business field and to scrutinise the potentials without prejudice or bias so as to assess the future prospects without any preset “target” results.

This study, as stated earlier, concentrates primarily on the utility, chances and acceptance of Mobile Commerce services in the banking sector (Mobile Banking). The study is conducted on two planes. The first plane examines the application of Mobile Banking and its utility in general. The second plane examines the applicability of the therein obtained results in a more specific context of Germany. For this purpose a background paper on the German banking sector has been prepared and attached as appendix.

1.2 Structure of the Study

This study is structured on the following lines:

Chapter 1 is built by this short introduction.

The phenomenon of Mobile Commerce, which has received little academic attention to date, is dealt with in detail in chapter 2. This study makes an ambitious effort to clarify the definition issues and sincerely hopes to be able to make a humble contribution in this regard. For this purpose, we undertake a detailed examination of the conceptual background and clarify the connection of Mobile Commerce to other related fields, in addition to dwelling on the features and advantages of Mobile Commerce.

Chapter 3 clarifies the regulatory framework of Mobile Commerce.

The technological framework of Mobile Commerce is discussed in detail in chapter 4. This chapter discusses various technologies required to deliver mobile services, e.g. data transmission technologies and display- and programming standards. It also entails a short outlook on the technological development.

Chapter 5 has a short overview on various Mobile Commerce applications and discusses several methods of payment for availing mobile services, including the mobile method of payment (Mobile Payment).

Chapter 6 marks the beginning of the main focus of this study: This chapter discusses in detail the possibility of offering banking and financial services via mobile devices. For this purpose the definition and scope issues of Mobile Banking are clarified and services identified that might be offered via mobile devices.

Chapter 7 deals with the technical realisation of Mobile Banking. It discusses in detail the three different types of mediums employed to offer Mobile Banking. It also entails a detailed overview on the current Mobile Banking offers and mediums employed by a selected group of 50 German and international banks.

Chapter 8 deals with the advantages of Mobile Banking from the perspective of banks. It illustrates individual advantages with certain examples.

Chapters 6, 7 and 8 also help in identifying relevant Research Issues that build the basis for subsequent empirical surveys. Altogether 20 open questions were formulated for the purpose of empirical surveys. Questions related to a particular field of interest were bundled into a Research Issue. All in all 10 different Research Issues were identified.

Chapter 9 builds the core of this study. It contains detailed, first-hand empirical information, e.g. on the acceptance of various Mobile Banking services, customers' willingness to pay for them, and the perception of banks including the objectives that they seek to follow by offering mobile services.

Chapter 10 makes a strategic assessment of the survey results and seeks to interpret implications of these results and educe recommendations.

The last chapter contains final conclusions and a short outlook regarding expected future developments in the field of Mobile Banking.

This study comes to the conclusion that Mobile Banking, as an interesting application in Mobile Commerce, is winning non-negligible acceptance and enjoys sufficient demand. Banks are seeing themselves increasingly forced to include Mobile Banking in their product portfolios to avoid negative differentiation vis-à-vis rivals. Apart from this strategic relevance, there are other financial incentives, too. Their actual scope however depends, amongst others, on the product portfolio and the customer structure of individual banks.

The authors would like to sincerely thank all those who have contributed, directly or indirectly, to the successful completion of this study. Apart from those who contributed to the successful organisation of this project (see “Acknowledgements”) a number of representatives of various banks and other firms took pains to provide candid help and valuable expertise to this research project.

The authors would like to thank them personally as well as on behalf of the research project team. A detailed list of surveyed institutions and their representatives is attached as Appendix-A.

2 The Concept of Mobile Commerce

In the following we characterise the concept of Mobile Commerce and distinguish it from the concept of Mobile Business. We further examine it in the more common contexts of Electronic Commerce and Electronic Business and present an overview establishing a holistic perspective of Mobile Commerce.

2.1 The Conceptual Background and Perspective

Before defining the mobile aspects of commerce (Mobile Commerce) and distinguishing them from the mobile aspects of business (Mobile Business), it is imperative to establish working definitions of the terms “commerce” and “business”, as they seem to have transcended their dictionary meanings⁴ and acquired new significance since the advent of the Internet economy.

In this section we further differentiate between the terms “electronic” and “mobile”, so as to clarify the respective concepts by showing their similarities and highlighting their differences.

Difference between “Business” and “Commerce”

The term “business”, in this study, refers to all activities undertaken by a firm in order to produce and sell goods and services. These activities are, thus, not exclusively of “commercial” nature but also include other processes such as procurement, production, customer relationship management (CRM) and human resources management (HRM).

⁴ The Oxford dictionary [2002] describes “commerce” as “financial transactions” and “business” among others as “selling/purchasing of goods”.

The term “commerce”, in this work, refers to selling and purchasing of goods and services in both business- and consumer segments and to activities directly related with such transactions. Examples of such activities are marketing measures and after-sales services. The related activities are included so as to take into account that not each and every transfer of ownership or rights to use a good or service must trigger a monetary transaction.

The term “commerce” is, hence, seen as an integral subset of the broader term “business”. In accordance with this approach Mobile Commerce is regarded as an integral subset of Mobile Business [Buse, 2002, p. 92; UNCTAD, 2004, p. 25]. Electronic Commerce is correspondingly seen as an integral subset of Electronic Business.

Difference between “Electronic” and “Mobile” Aspects

To understand the difference between Electronic- and Mobile Commerce or between Electronic- and Mobile Business it is essential to understand the similarities and differences between the terms “electronic” and “mobile”.

The adjective “electronic”, used within the specific contexts of “Electronic Business” or “Electronic Commerce”, signifies an “anytime access” to business processes managed by computer-mediated networks⁵. Furthermore, the access to such networks is, in this case, stationary⁶. The services are, therefore, not available independent of the geographic location [Hohenberg/Rufer, 2004, p. 35].

The adjective “mobile”, used within the specific contexts of “Mobile Commerce” or “Mobile Business”, signifies an “anytime *and* anywhere access” to business processes managed by computer-mediated networks. The access takes place using mobile communication networks, making the availment of these services independent of the geographic location of the user [Stanoevska-Slabeva, 2003, p. 2; Hohenberg/Rufer, 2004, p. 35].

⁵ Computer-mediated networks are “electronically linked devices that communicate interactively over network channels” [Mesenbourg, 1999, p. 3]. (Tele-) Communication networks are, in turn, used to provide access to these computer-mediated networks.

⁶ The conventional access to the Internet using fixed-line communication networks, such as Dial-up connections or Local Area Networks (LAN), is referred to as stationary access. This form of access is also called the “stationary” or “immobile” Internet.

At this point it would be useful to differentiate between the terms “mobile” and “wireless”. As opposed to the term “mobile” that signifies an anytime, anywhere access to computer-mediated networks, “wireless” is just a method of communication between electronic devices, e.g. with the help of infrared interfaces [Lehner, 2002, pp. 7-8]. Whereas a mobile device is *per se* wireless, not every wireless device may be suitable for feasible mobile applications [Ankar/D’Incau, 2002, p. 2]. For example, Wireless Local Area Networks (WLAN) with a limited range of maximum 300 metres cannot support feasible mobile applications.⁷

Hypotheses about the Mobile Commerce Perspective

Mobile Commerce is closely related to Electronic Commerce, since the services offered in Electronic- as well as Mobile Commerce are handled electronically by computer-mediated networks and are accessible through communication networks. The only difference in the procedure to Electronic Commerce is that in Mobile Commerce the communication networks are accessed through mobile electronic devices.

There exist two different paradigms about the relationship of Mobile Commerce to Electronic Commerce. The first paradigm classifies Mobile Commerce simply as an extension of Electronic Commerce; the second paradigm regards Mobile Commerce as an independent business field and consequently as an alternative mechanism to Electronic Commerce.

That both of these approaches are principally right and hence, individually, too one-sided, can be derived from the following facts:

1. Many of the services offered by Mobile Commerce may as well be availed using the “immobile” (stationary) Internet, e.g. purchasing an entrance ticket to a stadium.
2. At the same time Mobile Commerce opens new business opportunities by offering innovative, location-based and context-sensitive services that the “immobile” Internet is not able to offer. For example the loca-

⁷ The WLAN technology is described in section 4.2.1.

tion of the nearest Automatic Teller Machine (ATM) in real time⁸ can only be provided by determining the geographic position of the user.

This discussion shows that an exclusivist approach is erroneous and an integrative approach is, therefore, required. As a result of this discussion we can propose the following hypotheses:

1. Electronic Commerce is an integral subset of Electronic Business;
2. Mobile Commerce is an integral subset of Mobile Business;
3. Mobile Commerce shares a subset with Electronic Commerce.

In the following we examine these hypotheses regarding their correctness. For this purpose it is essential to define these terms, at first, individually and then to examine their complex relationships to each other in an integrative and holistic perspective.

2.1.1 Defining Electronic Business and Electronic Commerce

In the following we describe the earlier mentioned electronic aspects of the Internet economy, namely Electronic Business and Electronic Commerce.

Electronic Business

Electronic Business is often referred to as “E-Business” or “eBusiness”. This book works with the full form “Electronic Business”. Other forms are however left unaltered if cited from a reference.

The prevailing view in the academic literature regarding Electronic Business is reflected in the following definition:

“E-Business is the integration of systems, processes, organisations, value chains and entire markets using Internet-based and related technologies and concepts.” [Stanoevska-Slabeva, 2003, p. 2]

The United States (US) Bureau of the Census, the statistical division of the US Department of Commerce, measures Electronic Business as follows:

⁸ Real time is a “form of information processing where output is generated nearly simultaneously with the corresponding input. Used mostly where the results of the computation are used to influence a process while it is occurring.” [Globaltec, 2004, p. 1]

“Electronic Business (e-business) is any process that a business organization conducts over a computer-mediated network. Business organizations include any for-profit, governmental or nonprofit entity. Their processes include production-, customer- and internal or management-focussed business processes.” [Mesenbourg, 2001, p. 4]

According to the United Nations Conference on Trade and Development (UNCTAD) Electronic Business processes include Customer Acquisition and Retention, Electronic Commerce, Order Fulfilment and Tracking, Inbound and Outbound Logistics, Inventory Control, Finance-, Budget- and Account Management, HRM, Product Service and Support, Research and Development as well as Knowledge Management [UNCTAD, 2004, p. 26].

Electronic Commerce

Electronic Commerce is often referred to as “E-Commerce” or “eCommerce”. This book works with the full form “Electronic Commerce”. Other forms are however left unaltered if cited from a reference.

Electronic Commerce has found much more attention in the literature than Electronic Business, owing to its proximity to the consumer. There are many definitions of Electronic Commerce in circulation, with each one emphasising some different aspects of Electronic Commerce.⁹

A very simple definition is delivered by Kalakota and Robinson:

“E-Commerce is simply the buying and selling of products and services over the Web.” [Kalakota/Robinson, 2002, p. 8]

The prevailing definitions may be divided in two primary categories:

The first category works with a narrow, restrictive definition, requiring the whole transaction to take place in electronic form and having a monetary character. For example, the German Federal Statistical Office reportedly uses the following definition for Electronic Commerce:¹⁰

⁹ For a detailed discussion of different views, see [OECD, 1999].

¹⁰ According to Fischer [2003, p. 1] this definition was worked out by a Commission of Experts, set up at the request of the German Federal Ministry of Economics and Labour. The German Federal Statistical Office (“*Statistisches Bundesamt*”) does not provide public definitions of these terms at its homepage. (Site accessed on 23.05.2005).

“Transactions are regarded as Electronic Commerce, when the offer for sale as well as the purchase or the actual availment of a product or service is carried out electronically, with the help of a computer-mediated network, against monetary¹¹ payment.” [Fischer, 2003, p. 1] [*Abridged translation by authors*]

This definition seems to be too restrictive as it does not recognise the fact that just some parts of a transaction might also be carried out electronically without having to process all the steps of a value-chain in that form. Further, the emphasis on the monetary character ignores the commercial nature of marketing measures (transactions carried out with the *intent* to sell a product or service) and after-sales services (transactions carried out in *continuation* of a preceding monetary transaction), both important features of commercial transactions.

The second category works with a broader definition of Electronic Commerce, as can be seen in the definition used by the US Bureau of the Census:

“Electronic commerce (e-commerce) is any transaction completed over a computer-mediated network that involves the transfer of ownership or rights to use goods or services. [...] Completed transactions may have a zero price (e.g., a free software download).” [Mesenbourg, 2001, p. 4]

Also according to the Organisation for Economic Co-operation and Development (OECD) it is the method used to place or receive an order, not the mode of payment or the channel of the delivery that determines whether a transaction is considered as an Electronic Commerce transaction [OECD, 2002, p. 61].

The primary criteria for Electronic Commerce, thus, are the (at least partially) electronic form of a transaction and the transfer of ownership or rights to use a good or service whether against monetary payment or otherwise.

¹¹ The original wordings in German are as follows:

“Unter Electronic Commerce fallen solche Transaktionen auf einem Markt, bei denen nicht nur das Angebot elektronisch offeriert, sondern auch die Bestellung bzw. die Inanspruchnahme elektronisch unter Verwendung eines computergestützten Netzwerkes erfolgt, und durch die der Austausch von wirtschaftlichen Gütern gegen Entgelt (z.B. Kauf, Miete, Pacht) begründet wird.“ [Fischer, 2003, p. 1]

This discussion shows that our first hypothesis of Electronic Commerce being an integral subset of Electronic Business was correct, since all the aspects of Electronic Commerce also take place in Electronic Business but Electronic Business has a larger scope than Electronic Commerce.

2.1.2 Defining Mobile Business and Mobile Commerce

In the following we describe the earlier mentioned mobile aspects of the Internet-economy, namely Mobile Business and Mobile Commerce.

Mobile Business

Mobile Business is often referred to as “M-Business” or “mBusiness”. In this study we work with the full form “Mobile Business”. Other forms are however left unaltered if cited from a reference.

Mobile Business is often described as an extension of the traditional Electronic Business to wireless devices [Magic, 2000, p. 3] or as an additional channel for it [Stanoevska-Slabeva, 2004, p. 463]. Yet others regard it as “the application infrastructure required to maintain business relationships and sell information, services, and commodities by means of the mobile devices”. [Kolakata/Robinson, 2002, p. 8]. The UNCTAD defines Mobile Business in the following terms:

“Mobile Business involves business-related communication among individuals and companies where financial transactions do not necessarily occur.” [UNCTAD, 2002, p. 89]

Thus, we can regard Mobile Business as an extension of Electronic Business that also provides for some new, unique features, such as location-based, context-sensitive services accessible via Mobile Internet and hitherto unknown in Electronic Business. Mobile Business shares, but is not limited to, some common features with Electronic Business that also provides a vast range of services not possible with Mobile Business, as can be seen in figure 1.

Mobile Commerce

Mobile Commerce is often referred to as “M-Commerce” or “mCommerce”. This book, as with other such terms, works with the full form “Mo-

bile Commerce”. Other forms are however left unaltered if cited from a reference.

Mobile Commerce is also known as Mobile Electronic Commerce [Zhang et al., 2003, p. 52]. Mobile Commerce transactions are basically electronic transactions conducted using a mobile terminal and a wireless network. Mobile terminals include all portable devices such as mobile telephones and PDAs, as well as devices “mounted in the vehicles that are capable of accessing wireless networks” and perform Mobile Commerce transactions [Veijalainen et al., 2003, p. 2].

A simple definition of Mobile Commerce describes it as “any transaction with a monetary value that is conducted via a mobile telecommunications network” [Müller-Veerse, 2000, p. 7]. This definition, though simple, is problematic on more than one count:

1. First of all it fails to distinguish between Mobile Business and Mobile Commerce.
2. Secondly, it requires the transaction to have a monetary nature. This is not appropriate, as already shown in section 2.1.1.
3. Finally, it creates an impression that transactions have to be completed *exclusively* via mobile telecommunication networks. This prerequisite restricts the scope of Mobile Commerce to very few digitally deliverable “immaterial” products such as “information”. A vast range of transactions, initiated via mobile electronic devices and involving “material” products is, thus, falsely excluded from Mobile Commerce.

Some other definitions, often cited in the literature, tend to ignore Telematics (*described in section 5.1*), an important feature of Mobile Commerce. Such definitions concentrate on the appliance of mobile *hand-held* devices. For instance:

“M-commerce is the use of mobile (hand-held) devices to communicate and conduct transactions through public and private networks [...]” [Balasubramanian et al., 2002, p. 349]

“M-Commerce is [...] the buying and selling of goods and services, using wireless hand-held devices such as mobile telephones or personal data assistants (PDAs).” [UNCTAD, 2002, p. 89]

Such definitions, thus, only provide incomplete, often one-sided descriptions of the phenomenon of Mobile Commerce. These definitions, usually

formulated in the initial phase of Mobile Commerce, do not seem to be appropriate for an extensive study of Mobile Commerce today, even when they provide useful insights for understanding Mobile Commerce.

It is therefore essential to formulate a working definition of Mobile Commerce that takes all of the above-discussed factors into account. For the purpose of study we define Mobile Commerce as following:

Mobile Commerce is any transaction, involving the transfer of ownership or rights to use goods and services, which is initiated and/or completed by using mobile access to computer-mediated networks with the help of an electronic device.

Characteristics of this Definition

1. The primary criterion of mobility is the method of access:
Not all mobile devices provide for a mobile access to communication networks. For example, laptops – a mobile device – generally use stationary access to networks. Even when a laptop connects to a wireless network, its usage, while on the move, is limited owing to factors such as size and weight. On the other hand Telematics devices mounted in vehicles are capable of providing a truly mobile access to telecommunication networks.
The computer-mediated networks may be partially or even fully wired, as long as they are able to receive and handle requests sent by mobile electronic devices.
2. Some parts of a transaction may be processed in a stationary sector. For example, ordering a piece of clothes using a mobile phone is very much a Mobile Commerce transaction, even when the transaction is processed by stationary computer-systems, sent by normal post to the customer and paid against an invoice. Important is only that at least the initiation or the completion is carried out using a mobile access via an electronic device.
3. The completed transaction need not have a monetary character, as long as the transaction is carried out as a marketing measure or as an after-sales service.

This discussion shows that our second hypothesis of Mobile Commerce being an integral subset of Mobile Business was also correct, since all the

aspects of Mobile Commerce also take place in Mobile Business but Mobile Business has a larger scope than Mobile Commerce.

This discussion also proves our third hypothesis of Mobile Commerce sharing a subset with Electronic Commerce to be correct, since they both offer a similar set of services in addition to services unique to each one of them.

2.1.3 The Mobile Commerce Perspective

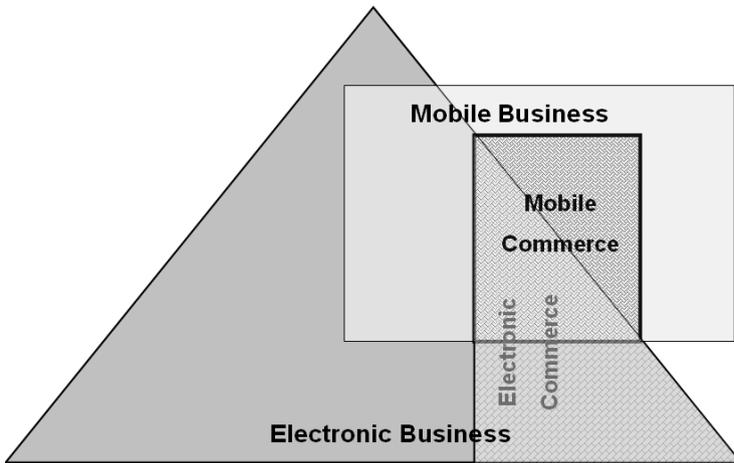


Figure 1: The Mobile Commerce perspective

The graphic illustrates the following facts:

1. Electronic Business and Mobile Business offer many similar services in both commercial and non-commercial areas. Respective examples are sale/purchase of goods and services on the one hand and CRM on the other.
2. Electronic Business offers additional services, not feasible with Mobile Business, e.g. coordination of Research & Development activities.
3. Mobile Business, too, offers unique services, not feasible with conventional Electronic Business, e.g. context-sensitive CRM.
4. Electronic Commerce is an integral subset of Electronic Business.
5. Mobile Commerce is an integral subset of Mobile Business.

6. Electronic Commerce and Mobile Commerce offer many similar services, e.g. booking an entrance ticket for a football match.
7. Electronic Commerce offers additional services, not feasible with Mobile Commerce, e.g. selling of high-quality, non-standardised products requires an intensive presentation not feasible on mobile devices.
8. Mobile Commerce, too, offers unique context-sensitive, location-based services, not feasible with Electronic Commerce, e.g. search for the nearest ATM specific to a dynamic location.

This discussion establishes a Mobile Commerce perspective and distinguishes it from other related terms. The concept of Mobile Commerce is now further characterised in the following section.

2.2 The Features of Mobile Commerce

Mobile Commerce is characterised by some unique features that equip it with certain advantages against conventional forms of commercial transactions, including Electronic Commerce [Müller-Veerse, 2000, pp. 8-9; Accenture, 2001, pp. 4-5; Buse, 2002, pp. 92-95; Kemper/Wolf, 2002, p. 402]:

1. *Ubiquity*: Ubiquity means that the user can avail of services and carry out transactions largely independent of his current geographic location (“anywhere” feature). This feature can be useful in many situations, e.g. to cross-check prices while standing in a supermarket.
2. *Immediacy*: Closely related to the feature of ubiquity is the possibility of real-time availment of services (“anytime” feature). This feature is particularly attractive for services that are time-critical and demand a fast reaction, e.g. stock market information for a broker. Additionally, the consumer can buy goods and services, as and when he feels the need. The immediacy of transaction helps to capture consumers at the moment of intention so that sales are not lost in the discrepancy between the point of intention and that of the actual purchase.
3. *Localisation*: Positioning technologies, such as the Global Positioning System (GPS), allow companies to offer goods and services to the user specific to his current location. Location based services can be, thus, of-

ferred to meet consumers' needs and wishes for localised content and services.

4. *Instant connectivity*: Ever since the introduction of the General Packet Radio Service (GPRS)¹² mobile devices are constantly "online", i.e. in touch with the network ("always-on" feature). This feature brings convenience to the user, as time-consuming dial-up or boot processes are not necessary.
5. *Pro-active functionality*: Mobile Commerce opens, by the virtue of its ability to be immediate, local and personal, new avenues for push-marketing¹³, such as content- and product offers. Services like "Opt-in advertising" can be offered, so that a user may choose the products, services and companies which he wants to be kept informed about. The Short Message Service (SMS)¹⁴ can be used to send brief text messages to consumers informing them of relevant local offerings that best suit their needs. This feature ensures that the "right" (relevant) information can be provided to the user at the "right" place, at the "right" time. On the other hand, the user does not have to fear missing some potentially crucial information or getting it too late.
6. *Simple authentication procedure*: Mobile telecommunication devices function with an electronic chip called Subscriber Identity Module (SIM).¹⁵ The SIM is registered with the network operator and the owner is thus unambiguously identifiable. The clear identification of the user in combination with an individual Personal Identification Number (PIN)

¹² The GPRS Technology is described in detail in the section 4.1.3.

¹³ Push-marketing refers to activities of a vendor (e.g. sending out advertisement and other product-related information to the customer) that are carried out with an intention to promote a product or service. The term signifies that the information is "pushed" to the next link of the value chain.

¹⁴ SMS refers to the ability of mobile telephones to send and receive text messages. The text comprises of alphanumeric combinations (words and numbers). Each short message may comprise of up to 160 Latin or up to 70 non-Latin (e.g. Chinese) characters [Buckingham, 2000b, p. 2].

¹⁵ SIM – synonymous with the "Smart Card" – is required by all mobile telephone customers in order to operate their phone. It carries authentication, billing and other personalised information about the individual subscriber [UMTS Glossary, 2005, p. 1].

makes any further time-consuming, complicated and potentially inefficient authentication process redundant.

These unique features of Mobile Commerce can provide the user with some concrete and specific advantages. The following section describes some of them.

2.3 The Specific Advantages of Mobile Commerce

Mobile commerce, on account of its earlier discussed features, can provide users with additional, value-added utility, particularly in following situations [Accenture, 2001, p. 5; Anckar / D’Incau, 2002, p. 3; Buse, 2002, p. 93]:

1. *Context-specific services*: Mobile Commerce makes it possible to offer location based services, which are specific to a given context (e.g. time of the day, location and the interests of the user). Such services offer new opportunities for personalised push-marketing in close proximity to the vendor thereby increasing the probability of sales. It enhances brand presence and thus encourages consumers to remain loyal to brands they are acquainted with.
2. *Time-critical situations*: The ubiquity and immediacy of Mobile Commerce allows the user to perform urgent tasks in an efficient manner, e.g. fast reaction to stock market developments irrespective of his current geographic location. It is also useful in emergency situations.
3. *Spontaneous decisions and needs*: Spontaneous needs are not externally triggered and generally involve decisions that do not require a very careful consideration, e.g. purchase decisions involving small amounts of money. An example of such a service would be reserving a place in a restaurant or cinema spontaneously. Users may also be provided with access to entertainment content, e.g. horoscope, music or sport news while on the move and with free time on the hand.
4. *Efficiency increase*: Mobile Commerce helps increase the productivity of the workforce by increasing the efficiency of their daily routines. Time-pressured consumers (employees) can use ‘dead spots’ in the day, e.g. during the daily travel to and from workplace, more effectively.

This can be utilised, e.g. to check e-mails, get current news, order products and carry out bank transactions.

The above discussion shows that Mobile Commerce has the potential to offer some new, hitherto unknown services to users on account of its unique features.

Having defined Mobile Commerce and its utilities, we describe in the next chapter its legal (regulatory) framework, since the potential services have to be carried out in keeping with the provisions of the law.

3 The Regulatory Framework of Mobile Commerce

Mobile Commerce, similar to Electronic Commerce, requires transparent and clear regulations as the contracting parties do not necessarily know each other and there is hardly, if any, face-to-face contact while negotiating an agreement [Wirtz, 2001, p. 572]. Personal contact is not feasible owing to a high number of participants – customers as well as vendors – in the market. This high participation results from the easy and relatively inexpensive access to telecommunication networks, low market barriers and the cross-regional nature of applications.

This anonymity, however, makes many potential customers suspicious of such technologies. The worry about the privacy and safety of personal data¹⁶ (e.g. credit card information) and about the precision of the transmitted data and its potential misuse while carrying out electronic transactions is well-known.

The contracting parties, therefore, should be able to count upon the law to enforce the provisions of contracts that are concluded using (mobile) electronic devices, if required. Further, the customer should be able to trust the privacy of his personal sphere. A clearly defined regulatory framework is, hence, indispensable to boost consumer confidence and increase acceptance amongst broad sections of the society as well as to ensure smooth functioning of Mobile Commerce.

The legal regulations imposed by the lawmaker, thus, intend to safeguard and balance both consumer- and business interests by setting rules and regulating the market as well as the usage of existing and emerging technologies. They impose the highest level of restrictions that govern legally carried-out transactions [Veijalainen et al., 2003, p. 4]. Regulations

¹⁶ The EU defines personal data as “any information relating to any identified or identifiable natural person” (EU Regulation 45/2001, Article 2).

applicable to Mobile Commerce are generally guided by five principles [Heinemann et al., 2004]:

1. Legal enforceability of contracts
2. Consumer protection
3. Privacy of data (no unnecessary, unauthorised data collection)
4. Confidentiality of data (protecting authorised data from misuse)
5. Right of self-determination (to carry out or reject a communication)

Mobile Commerce, being a relatively recent phenomenon, has not yet attracted the attention of the lawmaker as an independent business field. Its transactions are basically governed by the Electronic Commerce and Telecommunication regulations [Heinemann et al., 2004]. The Federal Republic of Germany has formulated regulations that are expected to provide a reliable and modern legal framework in order to better exploit the benefits of new technologies while ensuring a high degree of consumer protection, see [BMWA, 2004, pp. 1-2].

Many of these regulations have their origins in multilateral treaties, such as those of the European Union (EU) or the United Nations Organisation (UNO). Also other international organisations such as the OECD, the World Trade Organisation (WTO) and the World Intellectual Property Organisation (WIPO) have been actively supporting member countries in formulating regulatory frameworks. It may, hence, be reasonably assumed that the regulatory concepts, in principle, have an international character, even if the degree of regulations might differ across nations. This should, at least, be true for countries actively participating in international trade, i.e. for most of the developed and transit economies.

The EU has issued twelve directives stipulating the regulatory framework for legally-binding electronic commercial contracts, determination of jurisdiction and applicability, consumer- and data protection, protection of intellectual property rights (IPR), dispute resolution, cyber crimes and taxation regimes, among others, to ensure legal certainty and consumer confidence [EU, 2005, p. 1]. These EU directives stipulate the regulatory framework for member countries while ensuring compliance to international treaties, most importantly the “Model Law on Electronic Commerce” passed by the United Nations Commission on International Trade Law (UNCITRAL).

The law-regime for Electronic- and Mobile Commerce in Germany is organised under the ambit of The Information and Telecommunication Services Act (“*Informations- und Kommunikationsdienste-Gesetz*”, known as *IuKDG*). This act consists of a large subset of related laws [BMWA, 2004, pp. 1-2; Heinemann et al., 2004]. The cornerstones of this law-regime are:

1. The Act on Legal Framework Conditions for Electronic Commerce (“*Gesetz über rechtliche Rahmenbedingungen für den elektronischen Geschäftsverkehr*”, also known as “*Elektronischer Geschäftsverkehr-Gesetz*” or *EGG*)
2. The Teleservices Act (“*Teledienstgesetz*”, known as *TDG*)
3. The Teleservices Data Protection Act (“*Teledienstedatenschutzgesetz*”, known as *TDDSG*)
4. The Conditional Access Services Protection Act (“*Zugangskontroll-diensteschutzgesetz*”, known as *ZKDSG*)
5. The Interstate Agreement on Media Services (“*Mediendienstestaatsvertrag*”, known as *MDSStV*)

Some other relevant laws that are, however, not part of the *IuKDG* are:

1. The Fair Competition Act (“*Gesetz gegen den unlauteren Wettbewerb*”, known as *UWG*),
2. The Act against Restraints of Competition (“*Gesetz gegen Wettbewerbsbeschränkungen*”, known as *GWB*),
3. The Act of Distant Sales (“*Fernabsatzgesetz*”)¹⁷,
4. The Copyright Act (“*Gesetz über Urheberrecht und verwandte Schutzrechte*”, known as “*UrhG*”),
5. The Copyright Administration Act (“*Gesetz über die Wahrnehmung von Urheberrechten und verwandten Schutzrechten*”, known as *UrhWahrnG*),

¹⁷ Germany’s Act of Distant Sales (“*Fernabsatzgesetz*”) lapsed in December 2001. The new, modified regulations follow an EU directive on Electronic Commerce (2000/31/EC). The regulations are now integrated in the Book 1 (General Part) and Book 2 (Law of Obligations) of the German Civil Code (“*Bürgerliches Gesetzbuch*”) [BMJ, 2000, pp. 1-14; Becker, 2002, p. 1].

6. The Federal Data Protection Act (“*Bundesdatenschutzgesetz*”, known as “*BDSG*”).

This regulatory framework ensures legal certainty to customers and vendors alike. The following section describes some basic regulations relevant for Mobile Commerce transactions. This information is aimed at providing a general overview of the legal framework governing Mobile Commerce. It neither intends nor claims to provide all-exhaustive information on the subject.

3.1 Regulations on Legal Enforceability of Contracts

A contract is legally binding when both contracting parties make legally admissible, mutual and corresponding declarations of intent, i.e. a quotation by a prospective customer for acquiring a good or service and the acceptance thereof by the vendor [BMWA, 2005, pp. 1-2]. For Electronic Commerce, and therefore for Mobile Commerce too, the following specifications apply additionally:

1. The declaration of intent by the customer via electronic means is legally admissible, provided it is carried out by an unambiguous and deliberate act, e.g. reconfirmation of an order by sending an affirmation code via SMS to the vendor.
2. The presentation of goods and services on electronic platforms is in legal sense nothing more than an invitation to potential customers to submit their quotations. Only if the vendor accepts the quotation it can be considered a binding order.
3. The vendor has to acknowledge the receipt of the order without undue delay and by electronic means. The order and the acknowledgement of the receipt are deemed to have been received if the addressee can reasonably be assumed to be *able to access* them.
4. Erroneous, or inadvertently sent orders (e.g. owing to a typing mistake) may be revoked. In this case the customer may, however, be required to compensate the damages that arise for the vendor.
5. Electronic contracts may be revoked, and the purchased good returned, by the customer within fourteen days of the agreement without specifying any reason. This regulation does not apply for non-durable goods

(e.g. food items) or mediums of data storage that might be copied (e.g. unsealed copies of audios, videos or software).

6. The vendor must identify himself clearly and inform the customer about relevant characteristics of the offered goods or services.
7. The vendor must inform the consumer about the *final* price of a good or service. The quoted price must include all taxes and other costs. Exceptions are only allowed while dealing with business customers.
8. If these regulations are violated (e.g. failure to inform the customer of his right to return the good within fourteen days) the contract is deemed null and void and the good may be returned at any time.
9. The customer must be informed of the general terms of the contract (“fine print”) before the contract is concluded. The “fine print” should be easily and anytime retrievable.
10. International transactions are governed by two different principles. All the commercial transactions taking place in the business-to-business (B2B) segment are governed by the “country of origin” principle, i.e. the transactions are subject to the regulations of the country in which the vendor is located. Commercial transactions in the business-to-consumer (B2C) segment are on the other hand governed by the “country of destination” principle, i.e. the transactions are subject to the law of the country in which the consumer is residing.

3.2 Regulations on Consumer- and Data Protection

The protection of the private sphere of the consumer and the prevention of unauthorised use of personal data have been of primary concern for the lawmaker in order to safeguard public interest on the one hand and to increase the consumer confidence in the electronic form of commerce, on the other. For this purpose several stringent regulatory norms have been put in force, e.g.:

1. Personal data may only be collected, processed or used with the explicit consent of the user.
2. If the user is offered the choice to give his consent electronically, the provider/vendor must guarantee that:

3. such consent can only be given by an unambiguous and deliberate act by the user;
4. the text of such consent can be accessed at any time by the user.
5. The consent may be withdrawn by the user at any time.
6. Personal data can not be processed for any other purpose than the one for which it has been explicitly collected.
7. Separate processing of user-data for the use of different services.
8. Data that is no more required must be deleted without delay.
9. Customer profiles, even if anonymous, can only be created with the consent of the customer.
10. The user should be able to utilise and pay for the services anonymously or under a pseudonym, if technically possible.
11. The user may demand from the provider information on the data stored on him or her.
12. Violation of these regulations by the provider or the failure to inform the user of his rights constitutes an administrative offence, punishable with a monetary fine, not exceeding fifty thousand Euros.

These regulations are basic, general norms. The law provides for exceptions in extraordinary situations. Such exceptions may be permitted by government authorities in keeping with the provisions of the law.

3.3 Categories excluded from Mobile Commerce

Some of the very few categories for which EU member states are authorised by the virtue of the EU directive on Electronic Commerce (2000/31/EC Article 9 § 2) to prohibit conclusion of contracts by electronic means are:

1. Contracts that create or transfer rights in real estate, except for rental rights.
2. Contracts requiring by law the involvement of courts, public authorities or professions exercising public authority, e.g. notaries.
3. Contracts governed by family law or by the law of succession.

This discussion shows the legal framework governing Electronic Commerce and subsequently Mobile Commerce in Germany. The framework principles are however, as shown earlier, of international character and relevant not only within the geographic boundaries of the Federal Republic of Germany.

This information, though not all-exhaustive, provides a fair overview of the legal restrictions that must be kept in mind while designing mobile applications.

The next chapter describes the existing technological framework of Mobile Commerce, including a short overview of historical and expected future developments and trends in mobile technologies.

4 The Technological Framework of Mobile Commerce

Fast, secure and user-friendly mobile telecommunication technologies are a crucial factor for the commercial success of Mobile Commerce, since it is largely dependent on the acceptance of Mobile Commerce applications amongst targeted consumer groups and relevant business firms. This chapter provides an overview of technological standards that have either contributed to the development of Mobile Commerce or that can be expected to shape its future.

4.1 Technologies for Mobile Data Transmission

The mobile (wireless) telecommunication systems (networks) are generally categorised in three broad generations of technologies. Between the second and the third generation a “second and half” (2.5) sub-generation is supposed to exist, that bridges the two neighbouring generations (see figure 2). These generations and their technologies are described in the following sections.

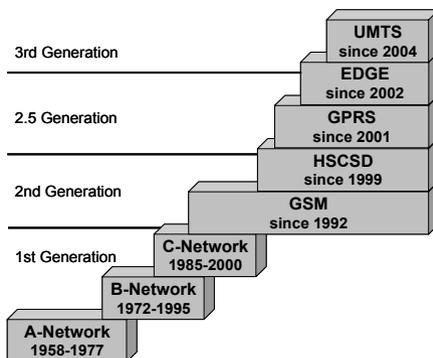


Figure 2: Generations of mobile telecommunication standards in Germany
[Graphic modelled after: Schell, 2002, p. 78]

4.1.1 The First Generation (1G)

The beginning of wireless communication in Germany can be traced back to 1926 as the German Railways introduced a wireless telephone service for first-class passengers on its Berlin-Hamburg route [IMZF, 2005a, p. 1].

The mobile telecommunication gained currency, however, only with the introduction of the A-Network in 1958, which was followed by a more advanced B-Network in 1972. A country-wide coverage was provided later by the C-Network¹⁸ in 1985 [IMZF, 2005a, pp. 1-2].¹⁹ In the United States of America (USA) a comparable system called the Advanced Mobile Phone System (AMPS) was introduced in 1983. Some more standards that belong to 1G are the Total Access Communications System (TACS), the Nordic Mobile Telephone (NMT) system and the Japan Digital Cellular (JDC) network system [Elliot/Phillips, 2004, p. 7; Toh, 2002, p. 1].

The first generation systems were voice-oriented analogue mobile and cordless telephones [Krishnamurthy/Pahlavan, 2002, p. 9]. Such systems are not suitable for modern Mobile Commerce services on account of low quality of transmission and their exclusive voice-orientation, i.e. the inability to transmit non-voice data [Geer/Gross, 2001, p. 17]. 1G is hence not relevant for this study.

4.1.2 The Second Generation (2G)

The second generation (2G) systems are based on the digital multiple access technology,²⁰ e.g. the Time Division Multiple Access (TDMA)²¹ and

¹⁸ There are A-, B-, C-, D- and E-Networks. No explanation is found in the literature about why the networks were named like this. An explanation could be Analogue (A-) and Digital (D-) Networks. That however does not explain the B-, C- and E-Networks.

¹⁹ For historical development of 1G systems in Germany see [IZMF, 2005a, pp. 1-3].

²⁰ For technical details see [Krishnamurthy/Pahlavan, 2002, pp. 12-18].

²¹ TDMA is a technique for multiplexing multiple users onto a single channel on a single carrier by splitting the carrier into time-slots and allocating these on *as-needed* basis, so that three calls can share a single frequency channel without interfering with one another [GSM Glossary, 2005, p. 21; Ericsson Glossary, 2004, p. 12].

the Code Division Multiple Access (CDMA)²², and currently worldwide in use. They use digital encoding and support transmission of not only voice but also of other data, e.g. fax and SMS. They make use of encryption techniques to enhance confidentiality of the transmitted data. Such features are prerequisites for mobile services. Examples of 2G systems are the Global System for Mobile Communication (GSM), Personal Access Communication Systems (PACS) and Digital European Cordless Telephone (DECT) [Toh, 2002, p. 1-2].

Since GSM has come to be “the” dominating standard in the world in general and in Europe in particular, we explain GSM and one of its offshoot, the High Speed Circuit Switched Data (HSCSD), in some details.²³

4.1.2.1 Global System for Mobile Communication (GSM)

GSM, first introduced in 1991, is an open, non-proprietary and digital system of second generation [GSM Glossary, 2005, p. 11; Ericsson Glossary, 2004, p. 6]. Originally developed as a European standard,²⁴ it has come to be the most widely deployed global standard.²⁵ Some of its basic features are [Schell, 2002, p. 51]:

1. A broad offer on voice and data communication services;
2. Compatibility with fixed-line networks, e.g. Analogue and Integrated Service Digital Networks (ISDN) due to standardised interfaces;
3. Automatic roaming²⁶ and handover²⁷ procedures;

²² CDMA is a digital technology that utilises a single frequency band for all traffic, differentiating the individual transmissions by assigning them unique codes before transmission [GSM Glossary, 2005, p. 4; Ericsson Glossary, 2004, p. 3].

²³ The number of subscribers of GSM-enabled mobile phones is estimated to be over 1.5 billion worldwide. This is an 85% share amongst all subscribers [Jenkins, 2004, p. 1].

²⁴ The term GSM originally stood for “*Groupe Spéciale Mobile*”, i.e. for the workgroup that developed this standard on behalf of the “*Conférence Européenne des Administrations des Postes et des Télécommunications*” (CEPT), a body of European Post and Telecommunication authorities [GSM Glossary, 2005, p. 11].

²⁵ For a comprehensive study of GSM see [Jenkins, 2004, pp. 1-40].

²⁶ Roaming is defined as the ability of a mobile telephone subscriber to automatically make and receive voice calls, send and receive data or access other services when travelling out-

4. Support for various types of mobile devices, e.g. hand-held devices and devices mounted in vehicles;
5. Independent of device manufacturers.

The first GSM-based digital network (D-Network) was launched in Germany in 1992 on the frequency of 900 Megahertz (MHz) by two network carriers, namely *Deutsche Telekom AG* (launched as D1) and *Mannesmann AG*²⁸ (launched as D2). In 1994 a new GSM-based digital network (E-Network) was launched by *E-Plus Service GmbH & Co. KG* (launched as E1). The E-Network is based on the Digital Cellular System (DCS) standard that utilises the frequencies of 1,800 MHz. In 1998 one more network, *Viag Intercom*,²⁹ launched its services as E2. Meanwhile D1 and D2 have also begun using the E-Network to expand their network capacities [At-mix.de, 2005, pp. 1-2].

Although GSM is a relatively advanced technology, it is not free of drawbacks. One major problem is that of low actual data-transmission rates. Though GSM is theoretically capable of a transmission rate of 22.8 kilobits per second (kbps), the actual rate of data-transmission is reduced to as low as 9.6 kbps as a safety-measure against possible transmission errors [Steimer et al., 2001, p. 9].

Another problem is that GSM is a circuit-switched technology. That means a channel is assigned for the transmission of data for the complete duration of usage. For example, if a user calls a Wireless Application Protocol (WAP)³⁰ page on his mobile phone, a channel is assigned to this process. This channel is kept allocated until the process is cancelled, even when all the data has been transmitted and displayed on the screen. The user is billed for the utilised channel-time and not for the volume of the actually transmitted data [Ahlke, 2002, p. 9].

side the geographical coverage area of the home network by means of using a visited network [GSM Glossary, 2005, p. 19].

²⁷ Handover occurs when a call is passed from one network cell to another, even as the user moves between cells [UMTS World, 2004, p. 3].

²⁸ The *Mannesmann AG* was taken over by the *Vodafone Group Plc* of Great Britain in the year 2000. The D2-Network is now run by the *Vodafone D2 GmbH*.

²⁹ Since 2002 *Viag Intercom* is known as *O₂ (Germany) GmbH & Co. KG*.

³⁰ The WAP technology is described in section 4.3.1.

Both these factors – low actual transmission rates combined with the circuit-switched technology – result in disproportionately high costs for the user and discourage the usage of data services offered. Low transmission rates are also problematic for data-intensive applications, e.g. mobile videos. Such drawbacks make GSM technology suboptimal for promoting attractive mobile services.

4.1.2.2 High Speed Circuit Switched Data (HSCSD)

HSCSD is an enhancement of data-services based on GSM to enable higher rates by using multiple channels. With a transmission rate of 28.8 kbps HSCSD allows three times faster access to non-voice (data) services.³¹

The bundling of channels requires functions that may dissect and consolidate data on and from various channels without compromising the integrity of data. This requires costly and extensive modification in the hardware of mobile devices [Steimer et al., 2001, p. 34]. There are currently few subscribers with voice terminals that support HSCSD. The other alternative is using a special portable computer card that has a built-in GSM phone. This card turns laptops and other portable devices into a high-speed mobile office with the ability to make voice-calls and carry out data transfer. This facility is particularly interesting for subscribers who wish to access the Internet, or their office Intranet, while on the move, by using a mobile device [GSM World, 2005a, p.1].

The main drawback of HSCSD lies in the circuit-switched technology³² that makes its usage very expensive, considering that the user has to pay for multiple channels [Steimer et al., 2002, p. 35]. HSCSD seems to be more interesting and suitable for a laptop than for a mobile phone [Müller-Veerse, 2000, p. 19].

4.1.3 The 2.5 Generation (2.5G)

The transit between 2G and 3G is known as 2.5G. The General Packet Radio Service (GPRS), main standard of this phase, even though based on GSM, distinguishes itself from other circuit-switched 2G technologies, in

³¹ Some upgraded networks can even reach transmission rates of up to 43.2 kbps.

³² For an explanation of circuit-switched technology see GSM, section 4.1.2.1.

that it is a packet-switched³³ technology [Toh, 2002, p. 2]. Another standard that arguably belongs to both 2.5G and 3G and builds on GPRS is the Enhanced Data-rates for Global Evolution (EDGE).

4.1.3.1 General Packet Radio Service (GPRS)

GPRS is a non-voice service that allows speedy transmission of data [Buckingham, 2000a, p. 2]. It is a packet-switched technology, which means that the data to be sent is broken up into small packets, which are “routed by the network between different destinations based on addressing data within each packet. Use of network resources is optimized as the resources are needed only during the handling of each packet” [Toh, 2002, p. 2]. GPRS offers the following advantages:

1. *Speed*: By using all eight time-slots simultaneously GPRS can theoretically achieve transmission rates of up to 115.2 kbps, about two times faster than ISDN and ten times faster than other circuit-switched GSM standards [Buckingham, 2000a, p. 2].
2. *Immediacy*: GPRS enabled mobile devices are, subject to network coverage of the geographic area, always connected to the network (“Always-on, Always-connected” feature).³⁴ The user does not have to dial up a connection to receive information [Buckingham, 2000a, p. 2; Ahlke, 2002, p. 10].
3. *Innovative services*: GPRS can offer services that were hitherto not possible due to low transmission rates. It facilitates creation of WAP-pages similar to Internet-based web-pages and provides access to many other services, e.g. the Internet, e-mail, music and office applications [Buckingham, 2000a, p. 2; Gneiting, 2000, p. 20].
4. *Costs advantage*: The subscriber pays for the volume of the transmitted data and not the time required in the process [Toh, 2002, p. 2].

These advantages make GPRS the first technology that can not only enable but also promote mobile applications. Nevertheless, GPRS has certain shortcomings, too, which are described in the following:

³³ The packet-switched technologies are explained later in this section.

³⁴ The importance of such a feature for Mobile Commerce is discussed in section 2.3.

1. *Low actual transmission rates*: The theoretically possible rates of data transmission are not achieved, because all the eight time-slots are seldom, if ever, available simultaneously [Buckingham, 2000a, p. 5]. The actual rates of data-transmission via GPRS is reported to be a meagre 14 kbps while sending and between 28 and 64 kbps while receiving [GSM World, 2005b, p. 1].
2. *Priority for Voice-transmission*: The packet-switched GPRS is used only as a secondary network channel along with the circuit-switched GSM network for voice-transmission that has a higher priority. If the capacities are being utilised for a voice-call, then the data-transmission has to take a back seat [Schell, 2002, p. 68].

These factors handicap the development of data-intensive and/or time-critical Mobile Commerce applications based on GPRS.

4.1.3.2 Enhanced Data-rates for Global Evolution (EDGE)

EDGE is a 2.5G technology that is based on GPRS and can be used to offer personalised multimedia services similar to 3G technologies [Toh, 2002, p. 2]. It can be used to transmit both voice and data. However, it is just an add-on to GPRS and can not work alone [Ericsson, 2003, p. 4]. EDGE allows subscribers to access the Internet and to send and receive data, e.g. digital images and videos, with a broadband like transmission speed of 384 kbps that is about three times faster than an ordinary GPRS network [Ericsson Glossary, 2004, p. 16].

This speed is sufficient even for video-transmissions and in that sense it rivals the 3G Universal Mobile Telecommunications System (UMTS) technology [Ahlke, 2002, p. 11]. EDGE is reputed to possess high potential and a growing importance in many regions of the world, e.g. the Americas, Australia and India, where it is reported to be gaining market rapidly [Menon, 2005, p. 1]. The main advantage of EDGE is that it could allow network carriers to offer 3G services without having to acquire a 3G license. Implementing EDGE is relatively simple, as it works with the existing GSM/GPRS structure [Toh, 2002, p. 2]. It may also be used with laptops with the help of a card [Menon, 2005, p. 1].

EDGE however does not seem to have very bright prospects in Europe for a practical reason: Most of the network carriers in Europe have invested

heavily in the expensive UMTS licenses and building a UMTS network [Wallbaum/Pils, 2002, p. 84].³⁵ Their priority lies in amortisation of these investments.

4.1.4 The Third Generation (3G)

The 3G technology aims to provide a broad range of services, e.g. interactive multimedia services, video telephony and high speed internet access, in addition to voice communication. The European 3G standard is called UMTS³⁶ and is based on a radio access technology called Wideband Code Division Multiple Access (WCDMA)³⁷. The high speed of data transmission makes it suitable for real-time and time-critical applications [Wallbaum/Pils, 2002, p. 84].³⁸

UMTS works with a hierarchical cell structure (see figure 3) consisting of different cell types [Schell, 2002, p. 71; Toh, 2002, p. 5]:

1. *Pico cells*: The speed of data transmission in Pico cells, i.e. at *low mobility*, is up to 2048 kbps, provided the device remains within a geographic range not exceeding 50 metres, e.g. in a building.
2. *Micro cells*: The rate of data transmission in urban areas is 384 kbps at *limited mobility*, within a geographic range of 50 to 350 metres.
3. *Macro cells*: Data transmission rates of up to 144 kbps at *full mobility* in suburban areas and countryside within a range of 350 metres to 20 kilometres depending on the area's topology and population density.
4. *Satellite cells*: UMTS supports universal roaming and provides global coverage. For this purpose it uses – in addition to terrestrial systems – also satellite systems [Toh, 2002, p. 5]. The data transmission rate in the satellite cell is 9.6 kbps [UMTS FAQ, 2002, p. 9].

³⁵ The network carriers in Germany alone are reported to have invested €100 billion for this purpose [Göttgens/Zweigle, 2001, p. 2].

³⁶ The terms “3G” and “UMTS” are used interchangeably in Europe, see e.g. EU Legal Notice: *Third generation mobile communications*, dated 31.10.2002, online available: <http://www.europa.eu.int/scadplus/printversion/en/lvb/124202a.htm>, 11.01.2005; and [UMTS Forum, 2005a, p. 1].

³⁷ WCDMA is a variant of CDMA, which is explained in section 4.1.2.

³⁸ For more information on UMTS, see [Toh, 2002, p. 5; IZMF, 2005b, pp. 1-2].

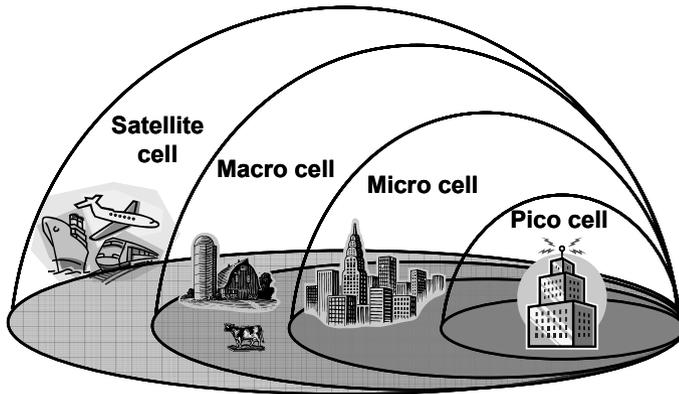


Figure 3: Hierarchical cell structure of UMTS

[Graphic modelled after: Wallbaum/Pils, 2002, p. 86; Schell, 2002, p. 74]

UMTS uses frequencies in the bandwidth of 1920 and 2170 MHz [IZMF, 2005b, p. 1]. This necessitates new mobile devices that are UMTS-capable. On the other hand these devices must be backward compatible with the GSM/GPRS standards because UMTS is initially available only in metropolitan areas, since a UMTS subscriber must be able to use “normal” mobile services while on the move outside of big cities.

UMTS services are being offered in Germany in nearly all metropolitan cities since 2004.³⁹ *Vodafone D2 GmbH* (Vodafone) and *T-Mobile Deutschland GmbH* (T-Mobile) launched their services in May, 2004, the other two carriers, *e-plus 3G Luxemburg S.à.r.l.* (E-Plus) and *O₂ (Germany) GmbH & Co. OHG* (O₂) in June 2004 [UMTS Forum, 2005b, p. 1].

There are several UMTS services being offered, e.g. *Vodafone* has been showing a complete movie on its UMTS network, which was running in cinema houses [Vodafone, 2005, p. 1]. At the end of the year 2004 there were approximately 75 models of UMTS capable mobile telephones [Gfaller, 2004, p. 1].

There are some 16 million UMTS subscribers worldwide, of which 6.5 million in Europe [FAZ, 2005, p. 15]; but only around 0.25 million in

³⁹ For a brief overview of offered services see chapter 5.

Germany [BITKOM, 2005, p. 1]. The customer response so far seems to have been less than enthusiastic on account of high costs for UMTS services [FAZ, 2004, p. 15].

Having discussed different generations of mobile telecommunication standards, it would be useful to have a look at technologies that are sometimes considered to be a potential threat to the success of 3G technologies.

4.2 Complementary Technologies of Data Transmission

This chapter describes two standards of data transmission that – unlike standards discussed above – are not used exclusively for mobile data transmission but can nevertheless be used to a certain extent for this purpose.

4.2.1 Wireless Local Area Network (WLAN)

The WLAN technology is employed for wireless communication with Local Area Networks (LAN) and theoretically provides data transfer rates of up to 54 megabits per second (mbps)⁴⁰, which is much higher than UMTS [Krishnamurthy/Pahlavan, 2002, p. 17-18]. In practice, WLAN permits data transfer with a speed of up to 2 mbps [Swisscom, 2004, p. 2].

Most of the WLAN systems are based on the standard developed by the US based Institute of Electrical and Electronics Engineers (IEEE) and work on the free-to-use, unlicensed 2.4 GHz frequency.⁴¹

The interface to mobile devices, e.g. laptops, is provided by Access Points (popularly known as Hotspots), which are connected to LAN. WLAN usually has a range of 100 metres in buildings and up to 300 metres on open ground.

WLAN has gained tremendous popularity in past few years. In Germany there were 109 Hotspots at the end of year 2002, after one year their number was reported to be 525 [Mobilmedia, 2004, p. 1]. The number however jumped dramatically in the following years. Over 7,400 Hotspots were

⁴⁰ 1 mbps = 1,000 kbps.

⁴¹ An alternative standard to IEEE is HIPERLAN developed by the European Telecommunications Standards Institute (ETSI). HIPERLAN works on the 5 GHz frequency.

reported to be in operation in October 2005 in Germany; most of them commercially run. The biggest provider is *T-Mobile*. Europe-wide there are reportedly over 25,000 Hotspots. WLAN is expected to grow in the same manner in coming years.⁴² Network carriers such as *Vodafone* and *O₂* are cooperating to share their WLAN infrastructure, particularly Hotspots at places such as airports and hotels [Vodafone, 2004, p. 1].

However, there are currently no mobile telephones available, which can communicate via WLAN. The biggest handicap of WLAN is that the hand-over of a network connection between two Access Points is not possible. It means that the connection (and every data transfer process) is broken, when the user leaves one WLAN range and enters another one.

On account of this handicap WLAN can not be really seen as a viable alternative to mobile telecommunication standards, e.g. UMTS. On the contrary it seems likely that WLAN could develop into a complementary standard to UMTS, so that subscribers could use WLAN for data-intensive mobile applications that are needed while outside of one's home or office but not necessarily while physically on the move. Both standards could, thus, reinforce the need for each other and give impulses for the success of each other.

4.2.2 Bluetooth

Bluetooth is basically a cable-replacement technology, intended to simplify the communication amongst and between mobile devices and personal computers (PC) [GSM Bluetooth, 2005, pp. 1-2]. Bluetooth has established itself as a useful tool for Mobile Commerce, serving for diverse business needs such as mobile payment and direct marketing [Incisor, 2004, p. 3]. The primary reasons for its success are [Ericsson Glossary, 2004, p. 2]:

1. Bluetooth makes it possible to create temporary (ad-hoc) networks;
2. It facilitates both voice- and data communication;
3. It can communicate with any other device having Bluetooth;
4. It helps synchronise data from different devices (e.g. transfer music and video files from mobile phone to PC or vice versa).

⁴² Current statistics for Germany can be found at: <http://www.hotspots-in-deutschland.de/de/statistik.asp>, 07.10.2005.

Bluetooth works with a freely usable, non-licensed frequency of 2.4 Gigahertz (GHz) in the Industrial, Scientific and Medical (ISM) band. It is a low-cost, short-range radio technology that can be used in a radius of about 10 metres, in some cases up to 100 metres. Bluetooth can transmit data with a speed of 432.6 kbps in case of synchronous and up to 724 kbps in case of asynchronous data links.⁴³ A Bluetooth device changes its broadcasting frequency (frequency hopping) up to 1,600 times per second to provide better security while transmitting data [Ahlke, 2002, p. 19]. It is, thus, a high speed, secure and yet low-cost as well as low energy-consuming technology and for this reason highly suitable for mobile devices, despite range limitations.

4.3 Display and Programming Standards

The previous section described protocols employed for voice- and data transmission. The transmitted data however must be presented to the user on his mobile device via a suitable and uncomplicated user-interface. This section describes two such programmable display standards, namely WAP and i-mode.

4.3.1 Wireless Application Protocol (WAP)

WAP is a non-proprietary (open), global standard that was introduced in its first version WAP 1.0 in 1998. It has been developed by the WAP Forum⁴⁴, a consortium of leading manufacturers of mobile phones including Ericsson, Motorola and Nokia. The objective of developing WAP was to provide an industry-wide specification for developing applications that operate on mobile telecommunications network and transmit Internet contents on mobile devices independent of the transmission technology used by network carriers [WAP-Forum, 2001, pp. 4, 11].

⁴³ For technical specifications see [Ferro/Potorti, 2004, pp. 4-5].

⁴⁴ The WAP Forum has in the meantime been renamed in Open Mobile Alliance (<http://www.openmobilealliance.org>).

WAP applications can be written with the help of the Wireless Mark-up Language (WML), a language that resembles in its structure the Hypertext Mark-up Language (HTML) used for creating Internet pages. It is used to specify content and user interface for delivery to a narrowband device”, e.g. a mobile phone. WML can work with constraints that a mobile device typically possess, e.g. small display, limited user input facilities, narrowband connections and limited disk and memory resources [WAP Forum, 2002, p. 16].

A WAP Gateway acts as interpreter between the mobile device and a web server which decodes and encodes the information in a way that the server and the mobile device can communicate with each other [Lei et al., 2004, p. 87].

Ever since the introduction of GPRS and higher data transfer rates, WAP can also work with complicated graphics and images. It allows a relatively easy and unproblematic integration of mobile applications into existing Internet services. Web servers can be modified with the help of suitable software to offer WAP functionality. On the hardware front only a WAP Gateway is required. However, the content must be made WML compatible so that it can be read by mobile devices [Lei et al., 2004, pp. 87-90]. Translating all relevant content into WML increases the temporal and monetary costs of WAP.

Another major problem of WAP 1.0 was that the data were decrypted by WAP Gateway before transmitting them to the web server and sensitive data, e.g. credit card information, could potentially be misused. The new version WAP 2.0, which was introduced in 2001, takes care of this problem and the data are no longer stored in decrypted form on the WAP Gateway [Lei et al., 2004, pp. 87-88].

WAP 2.0 also defines a new programming language “Extensible Hypertext Mark-up Language Mobile Profile” (XHTMLMP) that supports both of the established standards, namely WAP and i-mode. On account of its open, non-proprietary nature WAP is attractive for developers and application providers.

4.3.2 i-mode

The Japanese network carrier NTT DoCoMo (NTT) introduced i-mode in 1999 as an open standard based on programming language iHTML (i-mode compatible HTML). It is based on packet-switched network technology and

is thus GPRS- and UMTS compatible, allowing for a wide range of push- and pull services [Teltarif, 2004, p. 1]. The i-mode compatible sites can be divided in two categories:

1. Content provided by official providers: It is integrated in the i-mode menu and can be accessed directly by clicking on the menu item. Official partners need an agreement with NTT, which charges a 9% commission for collecting bills on behalf of the content providers and approves the content.
2. Content provided by unofficial providers: Such sites can be viewed by customers by typing the site-address in a mobile browser, similar to the Internet sites. These providers have to find their own mechanisms to collect charges for their services.

Content providers, generally, do not have to pay fees for offering i-mode compatible content. The real profit of NTT comes by transferring data on account of network usage. Other network carriers wishing to offer i-mode services need a license.⁴⁵ i-mode has been successful in Japan, attracting 45 million subscribers and offering access to over 93,000 Internet sites via mobile phones as of August 2005, according to information provided by NTT.⁴⁶

In Germany there are over a million *E-Plus* customers that subscribe to i-mode services. One more network carrier in Germany, namely, *O₂* announced plans to launch i-mode services in 2006. The service shall, however, be named *MMO2* owing to legal complications with *E-Plus* [Kroder/Wihofszki, 2004, p. 5]. The i-mode technology, however, has seen little success outside Japan. Taiwan, Germany, Holland, Belgium, France, Spain, Greece, Italy and Australia are the only countries, where i-mode services are available up to now.⁴⁷

The main advantages of i-mode as against WAP are:

⁴⁵ See NTT's official information on its i-mode business strategy, online available: <http://www.nttdocomo.com/corebiz/imode/why/strategy.html>, 02.03.2005.

⁴⁶ NTT provides on its Internet site regularly updated statistics on i-mode usage: <http://www.nttdocomo.com/corebiz/services/imode/index.html>, 16.10.2005.

⁴⁷ November 2004; see: <http://www.nttdocomo.com/corebiz/imode/global/>, 02.03.2005.

1. Official content providers do not have to install their own payment mechanisms and pay relatively low commission charges;
2. iHTML is developed as a subset of HTML so that Internet content can be transferred to i-mode with less problems. This results in reduced programming costs. This advantage, however, could be offset by XHTMLMP that is HTML based and WAP *and* i-mode compatible.

A severe handicap of i-mode is that it requires special i-mode compatible devices [Kroder/Wihofszki, 2004, p. 5]. The proprietary nature of i-mode services for network carriers is another reason why i-mode does not seem to be gaining ground in other parts of the world.

4.4 Future-Scenario: The fourth Generation (4G)

As the 3G services are just beginning to reach users, 4G is a distant scenario expected to be launched in year 2010, notwithstanding announcements by individual firms, e.g. NTT, to pre-poned 4G to year 2006 [Dholakia et al., 2004, p. 14]. Nevertheless principal trends of 4G are expected to go along following lines:

1. A seamless roaming between 2.5G, 3G and WLAN may be achieved so that mobile devices will automatically detect the presence of a network with higher bandwidth and switch to it. The handover will take place without interrupting existing connections. So that WLAN, as a complementary technology, could become an integrated component of Mobile Commerce [EITO, 2004, p. 32].
2. Speed of data transfer is expected to reach, and probably even exceed, 100 mbps [EITO, 2004, p. 111]. This would allow offering of highly data-intensive applications, e.g. live video streaming.
3. 2G and 2.5G technologies are expected to be still around since 3G/UMTS networks are not expected to extend their reach to all geographic areas. A downward compatibility of mobile devices would have to be ensured [Dholakia et al., 2004, p. 11].

The discussion in this chapter has shown that the technology is now ripe for fully functional, content-rich and value-added Mobile Commerce applications. The relevant issue is of finding suitable applications and offering

them for affordable prices. The next chapter provides a brief overview of such applications. It also dwells on the modalities of payment mechanisms for these applications.

5 Mobile Applications & Methods of Payment

The earlier discussed technologies make it possible to offer a wide range of mobile services to users, e.g. purchasing train tickets via mobile telephone or transferring money from the bank account. Individual services of similar nature can be bundled into an application, e.g. Mobile Ticketing or Mobile Banking.

5.1 Overview of Mobile Applications

Mobile Commerce Applications	
Application	Examples of Offered Services
Mobile Banking	Mobile Accounting Mobile Brokerage Mobile Financial Information
Mobile Entertainment	Mobile Gaming Download of Music and Ring Tones Download of Videos and Digital Images Location-based Entertainment Services
Mobile Information Services	Current Affairs (Financial, Sport and other News) Travel Information Tracking Services (Persons and Objects) Mobile Search Engines and Directories Mobile Office
Mobile Marketing	Mobile Couponing Direct (context-sensitive) Marketing Organisation of Mobile Events Mobile Newsletters
Mobile Shopping	Mobile Purchasing of Goods and Services

Mobile Commerce Applications	
Mobile Ticketing	Public Transport Sport- and Cultural Events Air- und Rail-Traffic Mobile Parking
Telematics Services	Remote Diagnosis and Maintenance of Vehicles Navigation Services Vehicle Tracking and Theft Protection Emergency Services

Table 1: Mobile Commerce services & applications

The applications are described briefly in the following:

Mobile Banking: This application makes it possible to complete bank-related transactions, e.g. checking account status, transferring money and selling stocks, via mobile devices, independent of the current user location.

Mobile Entertainment: On the one hand, this application contains services that provide the user digital data with entertainment value on mobile devices, e.g. ring-tones, music and videos. On the other hand it opens an array of interactive services, e.g. betting, gaming, dating and chatting.

Mobile Information Services: This term refers to mobile services that provide subscribers with content of informational character. Examples of such services are news updates of any nature (finance, politics, sport etc.), travel information, access to search engines and Mobile Office (e-mails, appointments etc.).

Mobile Marketing: This term refers to services based on mobile communication technologies that provide firms with new, innovative instruments, e.g. to increase sale, win and retain customers, improve after-sales services, build and sustain a positive and modern image/brand and carry market research. Mobile devices serve thereby as simple and relatively inexpensive channels of interaction.

Mobile Shopping: This application bundles services that allow for mobile processing of transactions involving purchase of goods of daily use. The user can purchase (mostly standardised) products by choosing them from a catalogue accessible from a mobile device. The products need not be of a digital nature.

Mobile Ticketing: All services that must be paid for, before a lawful utilisation can take place, are suitable for Mobile Ticketing, e.g. travelling in public transport, entry to a cultural event or cinema. This application ensures that the user can purchase a right to utilisation/entry (ticket) via a mobile device, replacing the conventional paper ticket. The ticket is sent in digital form to the mobile device.

Telematics Services: Telematics is an artificial term referring to innovative technologies that link *telecommunication* technologies with *informatics* (information technologies). The transport segment has been the primary area of this application, which is also known as Intelligent Transport System (ITS). The main services are navigation systems, remote diagnosis as well as access to other mobile applications such as Mobile Entertainment, Mobile Content/Office, Mobile Banking and Mobile Shopping.

5.2 Payment Mechanisms for Utilising Mobile Services

Having described various Mobile Commerce applications, it is imperative to have a look at the payment mechanisms required for availment of these applications. There are a number of such mechanisms, which are introduced in the following [Ondrus, 2003, pp. 1-33; Pousttchi, 2003, pp. 408-413; Lenz, 2004, pp. 73-93]:

Payment by credit card: In this method the charges for services are billed against the credit card of the subscriber. The subscriber can inform the service provider about his credit card number, e.g. via WAP interface.

Payment against invoice: The subscriber may register himself with the provider and get an invoice for the services that he utilises. The invoice may be paid by the subscriber manually or the provider may be entrusted with a standing order for direct debit against subscriber's bank account.

Payment by a prepaid card: The subscriber may buy a prepaid card sold by the provider. Any utilisation of offered services is billed against the prepaid card until the amount on the card is exhausted.

Payment by premium SMS: The subscriber may send an SMS to a certain number. This SMS costs a fixed, pre-determined amount that is collected by the network carrier on behalf of the service provider. In Germany pre-

mium SMS numbers usually begin with the prefix 0190 and generally cost anywhere between €0.19 and €2.99.

Payment via telephone bill: A comfortable way of paying for mobile services is payment via the monthly telephone bill that the network carrier, e.g. *T-Mobile*, sends to each subscriber. The carrier may collect the amount on behalf of the provider, against a certain service charge. For example, *T-Mobile* and *Vodafone* have started an alliance to offer such services to business partners for amounts not exceeding €10 [Krosta, 2002, pp. 1-2].

Mobile Payment: The term “Mobile Payment” refers to payments that are made via mobile hand-held devices in order to purchase goods and services.⁴⁸ Mobile Payment services usually act as intermediary between consumer and vendor. Prominent examples of such services are “Mobile Wallet”, a service by *T-Mobile* and “m-pay” by *Vodafone*. It is a hybrid form of payment that combines elements from other methods of payment, e.g. credit cards, prepaid cards, invoicing and telephone bills.

Both, the consumer, generally a mobile phone subscriber of the concerned network carrier, and the vendor, get themselves registered with the payment service. Each subscriber gets an individual PIN to authenticate himself via WAP or SMS, in order to make payments for his purchases. The advantage for the subscriber lies in the fact that he does not need to get himself registered with each individual vendor. The vendor, on the other hand, does not need to worry about the credit-worthiness of individual customers. He may also hope to attract customers who would have liked to pay by mobile means but who were not willing to register themselves with him.

There have been extensive studies, e.g. [Eco, 2004] and [Khodawindi et al., 2003], about the viability of Mobile Payment, which have generally confirmed the acceptability of such methods amongst consumers. In the following we introduce the findings of a representative study by Khodawindi et al. [2003] carried out by the University of Augsburg and involving about 4,400 participants.

Over 80% of survey participants were willing to accept Mobile Payment (payment via mobile, electronic devices). An overwhelming majority

⁴⁸ Mobile Payment does not make use of non-handheld mobile devices, such as those mounted in vehicles, for lack of suitability in standard payment situations.

(96%) of the willing participants gave “privacy of personal data” as one of the reasons for their decision. Other cited reasons were “simplicity of the method” (93%) and “less or no transaction costs” (92%). The transaction costs seem to be an important criterion for the acceptability, as over 37% of the surveyed persons were willing to use Mobile Payment only if it had no transaction costs, another 19% were willing to pay up to €2.50 yearly fees for utilising such services, a further 36% up to €5. The study further found out that Mobile Payment is preferred primarily for smaller amounts (“micro payments”). There is no clear cut definition of the term micro payments; opinions range from €2.50 to €10. Nonetheless, over 71% of the participants of the Augsburg study were willing to make use of Mobile Payment for amounts between €2.50 and €50.

All such studies can not be discussed here in detail on account of the limited space available. It may however be contended that the Mobile Payment methods have come to enjoy acceptability, paving way for Mobile Commerce applications. The limitation of micro payments must, however, be kept in mind while designing an application.

Mobile Payment is sometimes also described as being a part of Mobile Banking, see for instance Mustafa et al. [2002, p. 358].⁴⁹ This perception, however, seems to be somewhat misleading. Though Mobile Payment is generally employed to pay for goods and services ordered via mobile devices, it may as well be employed for purchasing goods and services that are neither ordered nor delivered via mobile devices. Because of this broader applicability it does not seem appropriate to confine Mobile Payment to the narrower scope of Mobile Commerce.

While Mobile Payment is thought to play a key role in the acceptance and success of Mobile Commerce by providing a convenient, uncomplicated and secure method of payment [Khodawindi et al., 2003, pp. 1-2], its scope is broad and transcends that of Mobile Commerce as defined for the purpose of this study. Mobile Payment provides a vital infrastructural foundation to Mobile Commerce and should thus be regarded as a component of Mobile Business. In accordance with this logic the issue of Mobile Payment is here not dealt with any further. This study is focussed on viability of mobile applications in the banking sector.

⁴⁹ This inclusion is tempting as payments are often conducted with banks' involvement.

6 Mobile Commerce in Banking Sector

Finance-related services that are offered by employing mobile telecommunication technologies are generally referred to as Mobile Financial Services. The offered services can be divided into two categories: Mobile Payment and Mobile Banking [Georgi/Pinkl, 2005, p. 57].

Since Mobile Payment is not a primary object of study in this work and has already been discussed in the previous chapter, we may now turn our attention to Mobile Financial Services in the banking sector.

The purpose of this chapter is to serve as a literature review on Mobile Banking. It describes, in detail, various services pertaining to Mobile Banking and explains the technical issues specific to this particular application. Even as Mobile Banking is defined and its services explained, we identify issues that potentially possess critical relevance for the future of Mobile Banking and which cannot be answered in a purely theoretic framework. Such issues are then formulated as “Research Issues”. These Research Issues form the backbone of this study, in that they serve as source of questions for the empirical surveys.

6.1 Definitions and Scope Issues

In order to understand and evaluate the prospects of the “mobile” form of banking it is imperative to first comprehend the scope of “banking” as such.⁵⁰

6.1.1 Scope of Banking Business

Banking has traditionally been defined as:

⁵⁰ The term “mobile” is defined in section 2.1.2.

“[...] the accepting, for the purpose of lending or investment, of deposits of money from the public, repayable on demand or otherwise, and withdrawal by cheque, draft, order or otherwise”. [*The Banking Regulation Act of India, 1949, I.5.b*]

Banks, in the meantime, are no more institutions involved exclusively in the business of lending and investing money. They now offer a much wider range of services. This modern reality is mirrored in the following definition of “banking business” provided by the Sixth Amendment of the Banking Act of Germany (“*Gesetz über das Kreditwesen*”, known as KWG).⁵¹

According to this definition the banking business comprises of:⁵²

1. *Deposit business*: the acceptance of funds from others as deposits or of other repayable funds from the public unless the claim to repayment is securitised in the form of bearer or order debt certificates, irrespective of whether or not interest is paid;
2. *Lending business*: the granting of money loans and acceptance of credits;
3. *Discount business*: the purchase of bills and exchange of cheques;
4. *Principal broking services*: the purchase and sell of financial instruments⁵³ in the credit institution’s own name for the account of others;
5. *Safe custody business*: the safe custody and administration of securities⁵⁴ for the account of others;
6. *Investment fund business*: all activities that are permitted to investment companies;⁵⁵
7. *Guarantee business*: the assumption of guarantees and other warranties on behalf of others;

⁵¹ The English language text of the Sixth Amendment of the Banking Act (“*Sechste KWG-Novelle*”) is provided by the *Deutsche Bundesbank* in an unofficial version on its website: http://www.bundesbank.de/download/bankenaufsicht/pdf/kwg_e.pdf, 21.05.2005.

⁵² The points from i) to xi) are quoted directly from the English language text of KWG.

⁵³ See section 6.2.2.1 for a definition of financial instruments.

⁵⁴ See section 6.2.2.1 for a definition of securities.

⁵⁵ The precise scope of investment activities in Germany is determined by the Act on Investment Companies (“*Gesetz über Kapitalanlagegesellschaften*”).

8. *Giro business*: the execution of cashless payment and other clearing operations;
9. *Underwriting business*: the purchase of financial instruments at credit institution's own risk for placing in the market or the assumption of equivalent guarantees;
10. *E-Money business*: the issuance and administration of electronic money; and
11. the incurrance of the obligation to acquire claims in respect of loans prior to their maturity.

The KWG (§1) defines the term “credit institution”,⁵⁶ in accordance with this approach, as following:

“Credit institutions are enterprises which conduct banking business commercially or on a scale which requires a commercially organised business undertaking.”

Having defined banks and banking business we can turn our attention to other services that might be relevant for Mobile Banking.

6.1.2 Scope of Financial Services

In addition to banks there are some other institutions that provide a limited range of similar services. Instead of offering classic banking services such as deposit- or giro business they specialise in services relating primarily to stock markets. The scope of financial services, as defined by the KWG (§1), includes:⁵⁷

1. *Investment broking*: the brokering of business involving the purchase and sell of financial instruments or their documentation;
2. *Contract broking*: the purchase and sell of financial instruments in the name of and for the account of others;
3. *Portfolio management*: the administration of individual portfolios of financial instruments for others on a discretionary basis;

⁵⁶ In Germany banks are often referred to as “*Kreditinstitute*” (credit institutions).

⁵⁷ The points from i) to viii) are quoted directly from the English language text of KWG.

4. *Own-account trading*: the purchase and sell of financial instruments on an own-account basis for others;
5. *Non-EEA deposit broking*: the brokering of deposit business with enterprises domiciled outside the European Economic Area (EEA);
6. *Money transmission services*: the execution of payment orders;
7. *Foreign currency dealing*: dealing in foreign notes and coins;
8. *Credit cards business*: the issuance or administration of credit cards and travellers' cheques unless the card issuer also provides the service underlying the payment transaction.

The KWG (§1) defines the term “financial services institution” in accordance with this approach as following:

“Financial services institutions are enterprises which provide financial services to others commercially or on a scale which requires a commercially organised business undertaking, and which are not credit institutions.”

Having described relevant services and institutions we may now define the scope of this study:

- For the purpose of simplicity, this study refers to all providers of banking business and financial services as *banks* and does not differentiate between credit institutions and financial services institutions any further.
- Services that do not fall under the ambit of either banking business or financial services, as defined by the KWG, are not dealt with in this work. The same holds true for business entities that are neither credit institutions nor financial services institutions as envisaged by the KWG.

6.1.3 Scope of Mobile Banking

Mobile Banking is usually defined as carrying out banking business with the help of mobile devices such as mobile phones or PDAs [Georgi/Pinkl, 2005, p. 57; Luber, 2004, p. 19]. This approach, apparently, does not differentiate between banking- and financial services. An explicit differentiation does not seem to be considered vital by many authors, even though they implicitly always take financial services into consideration. Since this

study makes use of many such sources, these two terms are sometimes used interchangeably.

The offered services may include transaction facilities as well as other related services that cater primarily to informational needs revolving around bank activities. Considering these factors and in keeping with the just defined scope of this study we can define Mobile Banking as follows:

Mobile Banking refers to provision and availment of banking- and financial services with the help of mobile telecommunication devices. The scope of offered services may include facilities to conduct bank and stock market transactions, to administer accounts and to access customised information.

The earlier definition of banking and financial services, however, throws up an important question regarding desirable scope of Mobile Banking:⁵⁸

Which banking and financial services are suitable for Mobile Banking from a commercial perspective?

Research Issue 1: Scope of banking and financial services in Mobile Banking

As a matter of fact, a purely theoretic answer to this question would not help us much. The issue must be, therefore, clarified empirically. The opinion of potential customers and banks should be sought to find a useful answer.⁵⁹

As next we describe various services that are either currently being offered or are thought to be suitable for Mobile Banking.

⁵⁸ The legal and technical issues have been dealt with in chapters 3 and 4 respectively.

⁵⁹ This issue is dealt with in sections 9.1.4 and 9.2.3.

6.2 Services Offered in Mobile Banking

Mobile Banking, as defined above, includes a wide range of services. These services may be categorised as following [Georgi/Pinkl, 2005, p. 57]:

1. Mobile Accounting
2. Mobile Brokerage
3. Mobile Financial Information⁶⁰

These sub-applications of Mobile Banking are discussed below in detail.

6.2.1 Mobile Accounting

Georgi/Pinkl [2005, p. 57] define Mobile Accounting as transaction-based banking services that revolve around a standard bank account and are conducted and/or availed by mobile devices.

Not all Mobile Accounting services are however necessarily transaction-based. Mobile Accounting represents basically that part of Mobile Banking which deals with utilising account-specific banking services of non-informational nature via mobile telecommunication devices.

Mobile Accounting services may be divided in two categories to differentiate between services that are essential to operate an account and services that are essential to administer an account. Additionally, services are required that inform a customer of transactions and other activities involving his or her account. It is for this reason that Mobile Accounting is offered – almost invariably – in combination with services from the field of Mobile Financial Information.

⁶⁰ Georgi/Pinkl refer to this category as Mobile Information Services (“*Mobile Informationsdienste*”). This term may be however misleading. Mobile Information Services include, but cannot be limited to, financial information. They provide information on a wide range of topics such as politics, economy, sport, entertainment, and weather and are an independent topic of research under this project.

Mobile Accounting	
Account Operation	Account Administration
Money remittances & transfers	Access administration
Standing orders for bill payments	Changing operative accounts
Money transfer to sub-accounts	Blocking lost cards
Subscribing insurance policies	Cheque book requests

Table 2: Services in Mobile Accounting

6.2.1.1 Account Operation

The term Account Operation, as used in this study, refers to activities that involve monetary transactions. Such transactions may involve an external account, e.g. when paying bills, or an internal (sub-)account, e.g. when transferring money from own savings account to own securities account held with the same bank. Mobile services that are used to operate an account are:

1. *Money remittances*: Mobile devices may be used to instruct the bank to remit money in order to conduct one-time transactions, such as paying bills or transferring funds. This service can also include the facility to cancel an ordered remittance.
2. *Issue standing orders for bill payments*: The house bank may be entrusted with standing orders for payment of regularly recurring bills, e.g. payment of monthly rent or telephone bill.
3. *Transfer funds to and from sub-accounts*: Funds from one sub-account may be transferred to another as and when needed, for instance from savings account to securities account and vice versa.
4. *Subscribing insurance policies*: Standardised, low-cost insurance policies, e.g. a travel insurance policy may be purchased via mobile devices. This service could be particularly attractive in time-critical situations, for instance if a bank customer has to set out on an urgent, unplanned journey, he may still be able to subscribe to a travel insurance policy offered by his house bank.

6.2.1.2 Account Administration

The term Account Administration, as used in this study, refers to activities that are undertaken by an account-holder to maintain his or her account. This may involve activities like access administration and cheque book requests.

Mobile Accounting services that are used to administer the account are:

1. *Access administration*: Mobile devices may be used to administer the access to an account, e.g. to change the individual PIN or to request new Transaction Numbers (TAN).
2. *Change operative accounts*: Through this service a customer can change his default operative account and do transactions using a different account. This option is attractive for customers holding several sub-accounts. Funds of sub-accounts may be hereby utilised in a targeted manner without first transferring the amount to the default account.
3. *Blocking lost cards*: Mobile non-voice telecommunication systems (e.g. WAP, SMS) can be used round the clock to speedily block lost credit- and debit cards irrespective of the current geographic location.
4. *Cheque book request*: Customers using cheque books can order new cheque books via mobile devices, as and when required.

This section raises interesting questions about the usefulness of and demand for the offered services. These questions can be formulated as following:

Which Mobile Accounting services are interesting for the customer?
Which are the services that the customer might be willing to pay for?
Which services are expected by the customer as no-charge “add-on”?

Research Issue 2: Issues related to Mobile Accounting

This Research Issue played a vital role in the subsequent customer survey. Answers to the questions raised here can be found in section 9.1.4.1.

6.2.2 Mobile Brokerage

Brokerage, in the context of banking- and financial services, refers to intermediary services related to the stock exchange centre, e.g. sell and purchase of stocks, bonds, funds, derivatives and foreign exchange among others.

Mobile Brokerage, thus, refers to mobile financial services of non-informational nature revolving around a securities account [Georgi/Pinkl, 2005, p. 57].

Mobile Brokerage, too, may be divided in two categories to differentiate between services that are essential to operate a securities account and services that are essential to administer that account. As is the case with Mobile Accounting, Mobile Brokerage requires informational services in order to facilitate brokerage activities. For this reason, Mobile Brokerage is invariably offered in combination with services related to Mobile Financial Information.

Mobile Brokerage	
Account Operation	Account Administration
Selling & purchasing financial instruments (e.g. securities)	Access administration
	Order book administration

Table 3: Services in Mobile Brokerage

6.2.2.1 Account Operation

Operating a securities account is primarily concerned with selling and purchasing of financial instruments. Mobile Brokerage allows placing and cancellation of orders to sell as well as purchase securities and other financial instruments.⁶¹

⁶¹ Securities are defined as shares, certificates representing shares, debt securities, participation certificates, warrants and other securities that are comparable to shares and debt securities that can be traded on a market. They also comprise fund units issued by an investment company. Financial instruments are defined as securities, money market instruments, foreign exchange or units of account and derivatives. For official definitions of these terms see KWG (§1.11).

Mobile Brokerage facilitates full-scale orders with all necessary details such as price limits and the desired stock exchange centre. This section however raises interesting questions about the usefulness of and demand for the offered services.

Which Mobile Brokerage services are interesting for the customer?
 Which are the services that the customer might be willing to pay for?
 Which services are expected by the customer as no-charge “add-on”?

Research Issue 3: Issues related to Mobile Brokerage

This Research Issue too played a vital role in the subsequent customer survey. Answers to the questions raised here can be found in section 9.1.4.2.

6.2.2.2 Account Administration

The following mobile services can be utilised to administer a securities account.⁶²

1. *Access administration*: As with Mobile Accounting mobile devices may be used to administer the access to an account, e.g. to change the individual PIN or to request new TANs.
2. *Administer order book*: Orders to sell or purchase stocks, which are not yet carried out, can be modified via mobile devices that are allowed to access the customer order book. Additionally, new standing orders may be placed to sell/purchase a particular stock on reaching a predefined threshold value.

6.2.3 Mobile Financial Information

Mobile Financial Information refers to non-transaction based banking- and financial services of informational nature [Georgi/Pinkl, 2005, p. 57].

This sub-application may be divided into two categories:

1. Account information
2. Market information

Information services are an integral part of Mobile Accounting and Mobile Brokerage but can also be offered as an independent module, i.e. Mobile

⁶² For a precise scope of the term Account Administration see section 6.2.1.2.

Financial Information can be offered without providing Mobile Accounting or Mobile Brokerage but *vice versa* is not feasible.

Mobile Financial Information services are generally provided by credit institutions and financial services institutions. However, there are other enterprises too that do not belong to either of this category but still provide market information via mobile devices. Examples for such enterprises are mobile publications like “*finanzen.net*” or “*Der Aktionär*”. Both of these companies provide market information via i-mode in cooperation with the German network carrier *E-Plus*. Such services, however, do not fall under the purview of this study, as these services – on account of their purely informational nature – rather qualify as content services. They are not consistent with the definition of banking or financial services, as envisaged by the KWG and the definition in section 6.1 of this study.

Mobile Financial Information services include subsets from both banking and financial services and are meant to provide the customer with anytime, anywhere access to information. The information may either concern the bank and securities accounts of the customer or it may be regarding market developments with relevance for that individual customer. The information is customised on the basis of preferences given by the customer and sent with a frequency decided by him. The information should be provided, ideally, on both, pull and push basis.

Mobile Financial Information	
Account Information	Market Information
Balance inquiries / Latest transactions	Foreign exchange rates
Statement requests	Market and bank-specific interest rates
Threshold alerts	Commodity prices
Returned cheques / cheque status	Stock market quotes and reports
Credit card information	Product information & offers
Branches and ATM locations	–
Helpline and emergency contact	–
Information on the completion status	–

Table 4: Services in Mobile Financial Information

6.2.3.1 Account Information

The term Account Information, as used here, refers to information that is specific to a customer and his bank, even though it does not necessarily involve a monetary transaction. Mobile services that belong to this category are:

1. *Balance inquiries*: Mobile devices may be employed to check the current financial status of own bank or securities accounts.
2. *List of latest transactions*: Mobile devices may be used to request a list of latest transactions performed on an account. This service works with a standard, pre-specified number of latest transactions that are reported, as and when demanded. Most of the banks provide a list of up to five latest transactions.
3. *Statement requests*: A statement request – unlike the request for a list of latest transactions – generates a list of all transactions in a given period, for instance in a week or in a month. Statements may be requested either manually, as and when needed. Alternatively the bank may be asked to automatically send statements regularly in pre-specified intervals, e.g. weekly. In Mobile Banking the account statements can be requested via and/or delivered on mobile devices.
4. *Transaction thresholds*: The bank may be instructed to automatically alert the customer via SMS whenever transactions (credits as well as debits) exceeding a certain amount are performed on the account.
5. *Balance thresholds*: A similar threshold alert may be activated for the balance status of the account. The customer may be informed via SMS whenever the balance falls below a certain predefined level. This service may be useful to help the customer avoid unpleasant situations of not being able to honour his commitments.
6. *Threshold alerts for stock prices*: The bank may be instructed to send an alert on mobile devices, via SMS, when prices of some particular stocks fall or jump to a predefined threshold value and ask for further instructions.
7. *Returned cheques/cheque status*: The customer may be informed without time-delay if one of his deposited cheques has not been honoured and corrective steps are required.

8. *Credit cards information:* The customer may check anytime and anywhere the current status of his credit cards and the amount that he may utilise at that given point of time.
9. *Branch and ATM locations:* Mobile devices may help finding the nearest branch or ATM affiliated to a bank. The current location of the customer may be determined by positioning the mobile device. This service may be particularly useful while travelling.
10. *Helpline and emergency contact:* Mobile devices may be provided with content that is required in emergency situations, for instance to block a lost credit card. The information may be either embedded in the telephone menu, e.g. in cooperation with a network carrier or the information may be provided on a WAP page analogue to a web page.
11. *Information on the completion status of an order:* The bank may use “push” services to inform the customer via his mobile device regarding whether or not his orders could be carried out. This ensures that urgent information can be provided to the customer while on the move.
12. *Product information and offers:* The bank can provide information about its products and new offers to a customer on the move. A customer can “pull” the information that he wishes to access. On the other hand the bank can “push” the information/offers that the customer has identified as interesting and is willing to receive.

6.2.3.2 Market Information

The term Market Information – as opposed to Account Information – refers to information with a macro-scope. This information is not directly related to the customer account. It is generated either externally, e.g. exchange rates or central bank’s interest rates, or internally by the individual bank, e.g. bank-specific interest rates.

The individual bank-customer does not play a direct role in this process. The information may be later sorted out to cater to the individual needs and preferences of a particular customer, if so desired by him,⁶³ and subsequent-

⁶³ The customer may wish to receive information with a direct and specific relevance for him, e.g. stock market developments for stocks in his portfolio. On the other hand it is

ly delivered on a mobile device of his choice, e.g. a mobile phone or a PDA.

Information in this category generally concerns:

1. Foreign exchange rates
2. Interest rates
3. Stock market news and reports
4. Commodity prices (e.g. gold and raw materials)

Mobile Financial Information is a widespread and well-known form of Mobile Banking, as demonstrated in the next section. Several banks focus their Mobile Banking services exclusively on this subset. This raises several questions:

Are Mobile Financial Information services interesting for the customer?
 Which are the services that the customer might be willing to pay for?
 Which services are expected by the customer as no-charge “add-on”?
 Why is Mobile Financial Information more popular than Mobile Accounting or Mobile Brokerage amongst banks?

Research Issue 4: Issues related to Mobile Financial Information

Answers to the first three questions can be found in section 9.1.4.3. An answer to the last question is found in section 9.2.6.

In this section we have described mobile banking- and financial services. Although most of the above mentioned services are currently being offered by some bank or other, rarely does a single bank provide all of the services in full-range with banks mostly preferring to make a limited offer.

Before we take a closer look at the reasons of this limited offer, it would be useful to understand the technical concepts which are employed to realise Mobile Banking because the technical complexity is a major factor in any decision-making about the launch of new, innovative services like Mobile Banking. The next chapter deals with the technical realisation of mobile financial services.

also possible that a customer wishes to receive general information regarding market developments, e.g. a daily stock market report.

7 Mobile Banking Offers & Employed Mediums

Mobile Banking services should fulfil certain safety criteria in order to ensure customer acceptance as well as business viability. The safety criteria, as described by Mustafa et al. [2002, p. 356] for conducting secure mobile communication services are certainly as much valid for Mobile Banking:

1. *Confidentiality*: The data must be protected in a way that prohibits any unauthorised access from taking place.
2. *Authentication*: Access to data may be granted only when the user identity has been ascertained and authenticated.
3. *Integrity*: Encryption techniques must be employed to avoid manipulation of the data during transmission. The bank and the customer, both, should be able to verify the integrity of the transmitted data by cross-checking the validity of certain pre-stipulated attributes.⁶⁴
4. *Non-disputability*: Transactions must be documented, e.g. by generating detailed log files and preserving them for a reasonably long time to allow the customer to take note of the transaction and to report discrepancies, if any, to the bank. So that the non-disputability of customer instructions can be ensured, if needed before a court of law.

These data protection/safety standards must be met by technologies that are employed by banks to offer Mobile Banking services. Applications based on three different types of technologies are used for these purposes:

1. Browser-based applications
2. Messaging-based applications
3. Client-based applications

⁶⁴ There are several methods, which are considered to be efficient, to authenticate the integrity of transmitted data on account of certain predefined attributes, e.g. hash values and checksums. See for further information: [Mustafa et al., 2002, p. 357], [Liebaug, 1997, pp. 1-30] or [AudioCodes, 2004, pp. 1-10].

These technologies and their usage are described in the following.

Methodology of the description

The following section describes various Mobile Banking technologies and their utilisation in Germany and other countries. In order to examine their utilisation 50 banks were selected, half of them from Germany and the rest from other countries across the world.

The banks were selected on fulfilment of one or more of the following criteria:

1. application description in the relevant literature;
2. identification by Internet search engines, e.g. *Google* and *Yahoo!*.

Two more alternative criteria were used for selecting banks from Germany:

1. listed by one of the 4 network carriers as a Mobile Banking partner;
2. listed at starfinanz.de⁶⁵ as an Online/Mobile Banking partner;

A three-tier research strategy was followed to examine the offers on mobile services and the employed technologies. The first tier consisted of selecting the banks on the basis of this preliminary research. On a second tier an extensive research was conducted on the websites of respective banks.

This second-tier research revealed some interesting facts. A non-negligible number of German banks was found to be offering Mobile Banking in a “discrete” manner, i.e. there was sometimes no direct mention of Mobile Banking offers on their respective websites. Some others had “hidden” their Mobile Banking offer in such a manner that only a determined user could find it.

The third-tier research was limited to banks in Germany and consisted of conducting a survey amongst all German banks that were considered during the second-tier research. Additionally, two Swiss banks were also interviewed.

The second-tier research however raised an interesting question:

⁶⁵ [Starfinanz.de](http://starfinanz.de) is the website of Hamburg-based *Star Finanz GmbH* that provides, in cooperation with *T-Online*, client-based Online- and Mobile Banking solutions to a large number of German banks.

What might be the motivation behind discretion in propagating Mobile Banking services?

Research Issue 5: Propagation of Mobile Banking by banks

The issue of discretion was followed in the bank survey. An answer can be found in section 9.2.6.

7.1 Browser-based Applications

Browser-based⁶⁶ applications generate the user interface on the server and transport it subsequently to the mobile device. This interface is then presented to the user graphically with the help of a browser. Primary examples of browser-based banking applications are services based on WAP and i-mode.

The main advantage of a browser-based application is that data-processing is conducted solely on and by the server. There is, thus, no requirement for the presence of additional software or of significant processing power on the mobile device. Browser-based applications are hence suitable for mobile devices with low memory- or processing power, e.g. mobile phones [Dilg et al., 2004, p. 15]. Secondly, the user does not need to be technology savvy to install software on his mobile device. Finally, the predefined user interface simplifies the interaction with the application and encourages the user to shed his inhibitions.

In the following, some important forms of browser-based applications are described. Since the browser-based applications include solutions based on two prominent protocols WAP and i-mode, we describe banking services offered via these protocols individually. The services offered via messaging-based and client-based applications are described in an aggregated form.

⁶⁶ A browser is a software application that locates and displays web pages. It initiates requests to a web server and displays the information that the server returns.

7.1.1 WAP Banking

Mobile Banking services offered via WAP⁶⁷ are often referred to as WAP Banking. Many renowned banks at national and international level are offering WAP-based services. Prominent examples of German banks offering WAP-based services include *Deutsche Postbank AG*, *comdirect Bank* and *Stadtsparkasse München*. At international level *Nordea Bank* (Finland), *Credit Suisse* (Switzerland) and *Maybank* (Singapore) are amongst those offering a differing degree of services using WAP.

Apart from the general problems faced by WAP (described in section 4.3.1), one important reason for the failure of WAP in Germany have been the high costs of its usage. Since WAP-based transactions are conducted online, the user ends up paying a comparatively large amount of money as connection charges to his network carrier, particularly as the GSM and GPRS networks are not very fast.

Nevertheless, the tables below give an overview of services that are being currently offered in Germany and other countries by using WAP. A hyphen (“-”) opposite a service signifies that *none of the examined* banks was offering that service at the time of this research.

⁶⁷ For a detailed discussion on WAP see chapter 4.3.1.

The Mobile Accounting services offered via WAP include:

Mobile Accounting	Banks	
	Germany	International
Account Operation		
Money remittances & funds transfers	Postbank, Sparkasse Köln-Bonn, VR-Banken	Bank of the Philippines Islands, Bankdirect, Maybank, Nordea
Standing orders for bill payments	-	Bank of the Philippines Islands, HDFC, Maybank, Nordea
Money transfer to sub-accounts	Postbank	Bank of the Philippines Islands, Maybank, Nordea
Subscribing insurance policies	-	-
Account Administration		
Access administration	Postbank	Maybank
Changing operative accounts	-	-
Blocking lost cards	Postbank	HDFC, Maybank,
Cheque book requests	-	HDFC, IDBI, Maybank

Table 5: WAP services for Mobile Accounting

This table illustrates that the use of WAP for offering Mobile Accounting services is not very widespread in Germany. In fact, many major banks in Germany, e.g. *Deutsche Bank*, *Hypo-Vereinsbank* and *LBBW*, are reported to have discontinued their WAP services [Dilg et al., 2004, pp. 37-41]. The Switzerland-based *UBS*, too, has recently discontinued its WAP services in the area of Mobile Accounting in order to concentrate its offer on “modern technologies” [UBS, 2005, p. 1].

The Mobile Brokerage services offered via WAP include:

Mobile Brokerage	Banks	
	Germany	International
Account Operation		
Selling & purchasing securities	comdirect, Fimatex, Postbank, VR-Banken	Bank of the Philippines Islands, Nordea
Account Administration		
Access administration	comdirect, Postbank	-
Order book administration	comdirect, Postbank, VR-Banken	Bank of the Philippines Islands, Nordea

Table 6: WAP services for Mobile Brokerage

In an interesting contrast to Mobile Accounting services, WAP seems to be somewhat more popular as far as brokerage services are concerned. Particularly as we see that there are banks that focus their WAP offer exclusively on brokerage services even though they are active in other fields as well.

The Mobile Financial Information services offered via WAP include:

Mobile Financial Information	Banks	
	Germany	International
Account Information		
Balance inquiries	comdirect, Postbank, Sparkasse KölnBonn, VR-Banken	Bank of the Philippines Islands, Bankdirect, Credit Suisse, HDFC, IDBI, Maybank, Nordea
List of latest transactions	Postbank, Sparkasse KölnBonn, VR-Banken	Bank of the Philippines Islands, Bankdirect, HDFC, IDBI, Maybank, Nordea
Statement requests	Postbank	Bank of the Philippines Islands, Bankdirect, HDFC, IDBI, Maybank, Nordea
Transaction & balance thresholds	-	Maybank
Threshold alert for stock prices	comdirect, Postbank	Nordea
Returned cheques & cheque status	-	HDFC, IDBI, Maybank
Credit card information	Postbank, Stadtsparkasse München	Maybank, Nordea
Branches and ATM locations	Postbank, Stadtsparkasse München	Credit Suisse, IDBI, Maybank
Helpline and emergency contact	Stadtsparkasse München	Maybank, Nordea
Information on the completion status	-	-
Market Information		
Foreign exchange rates	-	Credit Suisse, Nordea, UBS
Market and bank-specific interest rates	-	HDFC, IDBI, Nordea, UBS
Commodity prices	-	Credit Suisse, Nordea, UBS
Stock market quotes and reports	comdirect, Fimatex, Postbank, Stadtsparkasse München, VR-Banken	Credit Suisse, Nordea, Maybank, UBS
Product information & offers	-	IDBI

Table 7: WAP services for Mobile Financial Information

As the table above shows, WAP seems to be often used for providing Mobile Financial Information services. Banks like *Credit Suisse* and *UBS* seem to use it exclusively for offering informational services.

7.1.2 i-mode Banking

Mobile Banking services that are offered via i-mode⁶⁸ are referred to as i-mode Banking. Owing primarily to its proprietary nature, i-mode has not found much resonance outside its birthplace Japan. The number of banks in Western Europe that employ i-mode to offer financial services is, correspondingly, limited. However, there are a few banks offering i-mode functionality. Some banks in Germany have entered into collaboration with *E-Plus*, the local i-mode provider, in order to make use of i-mode as a distribution channel for their services. Prime examples of such banks are *Sparda-Bank Hamburg* and *comdirect*.

Société Générale (France), *ING Postbank* (the Netherlands) as well as *Citibank* (Australia) are also amongst those offering i-mode services.

The tables below give an overview of services that are currently being offered in Germany and other countries by using i-mode. A hyphen (“-“) opposite a service signifies that *none of the examined* banks was offering that service at the time of this research.

⁶⁸ For a detailed discussion on i-mode see section 4.3.2.

The Mobile Accounting services offered via i-mode include:

Mobile Accounting	Banks	
	Germany	International
Account Operation		
Money remittances & funds transfers	1822direkt, Sparda-Bank	Citibank (Australia)
Standing orders for bill payments	Sparda-Bank	Citibank (Australia)
Money transfer to sub-accounts	Sparda-Bank	Citibank (Australia)
Subscribing insurance policies	-	-
Account Administration		
Access administration	Sparda-Bank	Citibank (Australia)
Changing operative accounts	-	-
Blocking lost cards	Sparda-Bank	-
Cheque book requests	-	-

Table 8: i-mode services for Mobile Accounting

Mobile Brokerage services offered via i-mode are described in the next table.

Mobile Brokerage	Banks	
	Germany	International
Account Operation		
Selling & purchasing financial instruments	comdirect, Sparda-Bank	-
Account Administration		
Access administration	comdirect, Sparda-Bank	-
Order book administration	comdirect, Sparda-Bank	-

Table 9: i-mode services for Mobile Brokerage

None of the surveyed foreign banks was reported to offer i-mode services to its customers in the field of Mobile Brokerage. In Germany there were

only two banks that offered this facility to their customers. The situation in the field of Mobile Financial Services was not much different either.

Mobile Financial Information	Banks	
	Germany	International
Account Information		
Balance inquiries	1822direkt, comdirect, Sparda-Bank	Citibank (Australia)
List of latest transactions	1822direkt	Citibank (Australia)
Statement requests	1822direkt	Citibank (Australia)
Transaction & balance thresholds	-	-
Threshold alert for stock prices	comdirect, Sparda-Bank	-
Returned cheques and cheque status	-	-
Credit card information	-	-
Branches and ATM locations	ING DiBa, Postbank	-
Helpline and emergency contact	ING DiBa	-
Information on the completion status	-	-
Market Information		
Foreign exchange rates	-	-
Market and bank-specific interest rates	-	-
Commodity prices	-	-
Stock market quotes and reports	comdirect, Sparkassen Broker	Citibank (Australia)
Product information and offers	ING DiBa	Citibank (Australia)

Table 10: i-mode services for Mobile Financial Information

In the following we present a case study on the mobile offer of *Postbank*.

mBanking und mBrokerage

(Mobile services of *Deutsche Postbank AG*)

It would be probably no exaggeration to call *Postbank* “a leading light” in the field of Mobile Banking in Germany. *Postbank*, with a 3½ years history of Mobile Banking is a relatively late entrant to the landscape of Mobile Banking, considering that some German big banks could boast of mobile services as far as 5 years back. What makes *Postbank* remarkable is that it made a conscious decision to enter this field even as other banks were winding up their mobile operations on account of severe failure. *Postbank* has today probably the most extensive mobile service portfolio amongst all German banks.

Apart from standard information services, e.g. SMS-alerts on reaching individually defined transaction-, balance- or stock price limits, *Postbank* offers a wide range of services in the field of Mobile Accounting and Mobile Brokerage, which it refers to as mBanking and mBrokerage. *Postbank* makes use of all three mediums of Mobile Banking and offers the options of browser-, messaging- and client-based solutions. The client-solution “StarMoney Mobile” is offered in cooperation with *Star Finanz GmbH*. Cooperation with *T-Mobile* allows *Postbank* to offer its services via “t-zones” portal of *T-Mobile*.

A special feature of mobile offer of *Postbank* is the uniform validity of access authorisation across all platforms, which means there is no need for any extra registration. All mobile phone models that support WAP 2.0 and WTLS can thus access *Postbank’s* mobile services. Services can be accessed via *Postbank’s* secure-website (<https://mobile.postbank.de>). There are several simulators available on the *Postbank* website which allows user to practise Mobile Banking. Another notable feature of *Postbank’s* mobile offer is the mTAN. For the authentication purpose, the user receives a transaction number sent to his pre-registered mobile phone so that he does not have to carry a list of his valid TANs and yet has access to the PIN/TAN authentication procedure.

The usage of *Postbank’s* mobile services is as yet free-of-charge. Usage charges are planned for the future; no concrete plans, however, are reported for now. *Postbank*, following the objective of “innovation leadership” in this field, reports satisfactory response from its customers.

(Sources: Information provided by *Deutsche Postbank AG*, own research)

Table 11: Case study – mobile services of *Postbank*

Following is a case study on *Sevenval AG*, a firm providing innovative (browser-based) solutions for Electronic and Mobile Business. Its product *Sevenval FIT Mobile* is reportedly in use among several others at *Deutsche Postbank AG*.

Sevenval FIT Mobile

(Mobile services of *Sevenval AG*)

Cologne-based software firm *Sevenval AG*, with its 40-members team, provides an innovative, high-performance middleware solution for Mobile Business. Its product “*Sevenval FIT Mobile*” (FIT = Filtering Integration Technology) converts “an existing internet presence into an application for mobile devices”. The main advantage of such a solution is that the customer does not need to undertake any technical modifications on existing software. According to information provided by *Sevenval*, existing websites can be thus converted into suitable formats for mobile devices within a few man-days.

The idea behind *FIT Mobile* is as simple as it is ingenious. On receiving a request from a mobile device the *FIT* middleware interprets the request, retrieves the data including complex processes and security mechanisms from the existing internet applications and transforms it into a suitable mobile format. “Processes, graphics and images are thereby automatically adapted to the respective capabilities of the display and browser in use.”

FIT Mobile can work with all popular mark-up languages, mobile formats and web technologies, e.g. HTML or WML. It recognises the mobile device and automatically renders the content in an optimised format. For this purpose, *Sevenval* maintains and regularly updates, as per its own statement, a database containing technical specifications of over 7,000 mobile phone models from across the world. This feature of the *Sevenval* solution circumvents the otherwise seriously impairing issue of finding suitable mobile phones. This ensures that the mobile banking software does not have to be updated each time a new mobile phone model comes out; an entry of technical specifications in the database would suffice.

This solution seems to be gaining fast popularity. *Sevenval* can meanwhile boast of several top references in various sectors. Prominent references in the field of Mobile Banking include *Postbank*, *Norisbank* and *VR-Networld*.

(Sources: Information provided by *Sevenval AG*, own research)

Table 12: Case study – *Sevenval FIT Mobile*

7.1.3 Web-based Mobile Banking (PDA Banking)

In addition to the above-mentioned services that are especially designed for mobile phones, it is also possible to make use of the standard, web-based Online Banking services via certain (computer-like) mobile devices such as PDAs.

The user interface of standard web services (usually based on HTML) is offered in a modified form so that it can be displayed on small-sized screens of PDAs. This sort of banking is sometimes referred to by some banks, e.g. *Sparkasse Chemnitz*, as PDA Banking. Web-based Mobile Banking (PDA Banking) is offered, for instance, by the *Emirates Bank* of United Arab Emirates and Zurich-based *Habib Bank AG*. Prominent providers of this sort of banking in Germany are *Sparkasse KölnBonn*, and *Sparkasse Chemnitz*.

This form of Mobile Banking is attractive for banks as the infrastructure costs in terms of additional investment are not very high. For customers too this form is an attractive proposition, for they are usually anyway familiar with the web-based banking services.

The biggest disadvantage of web-based Mobile Banking is that it is accessible only via a certain type of mobile devices, i.e. PDA. But since PDAs have a much lower penetration than mobile phones, only a relatively small number of bank customers can make use of this facility.

Another disadvantage relates to the fact that the user has to prepare and carry out the transaction in the online mode, increasing the utilisation costs. Since a PDA, unlike a mobile phone, possesses sufficient resources in terms of memory, disk space and processing power it may be better suited for offering client-based Mobile Banking. This discussion raises some interesting questions:

Can PDA Banking be a viable application that enjoys better customer acceptance than client- or message-based applications?

Are there sufficient mobile devices that can make use of web-based Mobile Banking?

This issue was investigated further in our empirical surveys. An answer to the first question can be found in section 9.2.4. The second question is answered in section 9.1.2.

7.2 Messaging-based Applications

In messaging-based applications the communication between the bank and the customer is carried out via text messages. These messages may be triggered automatically by the bank whenever certain predefined events occur, for instance whenever a transaction is performed on the account. Alternatively, the messages may be sent by the bank as a response/confirmation to customer requests. A customer message may contain either an instruction, e.g. to carry out a transaction, or an information request, e.g. for the account status [Dilg et al., 2004, p. 18].

7.2.1 SMS Banking

The term “SMS Banking” refers to the provision and availment of banking- and financial services via means of text messaging service, known as SMS. SMS Banking services are availed via text messages that are carried by SMS. The customer sends a customised SMS to the bank with predefined commands for each offered service. The server of the banks receives the SMS, decodes the commands and executes the instructions, if the request is found to be authorised.

The authentication is carried out with the help of a special Mobile Banking Personal Identification Number (MPIN). Furthermore, the requests are only accepted from a mobile phone number that has been especially registered as authorised number for operating that particular bank account. This service uses “account keys” instead of account numbers so that the number does not need to be typed in and remains confidential [Citibank Philippines, 2005, p. 1].

SMS services are offered on both pull- and push basis, as discussed above.

7.2.2 MMS Banking

The term “MMS Banking” refers to banking services via Multimedia Messaging Service (MMS). This system works in analogy to SMS Banking.

The only difference lies in the extended scope and enhanced quality of push services for Mobile Financial Information, particularly for stock market charts and product information and offers. There is no other significant difference.

MMS-based services are reportedly offered by just one bank worldwide, i.e. *Banca Intesa of Italy* [Karsch, 2004, p. 72].

The tables below give an overview of services that are being currently offered in Germany and other countries by using messaging-based (SMS) applications. A hyphen (“-“) opposite a service signifies that *none of the examined* banks was offering that service at the time of this research.

Mobile Accounting services offered via messaging-based applications include:

Mobile Accounting	Banks	
	Germany	International
Account Operation		
Money remittances & funds transfers	-	Bank of Punjab, ICBC, ICICI, Citibank (Philippines)
Standing orders for bill payments	-	Bank of Punjab, Citibank (Philippines), HDFC, ICBC, ICICI IDBI
Money transfer to sub-accounts	-	Bank of Punjab, ICICI
Subscribing insurance policies	-	-
Account Administration		
Access administration	-	Bank of Punjab, Citibank (Philippines), HDFC
Changing operative accounts	-	Bank of Punjab, Citibank (Philippines), HDFC, ICICI
Blocking lost cards	-	Citibank (Philippines)
Cheque book requests	-	Bank of Punjab, Citibank (Philippines), HDFC, IDBI

Table 13: Messaging-based Mobile Accounting services

Mobile Accounting via SMS seems to be popular in Asia, as all the banks offering Account Operation via SMS are located in Asia. Account Administration is offered additionally also in USA (*Citibank*) and UK (*First Direct*).

Interestingly enough, none of the examined banks was offering services in the area of Mobile Brokerage, as can be seen in the table below:

Mobile Brokerage	Banks	
	Germany	International
Account Operation		
Selling & purchasing financial instruments	-	-
Account Administration		
Access administration	-	-
Order book administration	-	-

Table 14: Messaging-based brokerage services

This lack of brokerage offers via SMS is particularly surprising since many foreign banks are offering Mobile Accounting services via SMS. Further, this study did not come across any reports of technical or other problems experienced by banks utilising this medium.

One possible reason could be the inconvenience in keying-in the required data for sell or purchase of financial instruments, e.g. the stock name, number, price limits and stock exchange centre. Mobile Financial Information services offered via messaging-based applications include:

Mobile Financial Information	Banks	
	Germany	International
Account Information		
Balance inquiries (eventually including securities account)	Citibank, Netbank, Sparda Bank	Citibank (Philippines), Nordea, HDFC (India), Bank of Punjab (India), IDBI (India), ICICI (India), ICBC
List of latest transactions	HASPA, Netbank, Norisbank, Sparda Bank	Citibank (Philippines), Citibank (USA), Nordea, HDFC, Bank of Punjab, IDBI, ICICI, First Direct, ICBC
Statement requests	-	Citibank (Philippines), HDFC, Bank of Punjab, IDBI
Transaction & balance thresholds	-	Citibank (USA), First Direct, ICICI
Threshold alert	-	UBS, ICICI
Returned cheques & cheque status	-	HDFC, ICICI, IDBI
Credit card information	Citibank	ICICI
Branches and ATM locations	-	-
Helpline and emergency contact		Citibank (Philippines), HDFC
Information on the completion status	Citibank, HASPA, Norisbank	Citibank (USA), ICICI
Market Information		
Foreign exchange rates	-	UBS, Bank of Punjab
Market and bank-specific interest rates	Citibank	Bank of Punjab
Commodity prices	-	-
Stock market quotes and reports	-	ICICI, UBS
Product information & offers	Citibank, HASPA	ICICI

Table 15: Messaging-based Mobile Financial Information services

The broad range of information services offered via SMS in Germany as well as other nations point to the particular usefulness of this medium, which is price-worthy, easy-to-use and widely known. This raises some questions on its suitability.

Is SMS Banking only suitable for information services? If yes, what could be the possible reasons?

Why do banks in Germany seem to be indifferent to this application, particularly when young users – the targeted customer group – are very much familiar with this medium?

Research Issue 7: Suitability of SMS for transaction services

Answers to these questions can be found in section 9.2.4 in the responses of the banks to a specific question about the failure of SMS Banking in Germany.

7.3 Client-based Applications

Client-based Mobile Banking applications are those which require software to be installed on the mobile device. Transactions can be prepared offline (e.g. entry of necessary details). Once all necessary data have been keyed in, a connection to the server is established and the data transmitted. Before the data is transmitted a security check takes place by means of PIN and TAN. Client-based applications are attractive because a significant part of banking process is conducted offline reducing online connection time and costs [Dilg et al., 2004, p. 17].

It is conceivable that the possibility of entering data offline triggers a positive psychological effect for a customer as he does not feel the psychological pressure to be particularly fast during data-entry in order to save costs. This reduces the probability of typing errors getting transmitted thereby helping Mobile Banking win greater acceptability. The discussion raises the following questions:

Does the possibility to conduct a significant part of banking process offline increase the acceptability of Mobile Banking?

If yes, which are the factors that are actually responsible for this greater acceptance?

Research Issue 8: Issues related to client-based solutions

An answer to these questions, from the perspective of the banks, can be found in section 9.2.4.

Enhanced security could be another advantage of client-based applications. Since the device goes online only for a short period, there is little threat of some waiting hacker to attempt to break into the connection.

In order to install and run a Mobile Banking client on the mobile device, two primary pre-requisites must be fulfilled:

1. the mobile device must have sufficient disk space, memory and processing power to run the necessary software;
2. the software must be especially designed to cope with small-sized display, low processing power, low memory and low disk space.

Devices such as PDAs generally have sufficient hardware capabilities to run such a client and are, hence, ideally suited for Mobile Banking. Also other devices such as Smartphones and Blackberry are not reported to have any troubles with Mobile Banking clients. Mobile phones of newer generations, too, are generally equipped to handle such software. The software can be installed either on the SIM or on an additional, external memory card.

In the following we describe the various types of client-based applications:

7.3.1 SIM Toolkit (STK)

The SIM Toolkit standard, known as STK, was developed in 1996 by the European Telecommunications Standard Institute (ETSI) and Special Mobile Group (SMG) as a specification for value-added services in Mobile Commerce. It works with GSM-compatible devices [Bardet, 2002, p. 1].

The STK can be programmed into the SIM card of a mobile phone thereby enabling it to manage the user interface of the handset. An STK application can be updated over-the-air by the network, thus, giving the handset customisable functionality [Atmeda, 2005, p. 6]. The STK allows

the SIM to initiate commands independent of the mobile device and the network thereby giving it features to manage menus and control applications [Cellular, 2005, p. 3].

A Mobile Banking STK application can be thus installed along with utilities for encryption and digital signatures on a mobile handset. This application is then run in a user-friendly way via menus. When the user wishes to interact with his bank, for instance to enquire the current status of his bank account, he may navigate through the menu and enter the required data in corresponding fields. Once all details have been keyed in, the encrypted data is converted in a SMS and sent to the bank [Cellular, 2005, p. 2]. This application works in analogy to SMS Banking. The difference is that the user does not have to learn or type transaction commands. The STK acts as interpreter between the user and the bank.

One of the initial problems with the STK was that the SIM needed to be changed whenever a new application was to be installed [Dilg et al., 2004, p. 17]. In 2001, however, a new STK product was launched by the Singapore-based *eMobile Pte Ltd* that can be integrated on the current SIM of the user, as per the information provided by that firm [eMobile, 2001, p. 2]. None of the surveyed banks in Germany was found to be using the STK for offering Mobile Banking. Amongst the surveyed international banks only *Citibank* was offering this functionality in Philippines. This is somewhat surprising since the STK could be an interesting option owing to its relatively simple operation. The discussion raises an interesting research issue:

Why has the STK failed to generate popularity despite its relatively simple handling?

Research Issue 9: Reasons for lukewarm response to STK

For an answer to this question see section 9.2.4.

7.3.2 JAVA-based Mobile Banking Clients

Several other Mobile Banking clients that are utilised for conducting banking activities are based on Java, a programming language that can be deployed on electronic devices independent of their respective operating systems. This universal functionality is reached by installing a Java Virtual

Runtime Machine (VRM) that provides applications with a uniform computing environment.⁶⁹

The Java Community Process, an expert group of more than 50 leading companies from the telecommunication sector, has defined a new specification called Mobile Information Device Profile (MIDP) that is a key element of the Java 2 Platform, Mobile Edition (J2ME) and provides a standard Java runtime environment for mobile information devices such as mobile phones and PDAs. This standard runtime environment is made possible by MIDP in combination with another specification called Connected Limited Device Configuration (CLDC) for resources-constrained mobile devices [Sun Microsystems, 2005a, p. 1].

MIDP 2.0, the latest version of MIDP, allows enhanced user-interface, rich multimedia functionality and extensive connectivity via various data-transmission protocols coupled with a high degree of end-to-end security [Sun Microsystems, 2005b, p. 1]. On account of these functions MIDP 2.0 is attractive for developing user-friendly and secure Mobile Banking applications with full-scale functionality [Georgi/Pinkl, 2005, p. 59].

Applications based on MIDP 2.0 are suitable for all mobile devices including mobile phones and PDAs and that makes it possible to conduct a significant part of banking process offline, making MIDP 2.0 a very attractive proposition for developing Mobile Banking solutions, particularly in comparison to web-based Mobile Banking that is conducted with the help of PDAs.

Some prominent examples of Mobile Banking clients employed in Germany are “StarMoney Mobile 2.0 PDA” and “StarMoney Mobile 2.0 Handy” both developed by Hamburg-based *Star Finanz GmbH*, and “Sparkassen-Mobile Banking”, developed by Stuttgart-based *Deutsche Sparkassen Datendienste (DSD)* [Bader, 2005, pp. 1-2]. Finland-based *Meridea Financial Software Ltd.* (Meridea) as well as *Sparkasse KölnBonn* have launched client-based solutions in the German market.

Java-based Mobile Banking applications that are conducted via PDAs are often referred to as PDA Banking, see for instance: Dilg et al. [2004, p. 17]. This notion is however misleading, as it ignores the vital fact that PDAs are not used exclusively for client-based Mobile Banking. A PDA –

⁶⁹ For the utility of Java for mobile applications see [Götz/Nahr, 2002, pp. 14-17].

just as a mobile phone – can be utilised for both: browser-based and client-based applications.

The tables below give an overview of services that are being currently offered in Germany and other countries by using client-based applications. A hyphen (“-”) opposite a service signifies that *none of the examined banks* was offering that service at the time of this research.

The Mobile Accounting services offered via client-based applications include:

Mobile Accounting	Banks	
	Germany	International
Account Operation		
Money remittances & funds transfers	Commerzbank, Deutsche Bank, FRASPA, Hypo-Vereinsbank, Netbank, Sparkasse Harburg-Buxtehude, Sparkasse KölnBonn	Citibank (Philippines)
Standing orders for bill payments	-	Citibank (Philippines)
Money transfer to sub-accounts	-	-
Subscribing insurance policies	-	-
Account Administration		
Access administration	-	Citibank (Philippines)
Changing operative accounts	-	-
Blocking lost cards	-	-
Cheque book requests	-	Citibank (Philippines)

Table 16: Mobile Accounting via client-based applications

None of the examined banks reported to offer brokerage services via client-based applications, as can be seen in the table below.

Mobile Brokerage	Banks	
	Germany	International
Account Operation		
Selling & purchasing financial instruments	-	-
Account Administration		
Access administration	-	-
Order book administration	-	-

Table 17: Mobile Brokerage via client-based applications

The information services offered via client-based applications include:

Mobile Financial Information	Banks	
	Germany	International
Account Information		
Balance inquiries (eventually including securities account)	Commerzbank, Deutsche Bank, FRASPA, Hypo-Vereinsbank, Netbank, Sparkasse Harburg-Buxtehude, Sparkasse KölnBonn	Citibank (Philippines)
List of latest transactions	Commerzbank, Deutsche Bank, FRASPA, Hypo-Vereinsbank, Netbank, Sparkasse Harburg-Buxtehude, Sparkasse KölnBonn	-
Statement requests	-	-
Transaction & balance thresholds	-	-
Threshold alert	-	-
Returned cheques & cheque status	-	-
Credit card information	-	-
Branches and ATM locations	-	-
Helpline and emergency contact	-	-
Information on the completion status	-	-
Market Information		
Foreign exchange rates	-	-
Market and bank-specific interest rates	-	-
Commodity prices	-	-
Stock market quotes and reports	-	-
Product information & offers	-	-

Table 18: Mobile Financial Information via client-based applications

In the following we present a case study on Sparkasse KölnBonn that offers a “smart-client” solution to its customers.

S-Handy-Banking

A service of Sparkasse KölnBonn and rheinlandmobil GmbH

The public-sector bank *Sparkasse KölnBonn* and its subsidiary *rheinlandmobil GmbH* have developed a Java-based “smart-client” solution which runs on all mobile phone models of newer generations, i.e. models with Java2. The client has been tested for over 60 different models of mobile phones and is reported to work with all of them without any problem.

The client, currently in the version 2.0.2 makes use of 128-bits encryption and the standard PIN/TAN procedures providing, therefore, the same level of security as Internet-based versions of electronic banking.

The special feature of this solution is the reduction in the net volume of transmitted data to a minimal 1 to 3 KB thereby speeding up the processing time and reducing the costs of data transmission significantly. The novelty of this concept lies in the usage of an intermediary server which receives “net” data (i.e. purely user-specific data, for instance only field values without fieldnames) from the client, converts it into a format which the HBCI-Gateway of the bank can understand; receives the data, strips it of all non user-specific data before passing it on to the client.

According to information provided by *Sparkasse KölnBonn*, a balance enquiry – calculated on the basis of standard tariffs – costs a customer via WAP over €1.00; via smart-client only €0.05. That would mean the client is up to 20 times cheaper than other browser-based mobile banking solutions.

The client is capable to work with multiple accounts belonging to different banks. The functionality of this programme includes balance enquiries, lists of up to 30 latest transactions from past 30 days, money remittance within Germany and generation of templates for money remittances.

The software can be downloaded from the website of the bank optimised for mobile access (<http://mobil.skbn.de>). The bank does not charge any fees for the usage. The customer pays only the tariff of his network carrier.

Sparkasse KölnBonn is satisfied with the customer response. Over 1,000 downloads were registered in the first week of the launch; and over 3,000 in the first 3 months. Measured against the number of Online Banking customers it is a share of 2%, which is admittedly high for this field. *Sparkasse KölnBonn* expects this share to go up to 10% of all online customers.

(Sources: Information provided by Sparkasse KölnBonn, own research)

Table 19: Case study – Smart-client solution of *Sparkasse KölnBonn*

8 Utility of Mobile Banking for Banks

The previous chapter examined the composition and scope of services offered in the field of banking- and financial services. Additionally, we surveyed the various technologies employed to offer them. For this purpose services of fifty banks from Germany and other countries were examined.

The study showed that the majority of the examined banks is offering Mobile Banking services. Some of them, e.g. *Postbank* and *Nordea* (Finland), offer them actively, i.e. the mobile services are offered on a large scale to include transaction facilities, brokerage services as well as access to account- and market information. Some others offer these services rather passively, i.e. the scope of the offered services is limited to a few information facilities.

Having examined the technical composition of current Mobile Banking services, it would be relevant to understand the usefulness of Mobile Banking from the banks' perspective. This chapter deals with the utility of the mobile channel of banking and financial services. In this chapter we attempt to figure out the motivation behind these offers, whose utility after all might seem to be *prima facie* unclear and hence questionable.

Why do, then, so many renowned and reputed banks engage in Mobile Banking? What might be the guiding reason(s) behind the efforts of many banks to include Mobile Banking in their product portfolios in some form or the other?

In the following we examine the rationale of banks behind the introduction of banking- and financial services via mobile devices and the utility of Mobile Banking for them. This examination shows that banks have very concrete grounds to indulge in Mobile Banking for reasons, both, operational and strategic.

8.1 The Outset of Banking Environment

In order to examine the utility of Mobile Banking for banks it is imperative to at first understand the business environment in which banks operate and to identify customer groups that the banks seek to target via Mobile Banking.⁷⁰

8.1.1 Intensified Competition in Banking Sector

Bank products – being services – are necessarily of immaterial nature, which are sold increasingly with the help of computer networks spanning across the globe [Mustafa et al., 2002, p. 357]. The global networks provide the customer with world-wide services, for instance the use of credit cards while abroad.

The creation of an EU-wide single domestic market has led to intensification of competition in the EU in all business fields including the banking sector. The ongoing globalisation, for example the creation of the WTO, has further intensified the competition. Technical developments, particularly the Internet, coupled with the process of globalisation, have made it possible for banks (credit- as well as financial institutions) to offer their services in far-flung areas without investing money to build branches and hire additional staff.

This opportunity, of course, is a two-way street: On the one hand, a bank gets access to new markets. On the other hand it is faced with increased competition on its home turf. To master this combination of opportunities and challenges banks need – apart from business consolidation and cooperation – organic growth. It is, thus, necessary to retain the existing customer base while simultaneously trying to acquire new, economically prosperous customers. Seen in conjunction with the price-sensitivity of customers and the resultant low relevance of the brand-name banks are compelled to introduce innovative services that potentially attract prospective customers while retaining others. Even though the brand-name remains a critical factor on account of the need for trust in banking business, the globalisation and the technological development, however, have reduced

⁷⁰ A background paper on the German banking sector is attached as Appendix-E.

entry barriers so that the number of available reputed brands has increased significantly; thereby intensifying the competition.

In the next section we describe the core customer groups which might be specifically targeted by banks with Mobile Banking services.

8.1.2 Adapting to Requirements of Core Target Groups

Banks, today, are increasingly confronted with technology-savvy customers who are often on the move. As Wolfgang Klein, Private Customers Director at *Postbank* puts it: “Today’s customers want to organise banking transactions while on the move, irrespective of opening hours” [Postbank, 2004, p. 1]. Banks are responding to this change by introducing mobile services. Core target groups of Mobile Banking can be divided in three categories [eResult, 2004, p. 72]:

1. *The Youngsters*: The segment of 14–18 years old youth has acquired an important role in the growth of mobile telecommunications and related services. This group is reported to be technology-savvy and willing to experiment with innovative products and services. The youngsters, often on the move, demand ubiquitous, anytime service. Though the youngsters as a group are hardly relevant for banks from a financial perspective, they represent the prospective clientele of tomorrow and need to be cultivated in the middle to long-term marketing strategy of the banks. An example for tapping into the potentials of this customer group was set by *Dexia* Bank of Belgium. *Dexia* decided to concentrate on very young segments in the field of Mobile Banking and introduced in cooperation with the Belgian network carrier *Mobistar* a new brand called “Axion”. This brand was sold as “Tempo After School” package to school-going children, who received favourable conditions for their mobile phone connections along with a bank account to manage their pocket money. This offer seems to have played a key-role in increasing the number of Mobile Banking customers of *Dexia* to well over one million [Karsch, 2004, p. 71].
2. *The Young Adults*: eResult refers to the group of young adults, i.e. students and trainees, as “onliners” [2004, p. 72]. Also this segment is thought to be technology- and innovation friendly. Though this group is financially not very strong either, many members of this group are known to be involved in stock market activities and are increasingly at-

tractive for banks. Further, this group can be expected to enter in short to middle-run a professional carrier so that it needs to be cultivated in order to retain customers of this age-group once they enter professional lives.

3. *The Business People*: this group of customers, generally in the age-group of 25–36 years, is thought to be the most important one for Mobile Banking. Members of this group are generally well educated and economically well-off. They need to be often on the move for professional reasons. Therefore, they carry mobile devices to ensure accessibility. For this reason they are ideal candidates to use services offered via mobile devices [eResult, 2004, p. 72]. From the banks' perspective this group is particularly attractive on account of its relative economic prosperity and the need for financial services, e.g. home loans for young families. Such a group of customers is generally looking forward to do business with known and trusted brands that simultaneously offer individual advisory services [Mustafa et al., 2002, p. 358].

In order to cater to requirements of these above-mentioned customer groups banks tend to look at Mobile Banking as a promising option. However, these services apart from being an add-on feature for the targeted customer groups also have their own utility for the banks.

8.2 Mobile Banking as Distribution Channel

Mobile Banking enhances the number of existing channels of distribution that a bank employs to offer its services. The term 'distribution channel' hereby signifies a medium of delivery that a vendor employs to deliver his products or services to customers. Other distribution channels in the banking sector include branch offices, Internet Banking and Telephone Banking.

Some authors, e.g. Luber [2004], refer to Mobile Banking as a 'sales channel'. This study however works with the term 'distribution channel'; for a distribution channel is used to deliver products or services irrespective of whether the products are bought by the customer against monetary payment or provided free-of-charge by the vendor. The efficiency of a distribution channel can be measured by its fulfilment of three major objectives, which are closely related to each other.

8.2.1 Increasing Sales Volume

One of the primary tasks of a distribution channel is to increase the volume of demand for products at profitable prices [Luber, 2004, p. 142]. This objective is achieved by increasing operational efficiency so that those losses in the sales are minimised that are caused by delays in catering to customer orders. Further, a favourable reputation of the firm's logistical capacities may help generate additional orders. Mobile Banking can contribute to achieve this goal by following means [Luber, 2004, pp. 142-143]:

1. Anytime, anywhere access to banking services;
2. Availability of push services to suggest transactions on an urgent basis, e.g. to sell certain stocks when a crisis erupts;
3. Face-to-face talks with the personal consultant via video telephony.

As example, *ING Postbank* of Netherlands launched an innovative scheme in the year 2001 to boost its sales volume. Every new customer who deposited €450 in a savings account was provided with a mobile telephone worth €150 and capable of accessing Mobile Banking services of the *ING Postbank*. Within six weeks more than 500,000 new customers and over €225 millions in deposits could be acquired. More importantly, 97% of these new customers became regular users of Mobile Banking and remained with the bank [Karsch, 2004, pp. 71-72]. This example also shows the importance of “induced demand”⁷¹.

8.2.2 Reducing costs of distribution

In times of increased competition, a distribution channel must organise business processes efficiently so as to reduce distribution costs. The pressure to optimise business processes and reduce costs can be coped by rationalising organisational structures and increasing productivity. Mobile Banking can contribute to achieve this goal by following means [Luber, 2004, pp. 144-146]:

⁷¹ The observable fact of “induced demand” suggests that in most cases the demand for a good or service increases once the supply is increased and actively promoted.

1. The manual collection, processing, transmission and archiving of data by bank employees in branch offices is substituted, as in the Internet-based banking, by automated processes.⁷²
2. As against Internet Banking, Mobile Banking makes it possible to offer ubiquitous, semi-personal consulting services in real time. These services can be centralised to exploit economies of scale and scope as well as regional cost differences.⁷³
3. Diversification of distribution channels helps reduce the business costs that arise in the form of sales lost due to sudden collapse of a channel and to minimise customer dissatisfaction.

For instance, the utilisation of transaction-based mobile financial services of *Nordea Bank*, one of the pioneers in the field of Mobile Banking, grew by 30% in 2004. *Nordea* reported successful cost reduction by motivating customers to shift to electronic/mobile forms of banking. Liisa Kanninen, vice-president of the mobile banking division at *Nordea* is quoted as saying, “*Nordea*’s customers have been persuaded to take the netbanking and mobile routes because these are cheaper and more convenient ways of banking” [Atkins, 2005, p. 3].

8.2.3 Increasing customer satisfaction

Mobile Banking may help a bank increase the customer satisfaction ratio by adopting the following means [Luber, 2004, pp. 146-148]:

1. Streamlining of business processes to increase efficiency;
2. More attention and better consulting for individual customers due to automation of routine processes;

⁷² Luber cites a US study according to which a transaction carried out in a branch office costs banks on average \$1. When carried out via telephone it costs only \$0.5. The same transaction, when carried out via Internet or mobile devices costs the bank just 1 cent (\$0.01). The advantage of Mobile Banking vis-à-vis conventional banking is thus obvious. Vis-à-vis Internet-based banking, however, there is no cost advantage.

⁷³ Economies of scale refer to the reduction in average costs that occurs on account of increasing output even as the share of fixed costs per unit gets lowered. Economies of scope refer to cost advantages that arise while producing in the same plant goods that are related with each other in some way [Röller et al., 2000, pp. 14, 16]. For a detailed discussion on economies of scale and scope see [Porter, 1985, pp. 70-72, 328].

3. Innovative “anywhere, anytime” services customised for individual preferences and the current geographic location of the customer provide value-added to the customer;
4. The collected data can be utilised to create customer profiles.⁷⁴

Increased customer satisfaction can help reduce the customer attrition rate. A suitable example is provided by *Rabobank* of the Netherlands. Intending to provide better service to its customers by creating a new service- and distribution channel, it conducted a survey among its customers to examine the acceptance of Mobile Banking and the willingness to pay for mobile services. Based on the result of this customer survey the bank introduced Mobile Banking with a nominal registration fee of €2.00 per quarter coupled with a fee of €0.15 per SMS that a customer receives. The customer can define his own individual thresholds to trigger SMS alerts and thus control the number of SMS that he receives. This service has reportedly generated considerable interest and is counted amongst successful Mobile Banking applications launched in Europe [Karsch, 2004, p. 72].

8.3 Mobile Banking as Source of Revenue

Apart from functioning as an additional distribution channel Mobile Banking can also serve as a source of revenue. Mobile services can be offered on a premium basis. The price, in this case, should be reasonable enough so that customers are willing to pay them but at the same time they should be – from a financial point of view – higher than the costs incurred by the bank.⁷⁵ Additional revenues can be generated in two ways:

1. Offering innovative, premium services to existing customers;

⁷⁴ This may take place with customers’ explicit permission and within the legally allowed parameters, to enhance CRM by using data mining techniques. Data mining refers to the detection of hitherto unknown patterns in a given set of data by employing statistical methods in a computer-driven process. The difference to the usual methods of data analysis is that the researcher does not propose or test any particular hypothesis. For a detailed discussion on data mining see [Tiwari, 2001, pp. 5-15].

⁷⁵ There might be strategic reasons to offer services for free or below-cost, e.g. in order to position oneself as a technology leader or to generate economies of scale.

2. Attracting new customers by offering innovative services. New customers contribute to revenue generation not only by utilising mobile services but also by using other conventional distribution channels.

There are reports of banks that have successfully employed Mobile Banking as a source of revenue. The French bank *Société Générale* launched an SMS-alerts service named “Messalia” whose subscription costs in general €4.00 a month (with certain exceptions). This service had attracted 640,000 subscribers by the year-end 2004 with an 11% growth vis-à-vis year-end 2003 [Société Générale, 2005, p. 81]. This service has been generating profits ever since it was launched; the leading German bank magazine *Die Bank* reports [Karsch, 2004, p. 71]. Even otherwise, the number of *Société Générale* customers using WAP- and i-mode based mobile services crossed the mark of one million previous year, registering an almost 200% growth vis-à-vis 2003 [Société Générale, 2005, p. 81].

8.4 Mobile Banking as Business Model

In the literature Mobile Banking is sometimes also portrayed as a business model, see for instance Kupferberg [2003, p. 378].

The idea of using Mobile Banking as business model seems to have been derived from the business model of direct banks that offer their services exclusively via Internet or telephone and that do not run or maintain branch offices. Mobile Banking as a stand-alone business model means that banking- and financial services are to be offered exclusively via the earlier-mentioned mobile distribution channel, all other distribution channels are, as a consequence, dismantled.

The business viability of such an option is, however, questionable. There is no report of this option having been used to date. Mobile Banking, at least up to now, is only offered in combination with other distribution channels, e.g. branch offices and/or Internet Banking.

8.5 Mobile Banking as Image Product

Finally, Mobile Banking can be also used as an image product to gain strategic advantages. The bank may hope to win or retain a positive image amongst technology-savvy sections of the society and strengthen the brand-reputation of being innovative and visionary [Georgi/Pinkl, 2005, p. 60].

The image of being a technology leader can help the bank win customers who are looking for modern products and services and at the same time help it retain its own existing base of technology-savvy customers, some of whom otherwise might have switched to other banks while looking for such a product.

Further, the bank can profit from an early-mover advantage by actively shaping technological standards that are based on one's own strengths. Negative fallout of following already-set standards may be thus avoided. This is, of course, fraught with a substantial risk of incurring financial and image losses if the propagated technology fails to establish.

These are the benefits that banks might expect by offering Mobile Banking services. In the following we describe relevant issues that need to be clarified and/or verified in later sections of this study.

Which are the core target customer groups for Mobile Banking?
What are the objectives that actually motivate banks to offer mobile services?
Which factors might be inhibiting Mobile Banking?

Research Issue 10: Utility of mobile services for banks

This Research Issue played a significant role in shaping our questionnaires both for banks and customers. The first question of this Research Issue is to be answered primarily with the help of the customer survey, as this survey investigates the acceptance of Mobile Banking amongst various sections of the society and examines their willingness to pay for utilising mobile services. The results can be found in section 9.1.4. Section 9.2.5 entails information over customer groups that banks seek to target with their mobile offers.

The second question of this Research Issue can be answered best by banks. Banks that participated in our empirical, third-tier survey were asked for the objectives that they might have been pursuing with Mobile Banking.

Answers received can be read in section 9.2.5. Arguments against Mobile Banking, as some banks see them, are found in section 9.2.7.

This chapter marks the end of our literature-based academic research as well as that of the desk research, which guided us through two preliminary tiers of our study. The next chapter encompasses two empirical surveys of customer acceptance, customers' willingness to pay for individual mobile services and that of banks' views on a wide spectrum of issues.

These surveys were conducted on-field and, thus, entail valuable, first-hand information. It therefore would be no exaggeration to say that the next chapter builds a very central component of this study.

9 Empirical Research on the Viability of Mobile Banking

In order to find empirically tenable and logically well-founded answers to the questions raised in the previous chapters, extensive field research was conducted supplemented by a rigorous desk research. A survey was organised to examine the degree of customer acceptance for various Mobile Banking services and the customer's willingness to pay for them. The collected data were then analysed to identify characteristics of customers most likely to use a particular type of service.

Another survey was conducted to examine the empirical validity of various theories on the utility of Mobile Banking from the perspective of banks.⁷⁶ This survey was preceded by an investigation of Mobile Banking offers of various domestic and foreign banks.⁷⁷ Finally, a number of Mobile Banking experts, identified during literature review, were interviewed to ascertain their views on issues arising out of the findings of our surveys.

In the following, we present the main findings of our surveys. Owing to space-constraints not all findings can be illuminated here. Analysed data-sheets with detailed information are, however, attached in digital form on a compact disc so as to ensure a multi-aspectual perspective for the interested reader.

Subsequently, the results are briefly compared with two other empirical studies conducted in the years 2001 and 2003 respectively in order to ascertain and identify tendencies in the development and acceptance of Mobile Banking. Additionally, the comparison with other empirical studies provides a certain safeguard against erratic conclusions because the probability of wilfully false answers by certain participants cannot be completely ruled out, even when utmost care has been taken to safeguard against ill-considered answers.

⁷⁶ The academic views on the utility of Mobile Banking are presented in chapter 8.

⁷⁷ Mobile Banking offers of various banks are presented in chapter 7.

9.1 Customer Acceptance of Mobile Banking

This section is structured as follows: Before presenting the results we describe first the methodology and secondly the broad composition of the survey.

9.1.1 Methodology of the survey

The customer acceptance for Mobile Banking was surveyed between 28.06.2005 and 21.07.2005 largely in Hamburg.⁷⁸ A total of 488 natural persons in the age-group of 18 to 65 years answered a 3-page long questionnaire⁷⁹ giving information on their perceived preferences and willingness to pay for 17 different financial services offered in Mobile Banking. The services were bundled into 3 groups: Mobile Accounting, Mobile Brokerage and Mobile Financial Information.⁸⁰

It was ensured that survey participants by and large represented the targeted customer groups (i.e. youngsters, young adults and business people) as defined in section 8.1.2. The survey was therefore conducted in the following places, where members of these groups were likely to be found in large numbers:

1. University of Hamburg: Students in various classes at the Faculty of Economics and Business Administration were requested, with the concurrence of the teaching staff, to fill the questionnaire in lecture halls before the classes began.
2. Hamburg Airport: Business travellers in the morning hours were requested, with kind support from the airport authorities, to participate in the survey once they had checked in and had some free time at hand.
3. Alumni Network of Chair of International Management: The questionnaire was e-mailed to former students of the Chair with a request to participate in the survey. The answers could be returned back by post or fax. Members of particularly this group accounted for many responses from outside Hamburg.

⁷⁸ Some samples were also collected from other cities in Germany.

⁷⁹ The questionnaire is attached as Appendix-F.

⁸⁰ As classified in section 6.2

4. Business offices in and outside Hamburg: A number of samples were collected in various business offices in Hamburg, Frankfurt am Main and Munich either by the author or on his behalf by others.

Structure: The survey participants were asked about personal attributes, e.g. sex, age, profession and income so as to later identify characteristics of potential customers. The attributes “age” and “income” could be chosen from broadly condensed groups (e.g. income: €1,001–€2,500) to ensure that participants did not feel uncomfortable in giving information considered to be too personal.

The participants were asked further about their usage of online- and home-banking, bank group, possession of mobile devices and their familiarity to Mobile Banking. They were also requested to give their perception of advantages and disadvantages (shortcomings) of Mobile Banking. Finally they were asked to rate their enthusiasm for each individual service on a scale of 1 to 6 and to quantify their willingness to pay for them.

Scale: An even and broad scale of 1 to 6 was selected deliberately to generate precise responses on the one hand and to deny participants the easy option of a “golden mean” on the other hand. Further, the scales from 1 to 6 were labelled with explicit tags to avoid subjective scaling by participants and to ensure consistency in answers. The scales are described in detail in section 9.1.4.

Explicit vs. implicit information: The questionnaire contained elements of both explicit and implicit information. The implicit information is generated by analysing the explicit information provided by the participant in some another context and without a direct relevance, in the participant’s eyes, to issues that are of primary interest to the researcher. The implicit information is, thus, used to cross-check the validity of the explicit information provided by the user.

The participants were, for instance, asked about their preferred medium of Mobile Banking (SMS, browser or client). This explicit information alone however was not considered sufficient to judge the true popularity of a medium. Hence, implicit information was retrieved from the earlier-posed question regarding the usage of online and home-banking. The answer can be assumed to be authentic when a home-banking user pleaded for a client-based Mobile Banking solution as he can be expected to know the advan-

tages and disadvantages of a client-based solution. A user of (browser-based) online-banking claiming to prefer client-based solutions, on the other hand, should be considered with some reservation while the probability of an ill-considered answer cannot be completely discounted.

Data Analysis: The data is analysed in a descriptive, multi-dimensional manner so as to illuminate various aspects of Mobile Banking. An analysis is undertaken to check the potential influence of certain attributes, e.g. age, profession and income, on customer acceptance and his willingness to pay. All percentage figures have been rounded up or down to the nearest round figure. This may cause, in some cases, apparent discrepancies that the figures do not add up to exactly 100.

9.1.2 Composition of Survey Participants

This section describes personality attributes of the survey participants. As stated earlier, altogether 488 samples were collected. Of these, 36⁸¹ were rejected for containing either incomplete data or inconsistent answers.

Of the 452 valid samples, 282 were collected from masculine and 170 from feminine participants, making a ratio of 62% male vs. 38% female participants. This discrepancy was generated by a relatively low share of female participants amongst top management (0%), salaried class (20%) and the self-employed (11%). Women, however, made for a majority (56%) of the surveyed students. The gender-based participation ratio thus reflects, to a large extent, the composition of target customer groups. The largest group of survey participants, judged by profession, was that of students (42%), followed by the salaried class (29%).

⁸¹ Answers were regarded as inconsistent, when they were thought to be too contradictory to be true, e.g. when a participant stated to possess neither a mobile phone, nor a PDA nor a bank account but claimed to be a regular user of Mobile Banking.

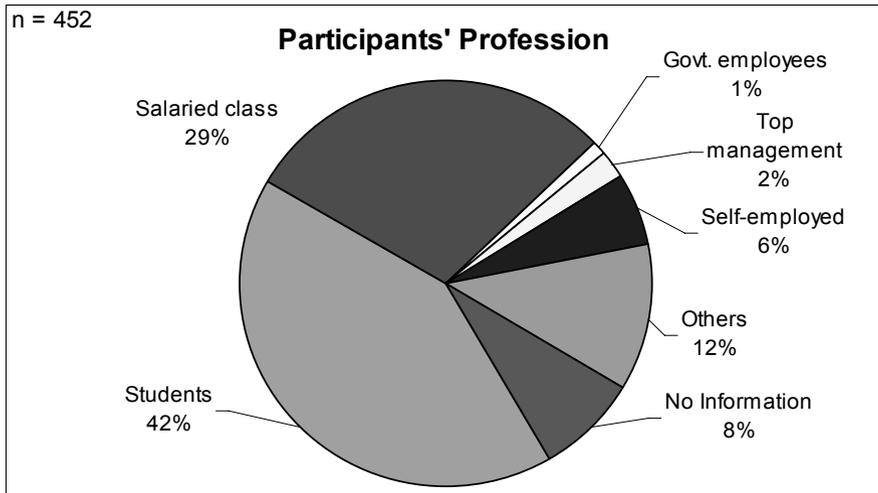


Chart 1: Overview of survey participants' professions

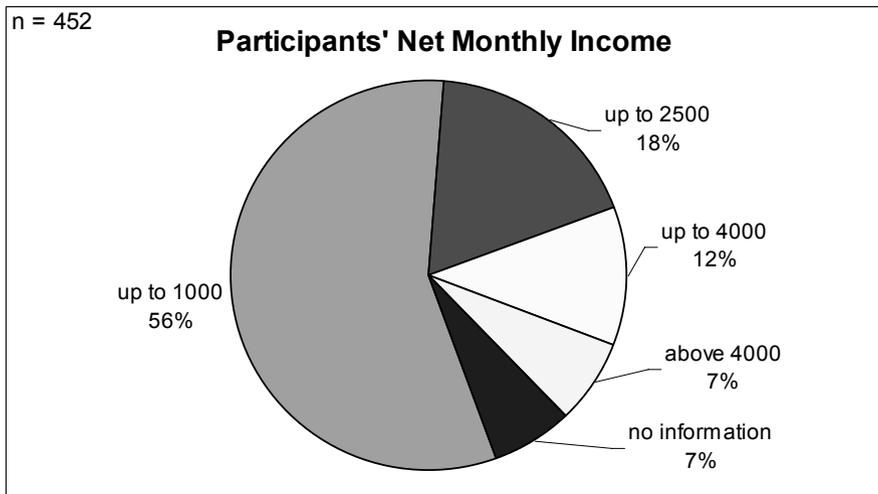


Chart 2: Overview of survey participants' net monthly income in euros

The largest group of survey participants, judged by age, was that of 21–30 years old (68%), followed by those in the age-group of 31–40 years (18%). One participant did not wish to state his/her age. Judging by net monthly income, the largest group of survey participants earned up to €1,000 a month (56%), followed by those earning up to €2,500 a month (18%).

The net monthly income, at the actual disposal of a customer after deducting taxes and other compulsory contributions to social security systems was thought to be more appropriate for this survey as this is the income that a customer can bring to his bank. For this reason, gross income was not seen as relevant.

Possession of mobile phones: 98% of all participants stated to possess a mobile phone. Interestingly, participants not possessing a mobile phone were all males. 72% of all mobile phone owners stated their phone to be less than 2 years old. It is an important point because it means that most of the mobile phones were equipped with modern technology and that there is no backlog of old equipments to take into account while designing Mobile Banking applications.

Possession of PDAs and other comparable devices: Only 18% of all survey participants possessed a PDA.⁸² A further 10% of all participants reported plans to purchase a PDA in near future. Students had a low probability (9%) of possessing such a device. However, 44% of the participants from top management and 41% of the self-employed stated to possess a PDA. 30% of the salaried-class participants were in possession of such a device. This information signifies that the offers of PDA Banking should ideally be targeted to the needs of these groups.

⁸² The term PDA includes here also other comparable devices, e.g. Smartphones.

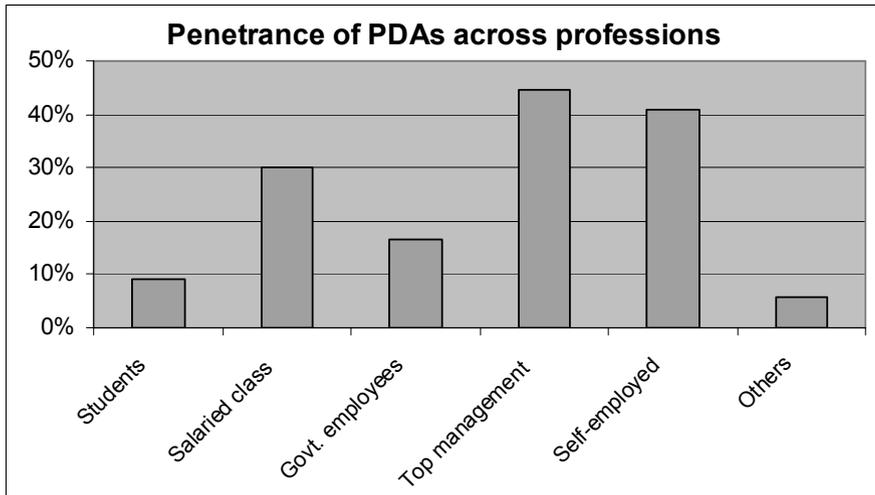


Chart 3: Penetrance of PDAs across professions

Online Banking: The term Online Banking refers to availment of banking services by accessing the bank website.⁸³ Amongst all participants 59% affirmed using Online Banking. More men (67%) than women (45%) were likely to use Online Banking. The group of 31-40 years olds was most likely to use Online Banking (76%). Youngsters (18-20 years) were, in contrast, least likely to make use of Online Banking (21%). Active professionals seem to be particularly active users of Online Banking, as can be seen from the following chart:

⁸³ The difference to Home Banking is that the customer makes use of his Internet browser and remains online during the whole procedure. In Home Banking the customer can prepare the transactions offline with the help of client software on his computer. Finally an Internet connection is established and the data transmitted to the bank server, reducing the need to be online. Online Banking, on the other hand, is carried out, as the name suggests, online without requiring any special software.

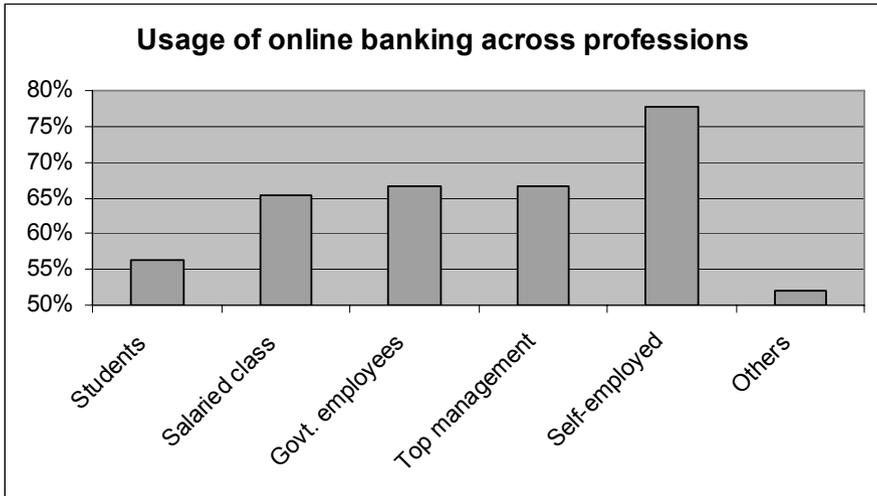


Chart 4: Usage of Online Banking across professions

Home Banking: The usage of Home Banking was examined separately from Online Banking in order to estimate the potential of client-based solutions for Mobile Banking. The results were somewhat surprising: Only 20% of all participants reported using Home Banking. Even more surprising was that only 3% of all participants were exclusive users of Home Banking. The rest used both Online- and Home Banking, as per need and suitability. Government employees topped the list of most likely exclusive users of Home Banking (17%).

In addition to customer reluctance due to the need to install and regularly update special software there was apparently one more reason for the low spread of Home Banking. Almost all surveyed banks reported a deliberate attempt to dissuade the customer from Home Banking. Problems in updating and other security related issues were cited as reasons. Unlike in Online Banking, where updates are basically needed on the server side, in Home Banking all users must be provided regularly with new updates. Even more difficult is to ensure that the user is actually willing and/or capable of updating the software. For this reason Home Banking seems to be destined to remain a niche product.

The interesting fact is, however, that altogether 62% (59% Online Banking + 3% Home Banking) of survey participants make use of some or other

form of electronic banking. Electronic banking seems to have thus taken strong roots amongst professionally active groups of the German society.

Bank accounts and issues: All 452 participants with a valid sample reported owning at least one bank account. 29% of them stated to maintain more than one bank account. The number of bank accounts maintained seems to have a direct correlation with income, and thus indirectly with the profession and to a lesser degree the age of the customer. The table below shows the probabilities for members of selected customer groups to maintain more than one bank account.

Net Income	Probability	Profession	Probability	Age-group	Probability
€ < 1,000	22%	Students	23%	18–20 years	0%
€ 1,001–2,500	35%	Salaried class	36%	21–30 years	28%
€ 2,501–4,000	40%	Govt. employees	17%	31–40 years	33%
€ > 4,000	42%	Top management	56%	41–50 years	33%
-	-	Self-employed	41%	> 51 years	35%

Table 20: Probability of more than one bank account across groups

A direct consequence of this correlation between income and profession is that customers with higher income and professional rank generally enjoy higher bargaining power vis-à-vis banks. They can shift transactions to another account held with another bank relatively easily, when unsatisfied with the performance of a bank. Therefore, banks have to be particularly sensitive to the needs and wishes of this customer group.

The fact that customers with high income are of particular interest for banks is nothing new. But younger customers too, e.g. students, are being increasingly cultivated by banks in the realisation that it is necessary to win over future customers early in their life. The changing demographic balance in developed western countries is also contributing to this realisation. Hence it would be useful to have a look on the bank preferences of different age-groups.

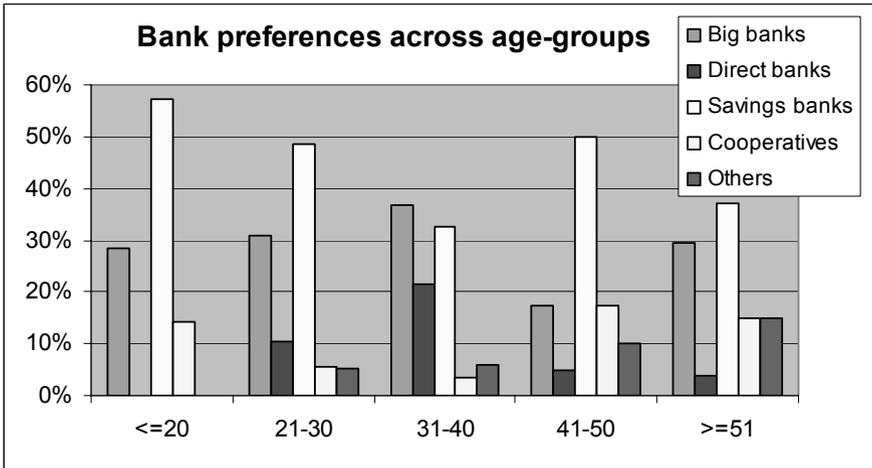


Chart 5: Bank preferences across age-groups

A large number of young people, e.g. almost half of the 21-30 years olds, are customers of savings banks. Both savings banks and cooperatives, however, seem to have a problem retaining them in the course of time.

The particularly attractive segment of young professionals (31-40 years olds), who as young families often have a high usage of financial services, seems to be hard-fought between big banks and savings banks. Direct banks, too, seem to get a significant chunk of this customer group. Direct banks seem to be particularly dependent on younger customers. Their dependency on this customer group can be gauged from the fact that 59% of all direct bank customers in this survey were between 21-30 years old and another 37% between 31-40 years. This dependency on relatively young customers is not surprising considering that the business model of direct banks has won popularity mainly in recent years with the advent of the Internet. Direct banks have to be hence particularly sensitive to the needs and wishes of younger customers.

Big banks seem to enjoy a strong position amongst the young. This position should be retained by proactive identifying of the needs of this segment and catering to them. Big banks however loose to savings banks in the segment of 41-50 years old middle-aged participants.

Banks in the category “others” are primarily small-sized private banks offering tailor-made services to a select class of financially affluent cus-

tomers. Automotive banks, who also belong to the category “others”, engage mainly in car-financing activities for the customers of their stakeholders. The results of this study are however of universal nature and thus not irrelevant to these banks, especially private banks. Owing to bank-specific customer structures of individual banks the relevance of this study is however limited for them.

Familiarity with Mobile Banking: 43% of the participants replied in affirmative to the question, whether their bank offered Mobile Banking services; just 4% said no. The majority (53%) was not aware of such offers by their bank. The positive side of this fact is that as many as 47% of the participants were aware of Mobile Banking and believed to know, whether or not their bank offered it. The other side of the coin is naturally that not many banks seem to have so far undertaken any serious attempt to make their customers aware of Mobile Banking.

Experience with Mobile Banking: 12% of all survey participants (55 of 452) reported to have used mobile financial services, at least once. Amongst them, 42% stated to be regular users; another 36% used Mobile Banking only now and then. 11% reported having discontinued their usage. The rest 11% did not provide any information about their current use.

80% of those participants who have already used Mobile Banking were males; 47% were between 21-30 years old, another 27% between 31-40 years. This data may however be somewhat misleading owing to a high number of survey participants in these age-groups. For this reason it would be more useful to examine the usage of Mobile Banking specific to each age-group.

Looking from this perspective, the situation turns quite different. The astonishing part often ignored in studies related to Mobile Banking is: The highest penetration of Mobile Banking was found among the age-group of 41-50 years old. In this age-group, 9 of 30 participants (30%) were using or had once used Mobile Banking. Closely followed by the group of over 51 years old in which 20% of the participants (4 of 20) reported having used Mobile Banking. The 31-40 years olds were not far behind either (15 of 80 participants). The penetration amongst youngsters was surprisingly low: 8% for those between 21-30 years of age and 7% for those below 21. Although the statistical base for the above two groups is relatively small, the findings were however confirmed by many banks.

The usage of Mobile Banking, when judged by the profession of the participants did not look any different, as can be seen in the next chart.

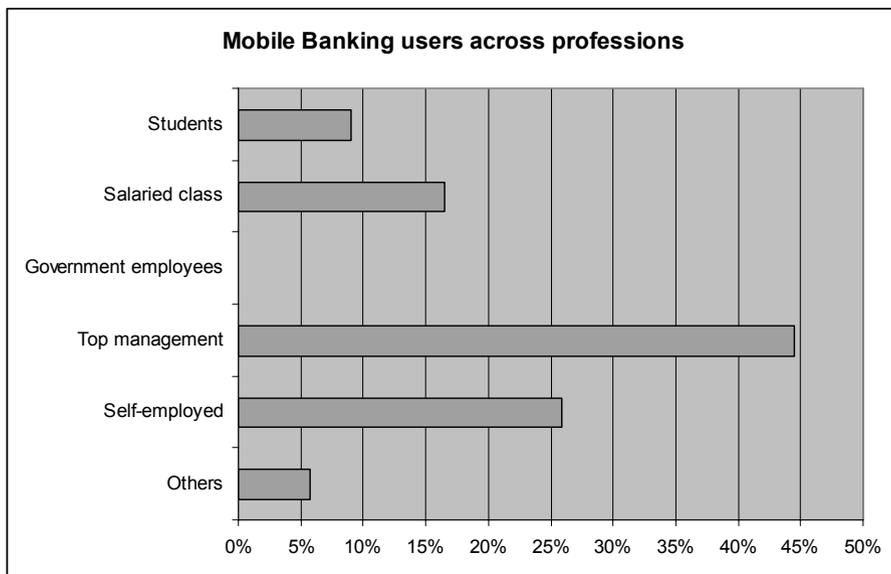


Chart 6: Existing Mobile Banking users across professions

The chart above shows that Mobile Banking enjoys significant chances amongst professionally active sections of the society. This statement is corroborated by the fact that 75% of all existing Mobile Banking users also use Online Banking while 31% of them possess a PDA. These are attributes that very often indicate professional activity, as discussed earlier in this chapter.

Having described the composition of the survey participants and their existing affinity to Mobile Banking, we now turn our attention to their opinion, wishes and acceptance of Mobile Banking.

9.1.3 Customer Perception of Mobile Banking

In this section we present the customer perception of general issues concerning Mobile Banking, e.g. advantages and disadvantages, expectations regarding future developments, preferred mediums and applications.

9.1.3.1 Advantages of Mobile Banking

The survey participants were asked about their perception of advantages that Mobile Banking might bring to users. The questionnaire provided the following multiple-choice options to choose from:

1. Ubiquity (conducting banking business anywhere, anytime)
2. Immediacy (fast reaction to market developments)
3. Overview over bank account and transactions
4. None
5. Other

The option “other”, if chosen, needed to be specified further. Seven respondents chose this option. Explanations given ranged from “practical”, “comfortable”, “less time consuming”, “technical feasibility” to “too little information to judge”.

The customer perception was found to be overwhelmingly positive. The most appreciated features were ubiquity and the overview over bank account. Fast reaction to market developments, often cited as one of the most attractive features of Mobile Banking did not find high appreciation. The chart below presents customer responses from three different categories:

1. amongst all 445 respondents,
2. amongst 55 existing users, and finally
3. amongst 390 non-users.⁸⁴

⁸⁴ Seven participants did not give any information about their usage of Mobile Banking.

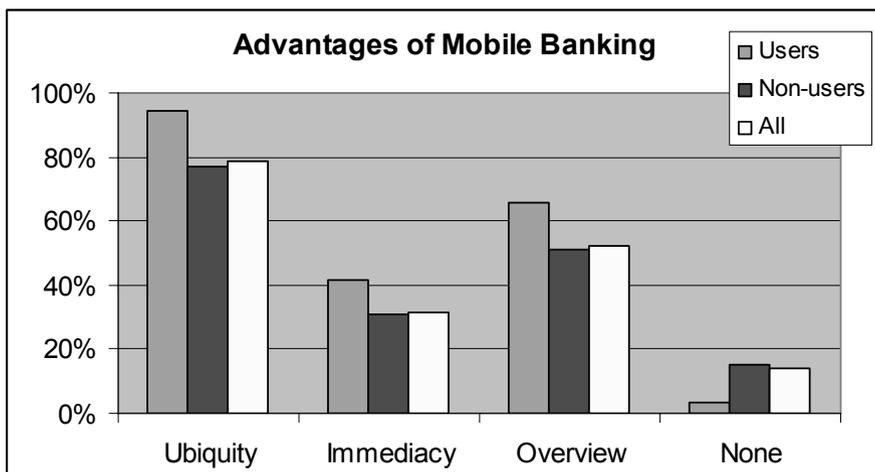


Chart 7: Advantages of Mobile Banking in participants' view

The chart above shows that the existing users of Mobile Banking are pretty enthusiastic about it, but non-users, too, have a positive opinion.

9.1.3.2 Disadvantages of Mobile Banking

The participants were again asked to choose from five multiple-choice options:

1. Security concerns
2. Complicated / uncomfortable usage of mobile devices
3. Too expensive
4. None
5. Other

Security concerns were found to be widespread amongst all three categories.⁸⁵ But on other issues there were serious differences in opinions. Almost half of the non-users believed Mobile Banking was too expensive while 93% of existing users rejected this notion. The question of comfort

⁸⁵ See previous section for the composition of the categories.

was also seen differently. Whereas 85% of the existing users did not agree with the statement that current devices were too complicated or uncomfortable to use for Mobile Banking, 32% of non-users did perceive the devices to be uncomfortable or complicated.

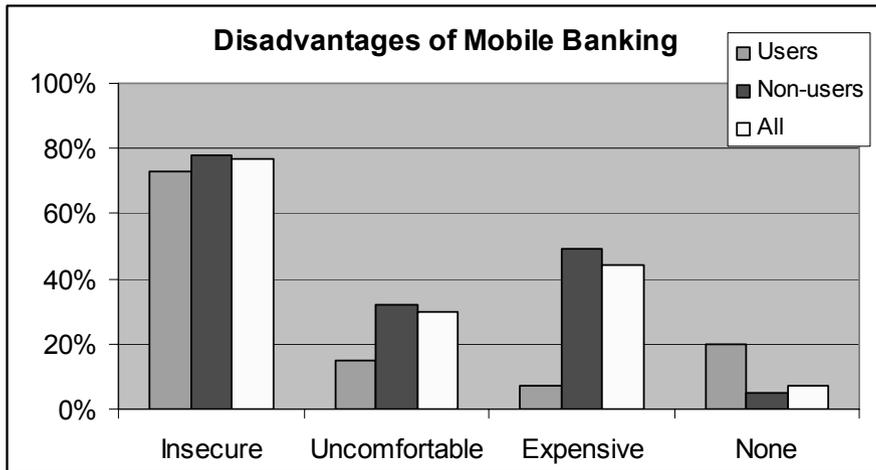


Chart 8: Disadvantages of Mobile Banking in participants' view

Interestingly, as many as 20% of existing Mobile Banking users did not see any disadvantage in it compared to just 5% non-users with a similar opinion.

The option "other" was chosen by 17 participants. The responses ranged mainly between "no requirement", "no added utility vis-à-vis Online Banking", "data transmission too slow" and "the need for registration". "Missing personal contact with the bank" and "the danger of spontaneous, impulsive actions" was complained by 2 participants. A few others said they had "too little information to judge".

9.1.3.3 Wish list for Mobile Banking

The survey participants were further asked to name factors which would, in their opinion, make Mobile Banking more attractive and animate people to use mobile financial services. Four standard options were given as multiple

choices, apart from the option “other” that allowed the participant to express individual wishes. The standard options were:

1. Devices with bigger display
2. Better input-devices (e.g. an external keyboard for mobile phone)
3. Higher speed of data transmission
4. Cheaper costs of utilisation

The responses are grouped again in three categories: users, non-users and all participants, as in the previous sections.

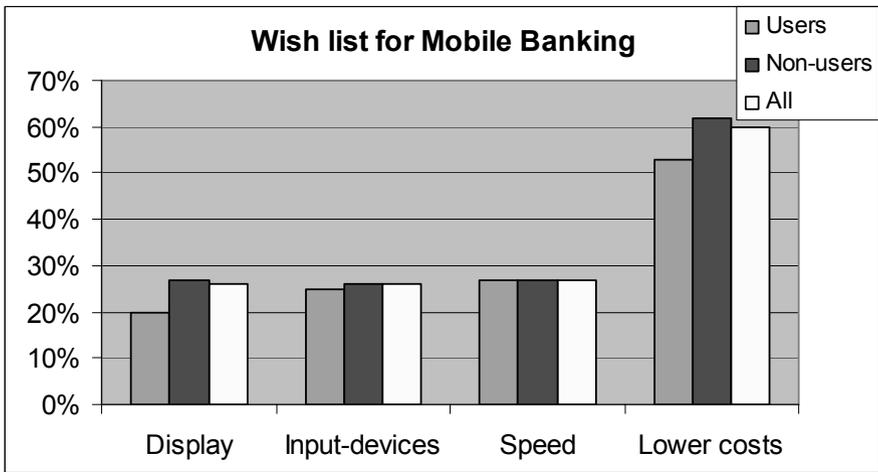


Chart 9: Wish list for Mobile Banking in participants’ view

The “wish list” brings a small surprise in the sense that many survey participants seem to be relatively satisfied with the quality of their mobile devices and network speed. The plea for lower costs is obviously not surprising and hardly requires any further explanation.

9.1.3.4 Preferred Mobile Banking Applications

Participants were confronted with the earlier defined mobile banking applications and asked whether and which of the services they could conceive to use. The applications were not explained any further. The idea was to get a spontaneous reaction by “shocking” the respondent with some slogan-like

terms. The term “services” was used deliberately in place of “application” so as not to confuse the participant with fine differences. The options given were:

1. Mobile Accounting
2. Mobile Brokerage
3. Mobile Financial Information
4. None

The responses are again grouped in three categories, as defined earlier.

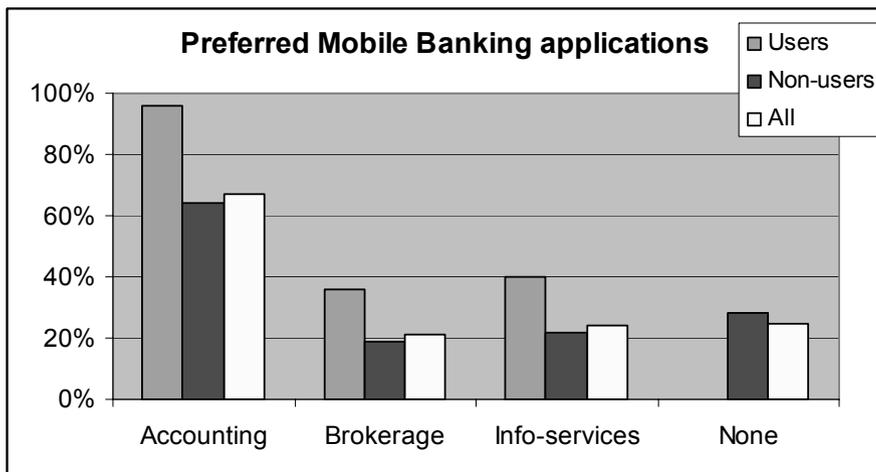


Chart 10: Preferred Mobile Banking applications

As the chart suggests, Mobile Accounting enjoys high popularity. 96% of the 55 users of Mobile Banking utilise it and 64% of the 390 non-users can imagine using it. Surprisingly, the Brokerage services turn out to be the least popular application even though they are often believed to be one of the most attractive features of Mobile Banking.

None of the users, naturally, selected the option “none” whereas 28% of the non-users said they could not imagine using any of these applications. Seen from the perspective of all participants, this option was chosen by 25% of respondents. One fourth of all participants were thus against using Mobile Banking.

This answer, being explicit information, however has limited relevance. In a latter section we measure the “Real Rate of Rejection” and illuminate the influence of ignorance. For this purpose, a list of 17 individual services was shown to participants to rate the probability of usage. The difference in the current and latter answers can be then measured as “influence of ignorance”. This was done to examine whether people tend to reject the idea of Mobile Banking based on impulsive thinking, without any precise information of the utilities possible.

9.1.3.5 Preferred medium for availing mobile services

Several different technologies are currently employed in order to provide financial services via mobile devices. These technologies can be categorised in messaging-based, browser-based and client-based technologies. Different banks typically use different technologies and there is to date no universally accepted standard technology employed by all banks.

In order to get an idea of the customer preference for a particular technology, we asked our survey participants to choose from a list of multiple choices, which of the three mediums/technologies they would like to use. The option “no preference” could be chosen when all of the three mediums were equally acceptable:

1. SMS
2. Internet access via (in-built/standard) browser
3. Client software (installable on the mobile device)
4. No preference

With 78% acceptance amongst existing users of Mobile Banking, browser-based solutions were clear favourites in that group. Messaging-based (SMS) solutions were not favoured by existing users. Client-based solutions also enjoyed certain acceptance: 29% amongst users and 28% amongst non-users. 91% of existing users reported clear preferences. Non-users, probably owing to the lack of experience, were more open to different technologies; 32% had no preferences.

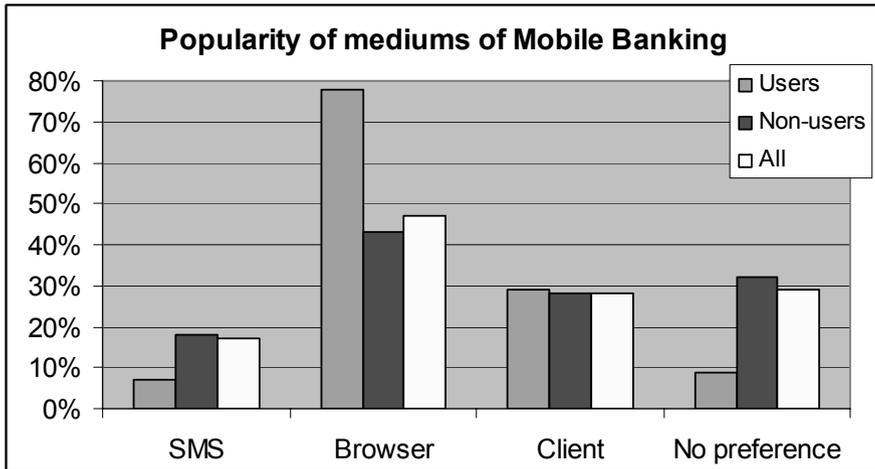


Chart 11: Popularity of mediums of Mobile Banking

The selection of an appropriate technology is an important issue for banks, for it might prove to be one of the decisive factors for the customer when making a decision on whether or not to use Mobile Banking. It would be therefore advisable to have a second look at this issue from a different angle.

For this purpose we examined the popularity of the individual mediums amongst different age-groups. Multiple choices were, as stated earlier, allowed.

As the next chart suggests, browser-based solutions enjoyed high popularity across all age-groups. They were clear favourites in the important age-groups of 21-30 and 31-40 years olds. Even when client-based solutions cut a respectable figure across all age-groups they could hardly surpass the popularity level of browser-based solutions. SMS-based solutions seemed attractive only to the fringe group of youngsters.

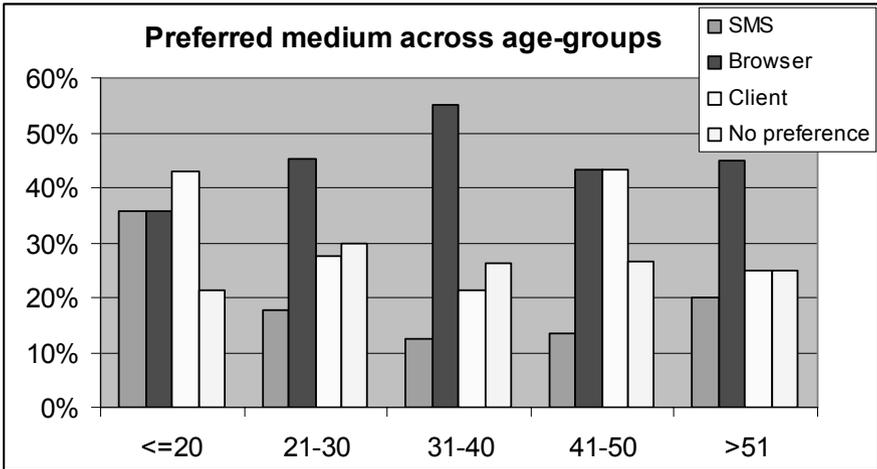


Chart 12: Preferred medium of Mobile Banking across age-groups

Combined with the earlier mentioned phenomenal popularity of browser-based solutions (78%) amongst existing users of Mobile Banking, there seems to be greater likelihood of winning customer acceptance for Mobile Banking with the help of this medium. Implicit information retrieved by analysing other related data confirmed this thesis.

9.1.3.6 Importance of (affordable) Mobile Banking

In order to measure the importance that customers might attach to Mobile Banking offers of their banks, we asked survey participants whether they could conceive to change their bank, in case it neither offered nor planned to offer mobile financial services? Moreover, in order to test the importance of affordability, we also asked whether they would consider changing to another bank, in case that bank offered mobile services for lower prices than their current bank.

Change because of missing mobile services: Altogether 69 of the 452 participants (15%) said they could conceive to change their bank, in case it refused to offer mobile financial services. This opinion was, not unexpectedly, shared by many existing users (24 out of 55; 44%). Seen in age-groups, participants of 31 years or above in age were more willing to change than younger ones, as seen in the chart below that depicts the will-

ingness across age-groups to change their bank because of missing offers for mobile financial services.

Seen across professions, participants from the groups of top management (33%), self-employed (26%) and the salaried class (22%) were more willing to change their bank than, for example, students (9%). This is not surprising considering that those groups are also most likely to maintain more than one bank account so that shifting transactions from one bank to another should not be that difficult.

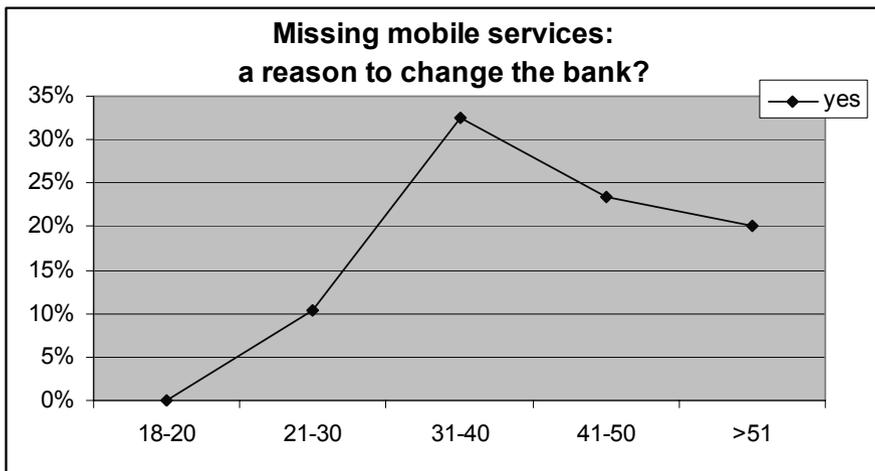


Chart 13: Willingness across age-groups to change bank for Mobile Banking

Judging from the perspective of customer/bank relationship, all banks had a reason to worry. Big banks (17%), direct banks (17%) and banks in the category “others” (22%) were more affected than savings banks (15%) and cooperatives (8%). With a 2-digit percentage of customers regarding the presence of mobile financial services as a must for the product portfolio of their bank, it would be almost reckless for any bank to ignore this development.

Change because of expensive mobile services: 29% of all participants (132 out of 452) regarded expensive Mobile Banking services of their bank as a valid reason to change to another bank with better conditions, e.g. cheaper services. This question generated by and large responses on the

similar lines as the previous one; they were only more emphatic. Customers of savings banks and cooperatives turned out to be most price-sensitive.

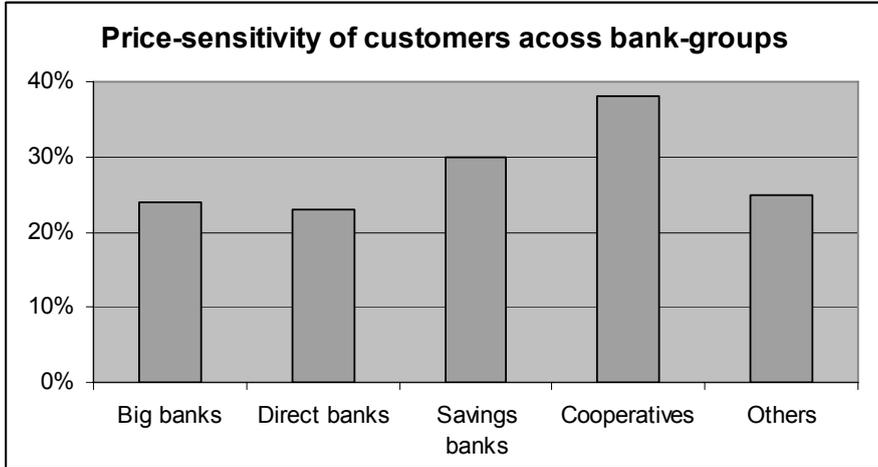


Chart 14: Willingness of customers to change bank for cheaper mobile services

The previous chart shows that all banks have a non-negligible number of customers willing to change their bank when provided with better conditions elsewhere. Though this question concerned exclusively the realm of Mobile Banking, the responses that it generated have significance for banks in general.

It is sometimes argued that survey participants generally respond on these lines to such a question, for it is in their own interest to do so. Moreover, it is claimed, they do not take such drastic measures when actually confronted with a price-hike. This argument, though undoubtedly valid to a certain extent, might prove to be misleading in this context. First, low customer loyalty must be taken seriously especially while designing products for a saturated market characterised by high competition. Secondly, many of Mobile Banking users have an affluent background and often own more than one bank account. Therefore, it is easier for them to shift their transactions from one bank to another without any noteworthy hassles.

An example for this phenomenon can be found at *First Direct*, a direct bank in England. This bank provides free-of-charge SMS service with balance details and list of transactions 2 times a week. A survey amongst its

new customers revealed that every 8th new customer (nearly 12%) changed to *First Direct* because of this service, see [Karsch, 2004, p. 71].

9.1.4 Customer Response to Service Offers

Having elicited the customer perception of Mobile Banking and issues closely related to it, we may now turn our attention to the utility of individual mobile financial services. In this section we present the results of our survey on the degree of utility that customers perceive in individual Mobile Banking services. In order to estimate the perceived utility, we asked survey participants about their enthusiasm (or lack of it) for particular services. We further examined their willingness, quantified in monetary units, to pay for those services. For this purpose, the participants were provided with a list of 17 services bundled into three groups, namely: Mobile Accounting, Mobile Brokerage and Mobile Financial Information.

The enthusiasm for using a service could be rated by the participant on a scale of 1 to 6 keeping in mind the perceived utility to him or her:

- 1 = very much willing,
- 2 = willing,
- 3 = unsure/rather willing,
- 4 = unsure/rather unwilling,
- 5 = unwilling,
- 6 = not at all.

The results are presented here mostly in the form of opinion blocks in order to have a better overview.

The opinion blocks are based on the average rating⁸⁶ received by a service:

Admiration: average rating better than 2;

Goodwill: average rating between 2 and 3;

Scepticism: average rating between 3 and 5; and

Rejection: average rating below 5

⁸⁶ The average rating of a service is calculated by summing up individual ratings given by all members of a group of participants and dividing it by the number of participants in that group.

The participants were further asked to quantify their willingness to pay for each of these services by choosing one of the payment options. The payment is to be regarded as a kind of surcharge paid for availing a service via mobile devices. It is thus in addition to any charges that the bank might be collecting for providing a particular service without mobile devices.

The payment options were: “none”, “up to €0.25”, “up to €0.5” and “above €0.5”.⁸⁷ Alternatively, the participants could opt for a monthly fee. The cumulated monthly fee for all such services that the participants chose to pay for using this option could be stated later. Paying a monthly fee for a service did not mean that the participant had then to choose this option for all other services as well.

The participant was, therefore, free to choose his ideal bundle of services for which he would be willing to pay a monthly fee and others that he might want to pay for only when used or still others that he wished to use but not pay for.

It is to be noted that the number of respondents belonging to a group of participants, who evaluated a particular service, may sometimes be lower than the total number of participants in that group. This is the case, when not all members of that group responded to the request to evaluate a particular service.

Owing to space-constraints and in order to preserve the readability of the findings not all aspects can be illuminated here in their full scope. For this reason, we present here only main highlights of our findings.

9.1.4.1 Services in Mobile Accounting

Of the eight services identified in section 6.2.1 as belonging to Mobile Accounting, five were put to vote. Leaving out three services (“money transfer to sub-accounts”, “changing operative accounts” and “cheque book requests”) was considered to be a justified trade-off to keep the questionnaire compact, as these services – to the best of our knowledge – anyway do not play a very significant role in day-to-day banking in Germany. Services put to vote were:

1. Money remittances & transfer (Mobile Remittance)
2. Standing orders for bill payments

⁸⁷ It was made clear that the upper limit was not meant to exceed 1 euro.

3. Subscribing standard insurance policies (e.g. travel insurance)
4. Access administration (e.g. ordering new PIN/TAN)
5. Card management (e.g. blocking lost cards)

In the following, we present the customer response to individual services. The 304 “Mobile Accounting Admirers” (those who had earlier named Mobile Accounting as one of their favourite applications) accounted for 67% of all participants.

Money Remittance and Transfer (Mobile Remittance)

The facility to remit money via mobile devices enjoyed high preference amongst all groups of survey participants. It reached an average rating of 2.67 (“goodwill”) amongst all participants and of 1.67 (“admiration”) amongst existing users of Mobile Banking. 65% of 55 existing users evaluated this service with a utility rating of 1 (“very much willing”).

A staggering 74% of all participants rated it with a rating of 3 or better, 37% of them with 1. Even more amazingly, 72% of all participants from the group of top management and self-employed rated this service with a rating of 2 or better (“admiration”). Of all participants, 17% voted with “rejection” (rating 6), a further 9% with “scepticism” (ratings 4 and 5). The chart below illustrates the ratings given to this service by Mobile Accounting Admirers of whom only 4% rejected mobile remittances while another 5% were sceptical.

This shows that banks should keep the preferences of Mobile Accounting Admirers in sight when determining technical and pricing issues related to this service.

The willingness to pay extra for being able to remit money via mobile devices was in the best case subdued. The chart below illustrates the willingness amongst some selected groups of participants. 53% of all participants and 57% of all students rejected to pay for being able to remit money via mobile devices. On the other hand, 47% of existing users signalled their willingness to pay a monthly fee for the same, as against 42% existing users that rejected any extra payment. Also, 35% of Mobile Accounting Admirers showed their willingness to pay a monthly fee.

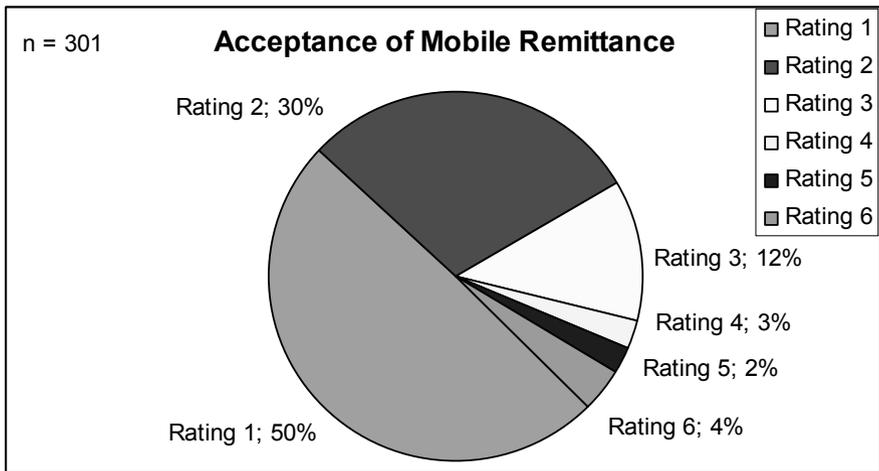


Chart 15: Acceptance of Mobile Remittance

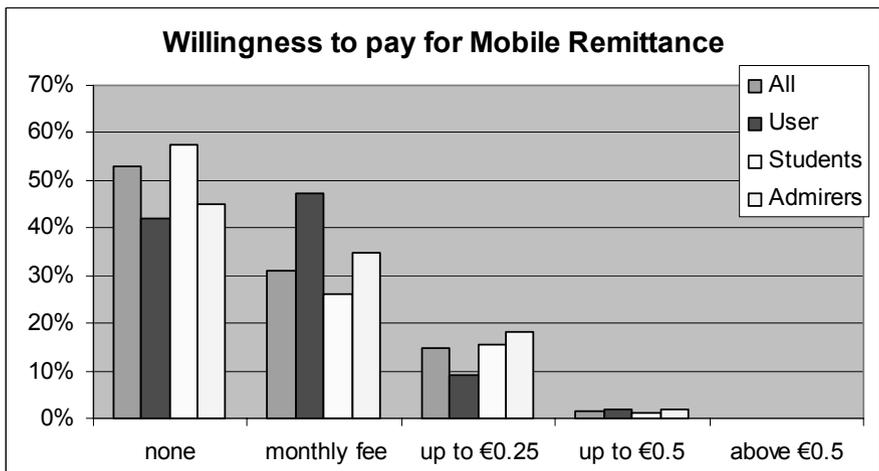


Chart 16: Willingness across selected groups to pay for Mobile Remittance

This rejection of payment is however understandable while customers generally pay a fee for remitting money. An extra surcharge just for being able to do so via mobile devices is hence regarded as unwarranted by many.

Standing Orders for Bill Payments

The possibility of issuing or modifying standing orders via mobile devices was received with “scepticism” (average rating 3.76) by the 451 participants that responded to this question. However, 33% of them rated this service with “admiration” (rating 1 and 2). Another 31% “rejected” it outright (rating 6). 58% rejected the idea of paying for this service, while 29% thought a monthly fee would be justified. Others agreed to “pay per use”.

The 55 existing users rated this service with an average rating of 2.69 (“goodwill”). 56% of them reported “admiration” and another 13% “goodwill” for this service with 55% of them willing to pay for it. Of all existing users, 45% pleaded for a monthly fee, others for “pay per use” charges. The 301 admirers of Mobile Accounting rated the service with “scepticism” (average rating 3.22). However, 61% of them rated it at least with “goodwill”, 44% even with “admiration”. A close majority (51%) did not wish to pay. 33% of those willing to pay pleaded for a monthly fee. This service, though not as popular as Mobile Remittance, has an above-average number of admirers many of whom are willing to pay for its utilisation.

Subscribing Standard Insurance Policies

This was one of the least popular services, with only 8% of the 450 respondents showing “admiration” for it while 62% respondents “rejected” it outright. Correspondingly, 65% respondents refused to pay for this service. However, surprisingly enough, 24% agreed to include it in their monthly package, and another 11% agreed to “pay per use”. The average rating received was 5.1 (“rejection”).

With only 9% “admiration” amongst existing users and 7% amongst admirers of Mobile Accounting, this service failed to evoke a popular response even within these Mobile Banking friendly groups. This least popular service in the realm of Mobile Accounting had a rejection rate of 44% amongst existing users and 56% amongst Mobile Accounting Admirers. The willingness to pay was however high amongst existing users (53%). The willingness of many users to pay for this service can probably be traced back to the rational idea of getting as much as possible for one’s money. Many participants seem to have included this option in their list just because they anyway decided to pay a monthly fee. Others who agreed to

“pay per use” might have been motivated by a sense of fairness, especially when the charges were in the realm of some cents.

Access Administration

This service evoked a response from 441 respondents, 38% of whom rejected it. The average rating received was “scepticism” (4.03). 63% of all respondents did not want to pay for this service. 26% of the respondents reported “admiration” while a similar number agreed to pay a monthly fee for it.

The scenario was quite different amongst existing users. Of the 50 users that evaluated this service, 48% reported “admiration” and another 16% “goodwill”, helping it to an average rating of 2.94 (“goodwill”). 52% agreed to pay for using this service, 40% pleaded for a monthly fee.

The 293 admirers of Mobile Accounting, who evaluated this service, were not as enthusiastic, giving it an average rating of just 3.66 (“scepticism”). 31% reported “admiration”, 27% reported “rejection”. Willingness to pay was reported by 44%. Responses amongst other groups of survey participants were on similar lines.

Card Management

Card management turned out to be the most popular service in Mobile Accounting achieving an average rating of 2.44 (“goodwill”) from 443 survey participants who evaluated this service, topping the rating of Mobile Remittance (2.67). A staggering 48% of all participants evaluated this service with a rating of 1 (“very much willing”). Altogether, 78% respondents rated this service with at least “goodwill”. This was the only service in Mobile Accounting for which a majority (52%) agreed to pay. Since card loss does not occur very often, many respondents pleaded for “pay per use”, with 11% willing to pay €0.5 or more per use.

Of the 54 existing users that evaluated this service, 83% rated it at least with “goodwill” (average rating 2.09), 56% rated this service with “very much willing” (rating 1). 61% agreed on the need to pay.

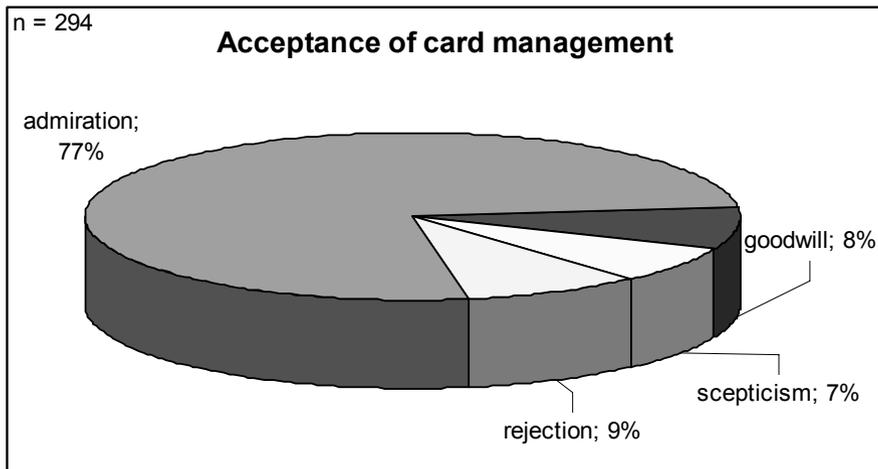


Chart 17: Acceptance of card management amongst admirers

The chart above illustrates the overwhelming acceptance of card management amongst the group of Mobile Banking Admirers where it reached an average rating of 2.04 with 85% of respondents rating it with either “admiration” or “goodwill”. Of this group, 56% agreed to pay for using this service, 30% on a monthly basis, others on the basis of “pay per use”.

Summary: The survey results show that a significant potential exists amongst the members of target customer groups for the services of Mobile Accounting. A non-negligible section of the society has a positive, even enthusiastic, opinion of Mobile Accounting. There exists noteworthy willingness across customer groups to pay for mobile financial services. Mobile Accounting, hence, seems to be a promising application.

The table below ranks Mobile Accounting services as per their perceived utility and the willingness to pay for them amongst all participants.

Ranking of the Utility		Ranking of the Willingness to Pay	
Service	Av. Rating	Service	Percentage
1) Card Management	2.44	1) Card Management	52%
2) Mobile Remittance	2.67	2) Mobile Remittance	47%
3) Issuing Standing Orders	3.76	3) Issuing Standing Orders	42%
4) Access Administration	4.03	4) Access Administration	37%
5) Subscribing Insurances	5.11	5) Subscribing Insurances	35%

Table 21: Ranking of Mobile Accounting services

9.1.4.2 Services in Mobile Brokerage

Mobile Brokerage is often regarded as one of the most attractive mobile applications owing to the possibility of fast reaction to market developments. For this reason, all of the three services identified in section 6.2.2 were put to vote:

1. Selling & purchasing financial instruments
2. Order book administration
3. Access administration (e.g. ordering new PIN/TAN)

In the following, we describe the customer response to each of these services. The 93 “Mobile Brokerage Admirers” (those who had earlier named Mobile Brokerage as one of their favourite applications) account for 21% of all survey participants.

Selling & purchasing financial instruments

Most of the survey participants seemed sceptic to selling and purchasing financial instruments (e.g. stocks) via mobile devices. 448 of the participants who responded to this question rated this service on average with “scepticism” (average rating 4.40). 49% “rejected” this service, another 19% were “sceptic”. 53% of all respondents refused to pay for availing this service. A silver lining, however, was that 13% rated this service with 1 (“very much willing”) and another 10% each with 2 and 3 (“willing” and “goodwill”). 30% agreed to pay a monthly fee, 17% agreed to “pay per use”. This answer showed two things:

1. This service is not suitable for mass popularity.
2. There are customer groups which seem to be willing to use this service and pay for it.

For this reason, we analyse the data further to look for customer groups with high support for this service. Two groups showed unusually high interest in selling and purchasing financial instruments via mobile devices, namely the admirers of Mobile Brokerage, as defined earlier and the existing users of Mobile Banking.

The 93 admirers of Mobile Brokerage evaluated this service on average with “goodwill” (2.7). A massive 61% reported “admiration” (ratings 1 and 2) and another 11% “goodwill” (rating 3), thereby pushing the positive feedback to well above 70%. The willingness to pay for utilisation of this service was very high amongst this group with 74% accepting a payment.

The 54 respondents from the group of existing users of Mobile Banking evaluated this service on average positively. 47% reported “admiration” (ratings 1 and 2) while 76% agreed on the need to pay. 41% favoured a monthly fee. The chart below demonstrates the willingness of selected participant groups to pay for transactions conducted via Mobile Brokerage.

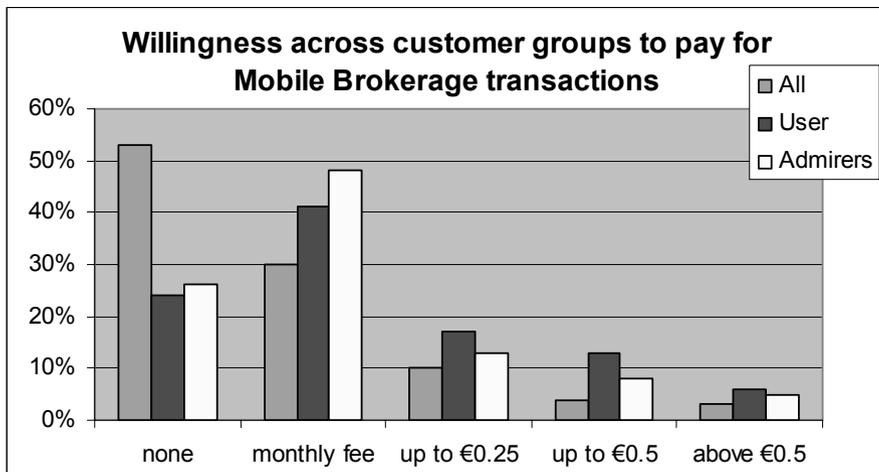


Chart 18: Willingness to pay for Mobile Brokerage transactions

The response to this service revealed that there is often sufficient demand for services. The real challenge is to identify suitable customer groups and

designing the services in a manner that the specific needs of these groups are fulfilled. The willingness to pay follows in most cases, when the customer values a service. The size of the group naturally plays a key role in any such decision.⁸⁸

Order Book Administration

Administration of the order book generated the least positive response amongst all Mobile Brokerage services. 53% of the 441 respondents “rejected” this service (rating 6), while 13% showed “admiration” (ratings 1 and 2). The average rating received was “scepticism” (4.77). 42% of the respondents (probably those who did not “reject” this service outright) however showed their willingness to pay for the utilisation of this service, 29% in the form of a monthly fee.

The group of existing users showed, as expected, a more positive response, with an average rating of 3.94. A relatively sizeable number of 27% reported “admiration” (ratings 1 and 2) for it. 76% of them were willing to pay for their utilisation, 40% within a monthly package. The “Mobile Brokerage Admirers” responded on similar lines, with a slightly better average rating of 3.54 (“scepticism”).

The apparent discrepancy (lower acceptance, high willingness to pay) observed in these two groups could be an indicator for a calculated move on the part of some respondents. Even if not really intending to use this service regularly, they would like to retain the possibility of doing so in emergency situations.

Access Administration

The possibility of administering access to the securities account with the help of a mobile device was greeted with “scepticism” by all respondents (445), who rated it on average with 4.52. The access administration to a securities account was thus apparently thought to be more sensitive than to a current account, which had received a slightly better rating of 4.03.

This service was “rejected” by 52% of all respondents (rating 6) while 65% did not see any reason to pay for it. Among existing users, however,

⁸⁸ For a detailed discussion on differentiation steps see [Porter, 1985, pp. 162-163].

48% rated it with “goodwill” or better. The willingness to pay for this service was on the other hand with 59% lesser than for any other service in Mobile Brokerage.

58% of the 93 “Mobile Brokerage Admirers” rated it with “goodwill” or better. However, the willingness to pay was with 46% significantly lesser than in the group of existing users (59%). This refusal on the part of many survey participants can be explained by the fact that many customers regard access administration as a basic service and hence do not see any reason to pay for it extra.

Summary: The results show that Mobile Brokerage does not enjoy a mass appeal. It however possesses very significant chances of success amongst certain customer groups that are not only willing to use Mobile Brokerage but are willing to pay for utilisation, as can be seen from the differences in the tables below.

The table below ranks Mobile Brokerage services as per their perceived utility and the willingness to pay for them amongst *all participants*.

Ranking of the Utility		Ranking of the Willingness to Pay	
Service	Av. Rating	Service	Percentage
1) Brokerage Transactions	4.40	1) Brokerage Transactions	47%
2) Access Administration	4.52	2) Access Administration	42%
3) Order Book Administration	4.77	3) Order Book Administration	35%

Table 22: Ranking of Mobile Brokerage services by all participants

The table below ranks Mobile Brokerage services as per their perceived utility and the willingness to pay for them amongst “*Mobile Commerce Admirers*”.

Ranking of the Utility		Ranking of the Willingness to Pay	
Service	Av. Rating	Service	Percentage
1) Brokerage Transactions	2.70	1) Brokerage Transactions	74%
2) Access Administration	3.54	2) Access Administration	67%
3) Order Book Administration	3.54	3) Order Book Administration	46%

Table 23: Ranking of Mobile Brokerage services by admirers

The 2 tables sufficiently illustrate the point of a differentiated approach and the necessity of offering segment-oriented products.

9.1.4.3 Services in Mobile Financial Information

Section 6.2.3 identified 13 different services as belonging to Mobile Financial Information. Services with similar function were bundled together for the purpose of this survey. For instance, the service “Returned cheque / cheques status” was considered to be sufficiently covered by the service “Information on completion status of an order”. The bundling was considered to be a justified trade-off to keep the questionnaire compact. Altogether nine services were put to vote:

1. Balance enquiries and statement requests (all types of accounts)
2. Transaction thresholds (SMS alert for predefined transactions)
3. Balance threshold (SMS alert on reaching a predefined level)
4. Stock market thresholds (SMS alerts for stock prices)
5. Enquiry of branch and ATM locations
6. Information on the completion status of an order
7. Stock market enquiries and reports
8. Exchange rate and interest rate enquiries
9. Product information, current offers and conditions

In the following we present the customer response to each of these services. 24% of all survey participants (110 out of 452) are regarded as admirers of Mobile Financial Information. These are participants who had earlier named Mobile Financial Information as one of their favourite applications.

Balance enquiries and statement requests

The possibility to use mobile devices to make balance enquiries or to order a list of latest transactions received a very favourable response (average rating 2.42: “goodwill”) from all participants.

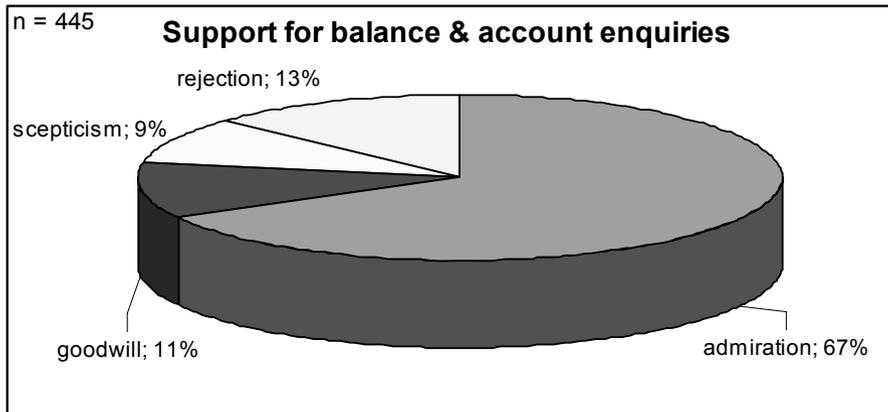


Chart 19: Support for account and balance enquiries

An overwhelming 78% out of 445 respondents to this question evaluated this service with a rating of 3 or better, 45% even with a rating of 1 (“very much willing”). 45% agreed to pay for it, 30% in the form of a monthly fee, others as “pay per use”. 55% did not see any need to pay.

An even higher enthusiasm for this service was shown by existing users: a crushing majority of 83% rated it with “admiration”, raising its average rating to 1.69 (“admiration”). No other service reached better ratings. Response for this service in all groups was more or less on similar lines. Chart 20 depicts the willingness of certain groups to pay for this service.

As can be seen in the chart below, the opinion was divided almost equally on the question of payment for account enquiries. However, 45% of all respondents were willing to pay, 36% in the form of a monthly fee. 9% reported their willingness to pay up to €0.25 per enquiry.

Most interesting was the enthusiasm shown by the group of those whose net monthly earnings are €1,000 or less (253 respondents). An overwhelming majority in this group (65%) showed “admiration” (ratings 1 and 2) and further 15% “goodwill” (rating 3). Only 13% rated it with 6 (“rejection”). 46% stated their agreement to pay for availing this service, 35% on the

basis of a monthly fee. Another 11% agreed to pay a fee of up to €0.25 per use. This shows the potential that this service enjoys amongst those with relatively low disposable income.

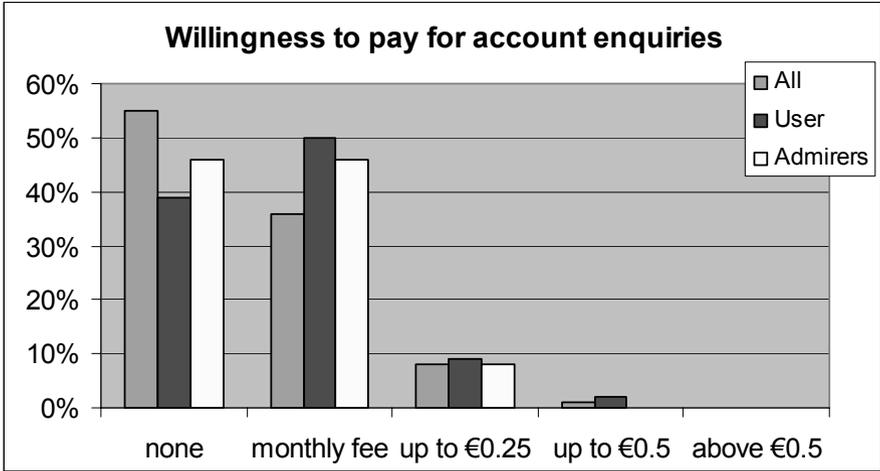


Chart 20: Willingness to pay for account enquiries

Transaction thresholds

Transaction thresholds can be set so that the customer gets an SMS alert whenever a certain type of transaction is performed on his or her account. The transaction type (e.g. all transactions exceeding the amount of €1,000) can be defined by the customer himself.

This service reached an average rating of 3.86 (“scepticism”) amongst all respondents. The opinion, however, seemed divided: 30% of the 445 respondents reported “admiration” while another 33% “rejected” this service. This division prevailed even amongst existing users with 28% reporting “admiration” and another 24% “rejection”. The group of admirers of Mobile Financial Information showed, not unexpectedly, a better opinion. 46% of 107 respondents from this group stated “admiration” for it as opposed to 21% who “rejected” this service.

The willingness across all customer groups to pay for the utilisation of this service did not deviate significantly from the previous one.

Balance and stock price thresholds

Both of these services showed responses that did not differ significantly from the service “Transaction thresholds”. Both generated an average rating of “scepticism” (balance thresholds: 3.68; stock price thresholds: 4.14) amongst all respondents. The responses in the groups of existing users and admirers of Mobile Financial Information were on the same lines.

More interesting is here the group of Mobile Brokerage Admirers, defined in the previous section. 48% of the 92 respondents from this group reported “admiration” for stock price thresholds. Another 16% had “goodwill”. 68% respondents were willing to pay for this service, 50% as a monthly fee.

Similarly, 41% of 294 respondents from the group of Mobile Accounting Admirers reported “admiration” for balance thresholds, 52% agreed with the need to pay. These facts underscore, once more, the need for differentiation while designing and marketing products or services.

Enquiry of branch and ATM locations

The 446 respondents amongst all participants evaluated this service with a relatively good average rating of 3.15. The single largest group (25%) was built by those that rated this service with a rating of 1 (“very much willing”), followed by 24% others that rated it with 2. On the other extreme, 23% rated it with 6 (“rejection”). 54% of all respondents demanded this service on a free-of-charge basis, 30% agreed to pay a monthly fee.

Over half (53%) of the 54 respondents from the group of existing users reported “admiration” for this service while 52% agreed to pay.

The 297 “Mobile Accounting Admirers” voted largely positively (average rating 2.87). Two-thirds (67%) showed either “admiration” or “goodwill”; only 17% “rejected” it outright. 53% agreed with the need to pay. The 92 respondents from the group of “Mobile Brokerage Admirers” responded similarly. But the admirers of Mobile Financial Information showed an even stronger, positive response. 60% of the 108 respondents stated “admiration” as against 11% with an outright “rejection”. The average rating received was 2.68 (“goodwill”), while 52% agreed with the need to pay for the utilisation. This service was, thus, a clear favourite on the second position directly after account enquiries.

Information on the completion status of an order

Of the 443 participants that responded to the question of utility of this service, 39% rated it with 6 (“rejection”), while another 39% rated with “goodwill” or better (ratings 1, 2 and 3). The average rating received was 4.12 (“scepticism”). 42% of all respondents showed willingness to pay, 30% on monthly basis.

Existing users of Mobile Banking rated this service more positively (average rating 3.24). Only 20% of the 54 respondents from this group rated it with 6 (“rejection”). A large majority (65%) was willing to pay, 48% on a monthly basis.

Another group that, not surprisingly, was interested in this service was that of the admirers of Mobile Brokerage, for whom it could be very important to be intimated of the status of an order, as soon as it is carried out. 49% of the 91 respondents from this group rated this service with “admiration” (rating 1 and 2); another 19% had “goodwill” (rating 3). 62% were willing to pay for utilising this service.

With “admiration” from 50% and “goodwill” from another 16% of the 107 respondents from the group of admirers of Mobile Financial Information, there was no substantial difference in the response of that group too.

Stock market enquiries and reports

The 444 respondents to this question awarded this service an average rating of 4.38 (“scepticism”). This rating is not unexpected for a service with little or no mass appeal. For this reason, it would be more useful to analyse the responses that this service generated amongst the group of admirers of Mobile Brokerage.

The “Mobile Brokerage Admirers” (92 respondents) evaluated this service with an average rating of 3.11. A substantial 71% were willing to pay for this service, 53% on a monthly basis. This response underscores again the need for customer segmentation and a differentiated approach while designing and marketing products and services.

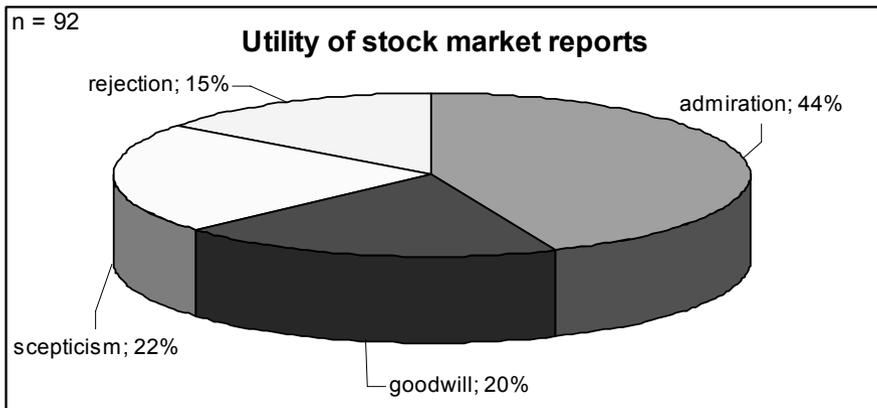


Chart 21: Utility of stock market reports for Mobile Brokerage Admirers

Exchange rate and interest rate enquiries

The response to the possibility of enquiring about current exchange- or interest rates via mobile devices generated a similar response as the previous service. The average rating by all participants (442 responses) was 4.48 (“scepticism”) with 43% “rejection” (rating 6).

The “Mobile Brokerage Admirers” (91 responses) were somewhat lenient and rated it with 3.76. 24% showed “admiration” (rating 1 and 2) while 21% had “goodwill” (rating 3). 22% could not see any use in it (rating 6). All in all 62% were willing to pay for utilising this service.

Product information, current offers and conditions

This service did not receive very good ratings, which is probably not a surprise, considering that there might be few emergencies in which a customer would need such information urgently and on a device with a small display.

The 443 respondents rated this service on average with 4.64. Half of them “rejected” it outright (rating 6) while 66% refused to pay for it. However, there were 16% respondents that rated it with “admiration” (rating 1 and 2) and another 10% with “goodwill” (rating 3). 28% were even willing to pay for this service as a part of their monthly package.

Existing users rated it better (average rating 4.36). Only 40% of the 53 respondents rated it with 6 (“rejection”). A majority of 55% was even willing to pay. Other groups rated this service by and large on similar lines.

Summary: As the discussion above showed, not all Mobile Financial Information services have a mass appeal. Some services are of universal interest, e.g. the possibility to enquire about the balance while on the move. Others are of interest to particular groups of customers. For this reason these services must be designed and priced keeping in mind the target customer groups and their strategic relevance to the bank.

The table below ranks the services in Mobile Financial Information as per their perceived utility and the willingness to pay for them amongst all participants.

Ranking of the Utility		Ranking of the Willingness to Pay	
Service	Av. Rating	Service	Percentage
1) Balance Enquiries	2.42	1) Branches/ATM locations	46%
2) Branches/ATM locations	3.15	2) Balance Enquiries	45%
3) Balance Thresholds	3.68	3) Transaction Thresholds	45%
4) Transaction Thresholds	3.86	4) Balance Thresholds	44%
5) Completion Status	4.12	5) Stock Price Enquiries	43%
6) Stock Price Enquiries	4.14	6) Stock Market Reports	43%
7) Stock Market Reports	4.38	7) Exchange/Interest Rates	43%
8) Exchange/Interest Rates	4.48	8) Completion Status	42%
9) Exchange/Interest Rates	4.64	9) Exchange/Interest Rates	34%

Table 24: Ranking of Mobile Financial Information services

9.1.4.4 Monthly Fee and Advertisements

All in all, 335 of the 452 participants agreed to pay for some service or other, making an astounding 74% with willingness to pay for utilising mobile financial services. As stated earlier, participants had the option of choosing to pay for services in the form of a monthly fee; an option, which was selected by many participants (252 out of 452: 56%). The options presented were:

1. None
2. Below €3.00

3. Between €3.00 and €5.00
4. Between €5.00 and €10.00
5. Above €10.00

The chart below illustrates the preferred levels for a justifiable monthly fee, based on the answers given by those who pleaded for a monthly fee.

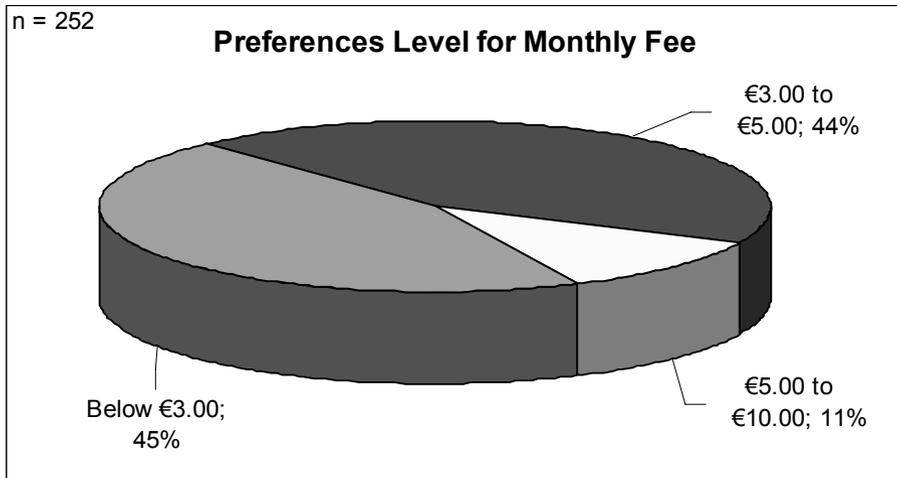


Chart 22: Preferences level of monthly fee supporters

An overwhelming majority of 99% pleaded for a monthly fee of less than €5.00, whereby 45% were willing to pay a monthly fee of less than €3.00. An almost similar number (44%) was willing to accept a fee between €3.00 and €5.00. Another 11% agreed to pay up to €10.00. Just 1 participant stated his readiness to pay more than €10.00 a month for availing mobile financial services.

If a participant opted for “none” when asked about the extent of monthly fee, even though he had earlier selected monthly fee for certain services, his answer was then treated as “unwilling to pay” for those services. His answers for individual services were adjusted accordingly.

Advertisements for free-of-charge service: 26% of all participants stated their willingness to accept advertisements on their mobile devices, e.g. via SMS, if the Mobile Banking services were provided free of charge.

9.1.5 Influence of Ignorance

After examining the customer acceptance for various mobile financial services, we now turn our attention to a phenomenon that we might describe as “influence of ignorance”. For this purpose, we analyse the anomaly that apparently exists in customer responses. Precisely, we examine the responses of those participants who had earlier rejected Mobile Banking (*explicit information*) by choosing the option “none” in response to the question, whether and which Mobile Banking application they could conceive to use. Of particular interest is now, whether these participants retained their rejection by consequentially rejecting the individual services put to vote? If a participant, who had earlier rejected Mobile Banking summarily, evaluates a service with a positive rating then it might be assumed that his earlier rejection was probably based on prejudices and thus “influenced by ignorance”. In this section, we attempt to find out the “Real Rate of Rejection”.

All in all 113 participants had stated their aversion to Mobile Banking by choosing the option “none” in response to the question regarding their preferred Mobile Banking application. But finally, only 29 of these “opponents” (26%) actually evaluated all 17 services with a rating of 6 (“rejection”). That means 74% of those who had looked like being opponents of Mobile Banking actually changed their opinion when possible services were listed to them. Even more astonishingly, half of them (57 participants: 50%) agreed to pay for some or another mobile financial service, thereby underscoring the importance of retrieving implicit information.

One more participant evaluated all services with a rating of at least 5 (“unwilling”). But that does not make any significant difference. Moreover, strictly speaking, being “unwilling to use” is not exactly the same as “rejecting” something.

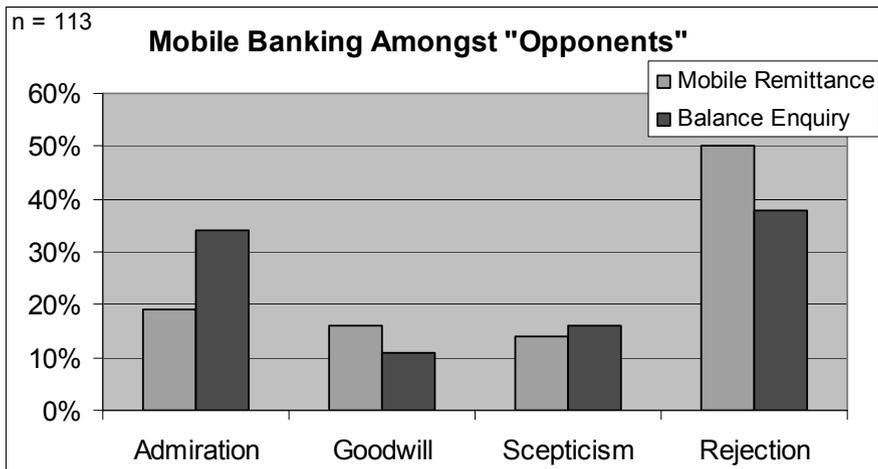


Chart 23: Popularity of Mobile Banking amongst opponents

The chart above shows the ratings of two mobile financial services, namely of Mobile Remittance and Balance Enquiry, by the group of participants that had earlier rejected Mobile Banking outright. Many participants seem to have changed their opinion with as many as 34% showing admiration for balance enquiries via mobile devices. 19% stated “admiration” even for being able to remit money via mobile devices. 28% agreed to pay for Mobile Remittance, 24% for balance enquiries. These facts are astonishing when considered in the light that all these participants had unanimously rejected the use of any mobile financial service and they therefore indicate clearly towards an “influence of ignorance”.

Further, the same phenomenon can be observed amongst the groups of those who had earlier decided against an individual application (e.g. Mobile Accounting) but not against Mobile Banking, as such. Due to space-constraints we do not describe those groups in detail here, as the “influence of ignorance” has been already sufficiently demonstrated and established. Data for these groups have been, however, prepared and analysed.

Real Rate of Rejection (RRR): The RRR can be defined as that percentage of survey participants which evaluated every mobile financial service with a rating of 4 or lower (“scepticism” or “rejection”) and consistently declined to make any payment for any of the presented service.

Of 452 participants, 34 evaluated all 17 services with a rating of 4, 5 or 6 and simultaneously refused any payment for any service; the RRR is thus 8%.

9.1.6 Identifying Significant Attributes

This section intends to find out main attributes (e.g. sex, age-group, income-group, profession, online/home-banking habits etc.) of those who admire Mobile Banking. For this purpose, we analyse and present here the composition of the group of “Mobile Accounting Admirers”.

Sex: 71% of all male participants (282) chose Mobile Accounting as one of their preferred applications, as against 60% of females (170). This gender-specific preference is probably caused by higher mobility of professionally active men. A further ground could be a possible inclination of men for new technologies.

Age: 79% of the participants in the age-group 31–40 years (63 out of 80) opted for Mobile Accounting. A similar response was generated in the age-group of 41–50 years, where 73% participants (22 out of 30) rated it positively. The group of 51 years or above had the least resonance with 60% (12 out of 20). The 21–30 years olds showed interest with 63% of them (194 out of 307) selecting it.

Profession: The highest resonance was received amongst the tiny group of top management with 9 out of 9 participants (100%) opting for Mobile Accounting. The salaried class (70%: 93 out of 133) and the self-employed (67%: 18 out of 27) followed next. 65% Students (122 out of 188) chose this application, too.

Income: Net monthly income seems to be a good indicator for a positive attitude to Mobile Accounting. 83% of the participants with a net monthly income between €2,501 and €4,000 (43 out of 52) opted for this application, closely followed by those who earned more than €4,000 a month, 23 out of 31 participants: 74%.

PDA: The possession of a PDA seemed to be a clear indicator for a positive response to Mobile Accounting. 81% of PDA-owners (66 out of 81) chose it.

Online Banking: Online Banking did not seem to play a key role for Mobile Accounting, as 68% of Online Banking users (180 out of 266) chose this application not much different than those who did not use Online Banking (121 out of 184: 66%).

Home Banking: Home Banking did seem to indicate a certain affinity to Mobile Accounting; 74% of Home Banking users (67 out of 90) chose this application as against 65% non-users of Home Banking (227 out of 348).

Bank group: The bank with which a customer maintains an account did not seem to play any key role. Customers of almost all banks showed similar tendencies. The only exception was that of cooperative banks, whose customers showed a low preference for Mobile Accounting (54%: 21 out of 39).

9.1.7 Comparison with Other Empirical Surveys

The Chair of International Management at the University of Hamburg conducted a study in August 2001 to examine the viability of Mobile Banking. This extensive study conducted by Mr. Marcus Wesse and guided by Dr. Stephan Buse surveyed 1,322 natural persons between August/September 2001. The results of the 2001 survey are compared here with those of the current study.

Another study used here for comparing results is that of *Meridea*. This study, conducted by Hamburg-based *Gelszus Marktforschung GmbH* on behalf on *Meridea*, surveyed 450 natural persons in Hamburg in August/September 2003.

These three studies, including the present one, build a suitable platform for this comparison since there is a 2 years gap between each of them. Moreover, all surveys have been conducted in Hamburg and around the same time of the year.

9.1.7.1 University of Hamburg Study from Year 2001

This study surveyed customer acceptance for 14 different mobile financial services and the customer willingness to pay. Not all services are comparable with those of this study as at that time Mobile Banking was still in an early phase. But some services are similar and – as importantly – use the same scales to measure customer acceptance and the willingness to pay. In the following, we present findings for five selected services common to both surveys. The data for the 2001 study has been taken from [Wesse, 2001, pp. 137-185].

Service	Average Rating		Willingness to Pay	
	2001	2005	2001	2005
Card Management	2.78	2.44 (↑)	43%	52% (↑)
Balance & Account Enquiries	3.81	2.42 (↑)	27%	45% (↑)
Mobile Remittance	4.07	2.67 (↑)	36%	47% (↑)
Stock Price Enquiries	4.33	4.14 (↑)	30%	43% (↑)
Mobile Brokerage Transactions	4.93	4.40 (↑)	32%	47% (↑)

Table 25: Comparison between 2001 and 2005 results

The table above demonstrates that the user perception of Mobile Banking has improved within past four years. All services received a better average rating now than four years ago, as the bracketed upwards arrow in the columns for the 2005 study suggests. Most impressive is the improvement in the rating of Mobile Remittance from an average rating of 4.07 in 2001 to 2.67 in 2005. The willingness to pay for services has also increased across the complete spectrum.

9.1.7.2 Meridea Study from Year 2003

The *Meridea* study tested customer “interest” and the willingness to pay for 8 different mobile financial services. Survey participants were asked to choose services which they thought were “interesting” for them. The results are not directly comparable with our study. We can however make an indirect comparison by assuming that the ratings 1, 2 and 3 in our study (“admiration” and “goodwill”) are comparable with the “interest” as defined in the *Meridea* study.

Service	Meridea (2003)	Uni Hamburg (2005)
Balance Enquiry	98%	78%
Transaction Thresholds	95%	44%
Card Management	90%	78%
Mobile Brokerage Transactions	40%	33%

Table 26: Comparison between Meridea and Uni Hamburg surveys

The table above shows that our study cannot confirm the popularity of Mobile Banking in the same scope as the *Meridea* study does. Since we have no reason to believe that the customer acceptance of Mobile Banking might have increased in 2003 to such levels only to decrease again by 2005, we assume that the difference is owing to different methodologies used. Both surveys, however, could detect a relatively high “acceptance” of certain mobile financial services.

The *Meridea* study also asked its survey participants about their perception of disadvantages of Mobile Banking. Three of the presented options are similar to our study and the results thus comparable:

Disadvantage	Meridea (2003)	Uni Hamburg (2005)
Security Concerns	31%	77%
Costs Issues (too expensive)	12%	44%
Complicated / Uncomfortable Usage	4%	30%

Table 27: Comparison of user perception of disadvantages

The University of Hamburg survey participants seem to have more reservations about using mobile financial services than those from the *Meridea* study.

The *Meridea* study also surveyed customers’ willingness to pay for services. The methodologies used in both surveys, however, are too different to allow a direct comparison. Nonetheless, both surveys detected a significant readiness on the part of the prospective customer to pay for utilising Mobile Banking.

Summarising, we can establish that a comparison of the three studies points to a positive development in the user perception of services and willingness to pay. In the following, we highlight some important aspects of the survey results:

The Customer Survey – at a glance

- 98% of all participants (18–65 years old) possessed a mobile phone; 72% of the devices belonged to newer generations of mobile phones (less than 2 years old), so that technical prerequisites for the utilisation of Mobile Banking applications on a large scale are given.
- 12% of all participants had already used mobile financial services. 42% of them became regular users.
- Most existing Mobile Banking users belonged to top management, self-employed or the salaried class; 75% were users of Online Banking.
- The “anytime, anywhere” feature of Mobile Banking was the reason cited most often for, and security concerns against, the use of these services.
- 60% of all participants pleaded for lower cost of usages.
- Browser-based applications were favoured by most participants.
- Mobile Remittance and Card Management were services most asked for in the field of Mobile Accounting, across all sections of the participants.
- Mobile Brokerage enjoyed popularity but only among certain sections.
- Balance Enquiries and Branches/ATM Finders were services most asked for in the field of Mobile Financial Information, amongst all participants.
- 74% of all participants agreed to pay for some or the other services.
- The Real Rate of Rejection for Mobile Banking is encouragingly low (8%).
- The customer acceptance and willingness to pay has registered significant improvements since our last survey in 2001.

Table 28: Results of the customer survey at a glance

9.2 The Banks' perspective

This section describes the phenomenon of Mobile Banking from the perspective of banks in Germany. A survey was conducted to get a glimpse of the considerations that might be influencing decisions of banks in Germany regarding whether or not to offer mobile financial services, the exact scope of such services, the mediums to employ, customer groups to target and the objectives to pursue.

9.2.1 Methodology of the survey

The survey was conducted between 19.08.2005 and 05.09.2005, one response was received on 22.09.2005. All German banks that were identified during literature review in chapter 7 as relevant were contacted for their views. Two Swiss banks, *UBS* and *Credit Suisse*, also identified during literature review were contacted as well since environmental (socio-cultural) conditions in Switzerland do not differ significantly from those in Germany.

A 5-page questionnaire was prepared for the purpose of this survey. The questionnaire was designed to act as a broad guideline for conducting meaningful, conversational interviews without following a strict, pre-set course. But at the same time, it had to be flexible enough to act as a formal questionnaire for survey participants that either did not have time for a telephone interview or wished to consult colleagues or seniors before answering certain questions.⁸⁹

Altogether 28 credit institutions were contacted by telephone. Even though it was a tedious task to find one's way to right interlocutors in banks, an overwhelming majority showed a cooperative attitude. In fact, the failure of some of the institutions to participate in this survey was caused more by their internal failure in clarifying competences than anything else. There were, however, 2 notable exceptions: Munich-based *Stadtsparkasse München* declared as policy to support only "regional" studies owing to "time-constraints". Those responsible for electronic/mobile activities in

⁸⁹ The questionnaire is attached as Appendix-G.

Commerzbank, the only German “big bank” missing in this survey, did not respond to repeated messages with requests for their opinion.

All in all 16 credit institutions agreed to participate in this survey: 9 institutions gave their opinion in a conversational telephone interview, 7 preferred to respond via written questionnaire. All interview partners belonged to senior management and enjoyed decision-making powers in the area of Mobile Banking in their respective institutions.⁹⁰

Banks were guaranteed discretion. It was assured – and consequentially ensured – that any sensitive data, which is not available as public information, shall be used, as far as possible, in anonymous form to avoid that an answering institution can be identified conclusively by a reader outside of this research project, unless expressly agreed to by the participant.

Structure: The participant banks were, as first, requested to provide some general information about their domestic business, e.g. the bank-group, the number of their retail/private customers, the usage of online- and Home Banking and their current position on Mobile Banking.⁹¹

The participants, in case they were offering mobile financial services, were asked to confirm (or modify) the findings of our desktop research about the present scope of those services. Their opinion on different mediums of Mobile Banking and the target customer groups was consulted. Information was also requested about their cooperation & coordination activities as well as about their perception of developments taking place in the field of Mobile Banking. Finally, they were requested to identify their objectives in offering mobile financial services and to evaluate the importance of these objectives for their respective institutions on a scale of 1 (very high significance) to 6 (without any significance).

Participants that did not offer mobile financial services were asked to evaluate certain inhibition factors on a scale of 1 (very significant hindrance) to 6 (no hindrance at all) that might have led to their decision against Mobile Banking.

⁹⁰ A list of the participant banks and interview partners is attached as Appendix-A.

⁹¹ International activities of banks were not considered relevant, owing to non-comparability of data resulting due to differences in environmental (i.e. socio-cultural) conditions. For a detailed discussion on these factors see [Choi et al., 2005, pp. 1-9].

The same scale of 1 (I agree completely) to 6 (I disagree completely) was used again to test the responses to some general theses concerning Mobile Banking. This final question was to be answered by all banks, irrespective of the presence or absence of Mobile Banking in their product portfolio.

Scale: An even and broad scale of 1 to 6 was selected deliberately, as in the customer survey, to generate precise responses on the one hand and to deny participants the easy option of a “golden middle” on the other. Further, the scales from 1 to 6 were labelled with explicit tags to avoid subjective scaling by participants and to ensure consistency in answers.

Data Analysis: The data is analysed in a descriptive manner so as to illuminate various aspects of Mobile Banking. It is to be noted that any percentile data presented here must be considered with certain reservation, as the statistical base (16 samples) is too low to guarantee statistical significance. Nonetheless, the results here imply the opinion of renowned banks in Germany and, at the very least, provide an insight into the perception of German banks as far as Mobile Banking is concerned.

All percentage figures have been rounded up or down to the nearest round figure. This may cause, in some cases, apparent discrepancies that the figures do not add up to exactly 100.

9.2.2 Composition of survey participants

The 16 banks that participated in this survey represented a wide-spectrum of the German banking sector. Of 5 German big banks 4 participated in this survey with the only exception of *Commerzbank*, as stated earlier. The *Citibank* represented the group of foreign banks with considerable business in Germany. The following chart gives an overview of the composition:

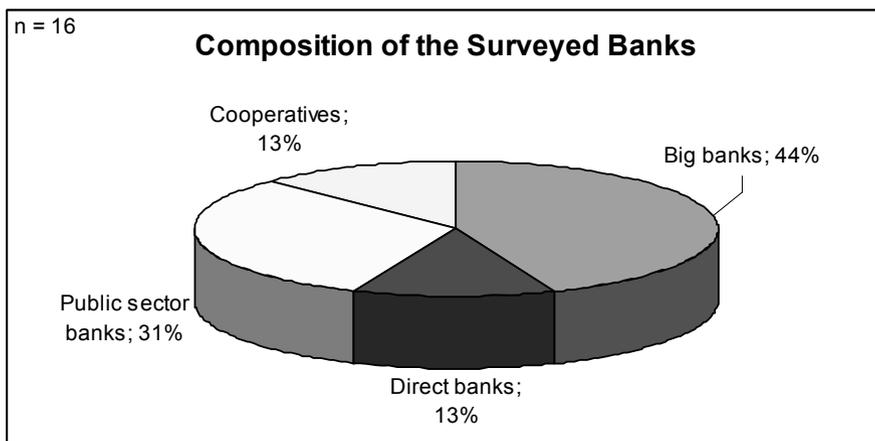


Chart 24: Composition of the surveyed banks

Of the surveyed banks, 8 boasted of between 1 and 5 million private (retail) customers, 2 institutions had a retail customer base of over 5 million. The smallest institutions (2) had a retail customer base of less than half a million but over one hundred thousand.

All banks offered Online Banking. The percentage of retail customers using Online Banking ranged from 10% to 97%. The number of online customers was, not surprisingly, particularly high amongst the customers of direct banks and those specialising in online services. One bank did not provide any detail. One of the reasons for this seemingly high difference in usage – apart from user preferences – is that some banks provided the number of all registered online users and others counted only those who actually utilise online services regularly.

Out of 9 banks that provided details for the usage of their Home Banking services, 4 had a double digit figure. The usage ranged, in general, between 1% and 20%. Direct banks had a strong presence of Home Banking users.

This data suggests a clear user preference for Online Banking. But almost all survey participants also admitted conscious and concerted efforts on the part of the banks to move customers away from Home Banking to Online Banking, owing to update problems. Banks find it difficult to regularly distribute new versions of client software and to enforce their installation. The requirement of software installation by users demands a robust

customer support and is hence more cost-intensive for banks than Online Banking, which works on the basis of standard Internet software, normally found on every computer. Updates are usually needed only on the bank server.

Mobile Banking: A large majority of survey participants was already offering mobile financial services, even when the scope of offered services varied.

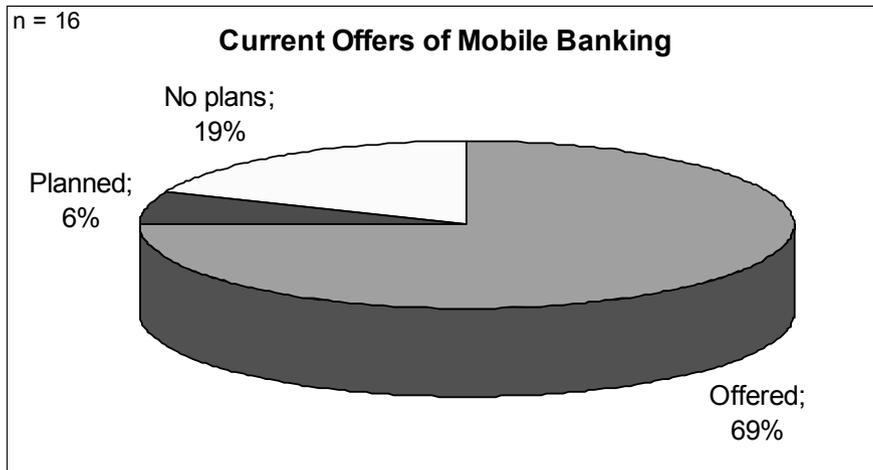


Chart 25: An overview of current offers of Mobile Banking

12 of the 16 surveyed banks were already offering some or other mobile financial services, 1 big bank planned to (re-)launch them next year, and 3 banks did not have any plans, as of now, to launch Mobile Banking. However, 2 of them reported a “wait and watch” policy. They expected Mobile Banking to establish itself in the long run but did not wish to take a pioneer role themselves. The third participant did not see any future for Mobile Banking in its house; justifying its opinion with a conservative customer structure.

One relatively small-sized bank offering a limited scope of mobile services referred to them as an “alibi offer” meant for customers who proactively enquired about it. That bank did not see any significant relevance for Mobile Banking in its house, owing to what it termed was a “unique” customer structure.

Eyes on the future: 5 banks reported to have been offering mobile services for the past 5 years; others between 3 and 4 years. All banks that agreed to go on record about the number of their Mobile Banking users stated this number to be less than 1% of all retail customers. One bank reported the number of its customers utilising SMS alert service to be 5% of all retail customers, the number of customers using other banking services was however again below 1%. That means Mobile Banking does not yet play any significant role in the banking business. Mobile Banking remains, as of now, a niche product and banks are positioning themselves in this field, apparently, with an eye on the future.

Free-of-charge services: The perception of positioning for the future was enforced by the fact that most banks offered mobile services for either completely or nearly free-of-charge. Only 2 banks, *Citibank Deutschland* and *Sparda Bank Hamburg*, reported nominal monthly fees of €1.50 and €1.00 respectively for receiving SMS alerts. One bank reported in-principle plans to charge fees for service utilisation. Another bank planning to launch mobile services next year intends to charge a fee of €0.20 per transaction.

Having made us familiar with the composition of this survey, we may now have a brief glance at product portfolios in the field of Mobile Banking.

9.2.3 Product Portfolios in Mobile Banking

The participant banks were asked to confirm the findings of our desktop research about their current offers on mobile financial services. But more importantly, they were asked about their future planning on services that were currently not on offer. In case a bank thought some particular service was not suitable for Mobile Banking, they had the option to characterise it as such. It was recognised that not all services considered suitable for Mobile Banking have to be offered by each bank since each bank must examine every individual service for value-added that it might generate for its (potential) customers. In the following, we present the results, grouped in three sub-applications, as defined in section 6.2.

9.2.3.1 Mobile Accounting

Positions of banks to individual services belonging to this sub-application are described below.

Money remittances: This was the most extensively offered service in the realm of Mobile Accounting. Out of 12 banks offering Mobile Banking, 6 were already providing this service to their customers (50%), another 3 were planning to introduce this service (25%). None characterised it as unsuitable.

Standing orders for bill payments: 4 banks were planning to introduce the option of administering standing orders via mobile devices. Further 2 banks, namely *Postbank* and *Sparda Bank, Hamburg*, were already providing this service. One bank, planning to launch mobile services, considered it unsuitable.

Subscribing standard insurance policies: 8 of the 12 banks (67%) offering mobile services referred to subscription of insurance policies via mobile devices as unsuitable for Mobile Banking. None of the surveyed banks was offering, or planning to introduce, this service.

Access administration: 6 of the 12 banks (50%) offering mobile services provided the facility to administrate account access via mobile devices; 1 planned it while 2 other considered it to be unsuitable.

Card management: Just 1 surveyed bank (*Sparda Bank, Hamburg*) was offering this service; 5 others were planning to introduce it. This in itself is a positive development, as during our 2001 survey none of the then examined banks wanted to introduce this service citing high investment costs coupled with low utility as a main reason. Even when an overwhelming majority (68%) of the then surveyed participants had expressly desired this service and 43% were willing to pay a certain fee for it.⁹² Only 2 banks referred to this service as unsuitable.

The discussion above shows that there is some remarkable movement in the landscape of Mobile Accounting. Pioneer work in the field of Mobile Accounting was being done, as far as the number of offered services is concerned, by *Sparda Bank, Hamburg*, closely followed by *Postbank*.

⁹² For more details see [Wesse, 2001, pp. 162-163].

9.2.3.2 Mobile Brokerage

Positions of banks to individual services belonging to this sub-application are described below.

Selling & purchasing financial instruments: 2 of the surveyed banks (*Postbank* and *comdirect*) were currently offering this service, 3 banks planned to offer it, while 2 others considered it unsuitable.

Order book administration: This service was offered only by *comdirect*, 3 others (not identical to the 3 in the earlier mentioned service) were planning to introduce it, 2 banks rejected this service as unsuitable.

Access administration: 4 of the 12 banks offering mobile services offered the facility to administer account access via mobile devices, 1 bank was planning it, and 2 banks (not identical to those rejecting the earlier mentioned services) thought it to be unsuitable for Mobile Banking.

This discussion suggests that Mobile Brokerage is treated with certain reservations by many banks. The reason could lay in high security- as well as legal requirements for brokerage transaction coupled with a low customer demand.

Judging from the number of offered services in the field of Mobile Brokerage, *comdirect* was the leading provider with all 3 services in its product portfolio, closely followed by *Postbank* with 2 services.

9.2.3.3 Mobile Financial Information

Positions of banks to individual services belonging to Mobile Financial Information are described below.

Balance enquiries: This service seems to be highly popular: 8 of the 12 banks (67%) offering mobile financial services provided their customers with this facility, 2 other banks are planning to launch it, thereby increasing the penetration of this service to 83% amongst institutions with Mobile Banking. No bank rejected it.

Transaction thresholds: This service was also popular: 4 banks were offering it already; further 4 were planning to introduce it. None considered it unsuitable.

Balance thresholds: Balance threshold alerts were offered by 3 of the 12 banks, another 4 planned to launch it, while 1 bank rejected this service as unsuitable.

Stock price alerts: Stock price alerts enjoyed a response on similar lines. 4 of the 12 banks were offering it already, 3 planned to launch them soon, 1 bank regarded them as unsuitable.

Branches & ATM finder: This service seems to be gaining increasing acceptance. Whereas only 2 of the surveyed banks, *Credit Suisse* and *Postbank*, had this service already in their product portfolio, 4 others were planning to launch it. Further 2 banks called it unsuitable. Interestingly enough, one of them was a bank that does not maintain branches; the other one a bank with business interests limited primarily to metropolitan regions.

Information on the completion status of an order: Also this service is experiencing an upturn: 4 banks were offering this service, another 4 were planning it. None of the surveyed banks with mobile services saw it as unsuitable.

Stock market reports and enquiries: 5 of the 12 banks with mobile offers have this service in their portfolio, 2 others are planning to launch it, 1 bank called it unsuitable for Mobile Banking.

Exchange rates and interest rates enquiries: 4 banks, amongst them not surprisingly both of the Swiss banks, are already offering this service, while 2 others are planning it. 2 banks called it unsuitable.

Product information & conditions: This service, which did not receive very encouraging user ratings, seems to be popular with the banks: 3 banks (all from the category of public sector banks) were offering this service to their customers, 3 others were planning to introduce it. However, 3 banks called it unsuitable.

Some other services, e.g. maintaining model depots and opening accounts via mobile devices were offered, too. *Sparkassen Direkt* offered the option of appointment management using a mobile device.

The most extensive offer on Mobile Financial Information was found to be that of *Sparkassen Direkt*, which offered all other services mentioned above, with the only exception of “Branches & ATM Finder”. A close second was *Postbank* which offered almost all services as of now and had plans to introduce new services currently not in its portfolio. Thus, we can

also see *Postbank* as “the” pioneer in the field of mobile services in Germany, as it maintains the most extensive portfolio when seen in a complete perspective across all the three sub-applications.

Mobile Financial Information seems to be a favourite application of German banks with many services either being already offered or currently in the pipeline, as seen in the discussion above.

After describing the landscape of mobile financial services amongst surveyed banks, we can now have a look on the technological mediums employed.

9.2.4 Mediums of Mobile Banking

In order to test the preferences of banks regarding mediums of Mobile Banking, survey participants were asked about mediums that they employed. This section presents the answers of 12 banks that are currently offering mobile services.

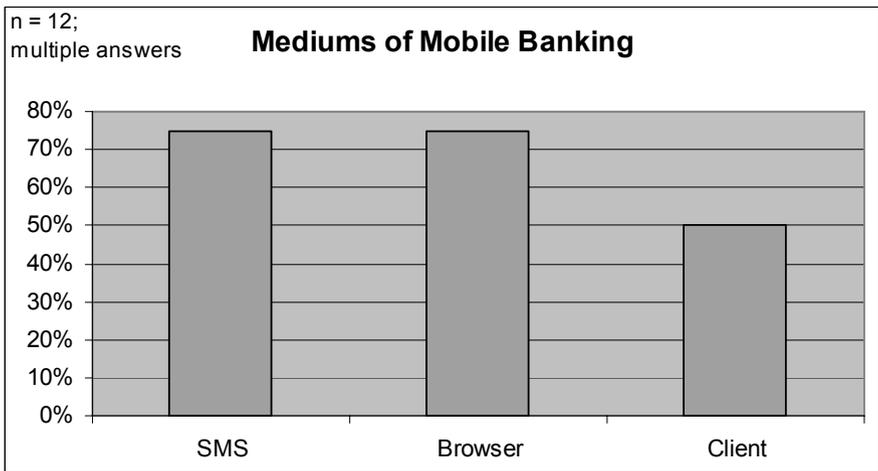


Chart 26: Mediums of Mobile Banking employed by banks

The chart above shows that messaging-based and browser-based solutions are often favoured by banks. The messaging-based solutions are, however, used exclusively in the field of Mobile Financial Information and other non-transaction services. Four banks (*Postbank*, *Sparda Bank Hamburg*, *HASPA* and *comdirect*) offered the most extensive network by offering all

three mediums to their customers. *Citibank*, *Credit Suisse* and *UBS* offered a combination of SMS and browser-based solutions. One bank planning to launch mobile services within the next year intends to use a combination of SMS and client-based solutions.

None of the banks offered mobile services solely on the basis of SMS; 2 institutions (*Sparkassen Broker* and *1822direkt*) made exclusive use of browser-based solutions whereas *Sparkasse KölnBonn*, one of the leading pioneers in client-based solutions, remained loyal to its own client-product.

Reasons for low acceptance of SMS for transaction services

SMS has established itself as an important medium for conducting transaction-based Mobile Accounting services in countries such as India and the Philippines, as described in section 7.2. It has however failed to generate such response in Germany and other western countries. Banks were asked about their perception on this issue.

Almost all banks regarded SMS as vulnerable to security risks. Some of the participants mentioned uncomfortable usage for conducting transactions (e.g. learning & typing commands). One participant said this was a question of differing mentality as people in Germany found online services more comfortable. Importantly, one participant pointed to dependencies that may arise for banks vis-à-vis powerful network carriers and would thus lessen banks' bargaining power.

Chances for SIM Toolkit

The SIM Toolkit, a hybrid form between messaging- and client-based solutions described in section 7.3.1, is thought to simplify SMS solutions and reduce security risks. Survey participants were asked about their opinion on this product.

3 of the 12 participants with mobile services (25%) thought SIM Toolkit could be an interesting option, as it would be more comfortable than SMS and yet cheaper than other solutions. 4 participants (33%) had no opinion on this issue; others were sceptical. Some said SIM Toolkit, being a client programme, will have similar disadvantages (e.g. need to install and update). Apart from this user unfriendliness, it would entail similar risks vis-à-vis network carriers.

Prospects for client-based solutions

Participants with mobile services in portfolio were asked about their opinion on whether client-based solutions could increase customer acceptance of Mobile Banking, as browser-based solutions are often perceived by prospective users to be too expensive and SMS-based transactions are too complicated and risky. Opinions seem to be divided on this score:

6 of the 12 participants (50%) agreed with this notion. The reasons cited were: i) it is easier to learn and use; ii) offline preparation of transactions saves costs; iii) special stand-alone software provides better security. One participant also pointed out the possibility of broader functionality that can be programmed to cater to the specific needs of particular customer groups.

2 participants (17%) were sceptic. They accepted the argument of cheaper, offline services but saw a deeper problem in the update issues.

3 participants (33%) thought that client-based solutions lack customer response because they require more effort to learn how to use them. One of the participants said, as soon as affordable flat rates for UMTS are available, costs would cease to play a role and client-solutions would lose their basic advantage as has happened in the field of Home Banking vs. Online Banking. Another participant said the need to install software would always act as a barrier for the customer.

One participant did not offer any comments on this issue.

Prospects for PDA Banking

An ever-increasing number of banks is offering mobile financial services via PDA; see section 7.1.3 for details. Banks were asked for their perception on the future chances of this business concept. The opinion was divided equally on this front.

Half of the respondents looked positively at the phenomenon of PDA Banking. The argument cited most was that the target customer groups have a high penetration of PDAs that has a high usability and fewer shortcomings (e.g. better display) than mobile phones. The other half did not think PDA Banking could succeed, the reason being low market penetration which in their opinion was not expected to increase significantly in future. One participant warned of missing features and of intensified focus on particular groups. Another participant foresaw technically better-equipped

mobile phones (e.g. smartphones) taking the front seat in future so that PDAs may eventually lose relevance altogether.

9.2.5 Objectives Pursued by Mobile Banking Offers

Banks offering mobile financial services were asked about the objectives that they might have been pursuing in offering Mobile Banking to their customers. Nine possible objectives, identified during literature review, were presented to the participants with a request to evaluate their possible influence, on a scale of 1 (very high influence) to 6 (no influence at all), on the decision of their bank to launch these services. Participants could of course name other objectives that might have played a role in their decision. The table below shows average ratings in ascending order received by individual objectives; the nearer a rating is to 1, the higher the influence and vice versa.

No.	Objective	Average Rating
1	Fostering innovative image	1.67
2	Better customer relations management	1.92
3	Differentiation vis-à-vis rivals	2.75
4	Attracting new customers	3.17
5	Increase in the turn-over	3.58
6	Increased efficiency of the workflow	3.83
7	Cost reduction	4.00
8	Higher flexibility in business processes	4.00
9	Increased motivation of the workforce	4.33

Table 29: Average rating of objectives pursued by banks

The ratings are calculated on the basis of the responses by 12 participants either offering or planning to offer Mobile Banking. One participant currently offering mobile financial services did not take part in the evaluation. This participant did not attach any importance to Mobile Banking and hence followed no particular objectives except to provide an “alibi offer” to customers that proactively ask for it.

Two participants emphasised the importance of multi-channel approach.

The average ratings reveal that banks are principally motivated by “soft” strategic reasons in their decision to offer mobile financial services and while determining their scope, than by “hard” business reasons.

It is not to deny that there might be individual banks with differing motivations. In fact, there were few participants that evaluated objectives such as cost reduction and increase in the turnover with high priorities.

Target customer groups

Banks were asked about customer segments that they sought to target with their mobile services. Of 12 banks offering Mobile Banking, 11 responded to this question, another response was received from a bank set to launch mobile services. The bank with the “alibi offer” did not have any preferred customer group.

Banks were asked specifically about their opinion on students, the salaried class, top management, financially affluent sections of the society and customers with high affinity to technology. Banks were further encouraged to name their own target groups. The following chart describes the responses to this question:

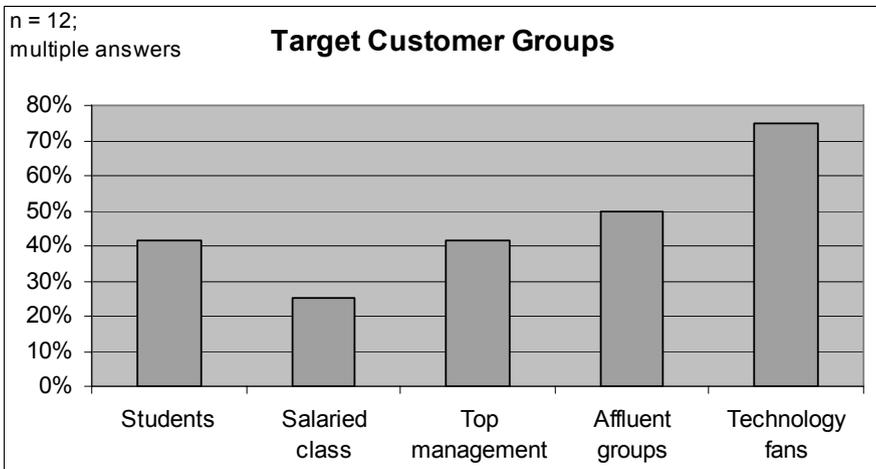


Chart 27: Target customer groups in banks’ perspective

Most banks (75%) believed that those with high technological affinity were most likely to use mobile services. Financially affluent sections of the soci-

ety were also regarded as attractive groups. Students and executives belonging to top management received similar attention (both 42%). The salaried class was apparently not thought to be very attractive.

Other groups cited as attractive for banks were:

1. users of Online Banking;
2. employees often on the move (e.g. sales representatives);
3. young people;
4. customers with higher education;
5. active stock market traders;
6. the self-employed; and
7. small enterprises.

One participant considered every user of mobile phone to be a potential user of Mobile Banking, as soon as the prices of better mobile devices were to become payable for everyone.

9.2.6 General Issues relating to Mobile Banking

As general issues we considered the current situation of Mobile Banking in Germany, especially the fact that many banks are offering mobile services without actively promoting them and secondly the dominance of information services over services related to accounting and brokerage.

We further wished to know the importance of inter- and intra-industry cooperation in this area. Finally, we asked about the competence issues; who is internally responsible for Mobile Banking activities. In the following, we present the results to these four questions.

Reasons for passive activities: The survey participants offering or planning mobile services were asked for their opinion on largely passive offers on the part of many credit institutions in Germany and the lack of active promotion.

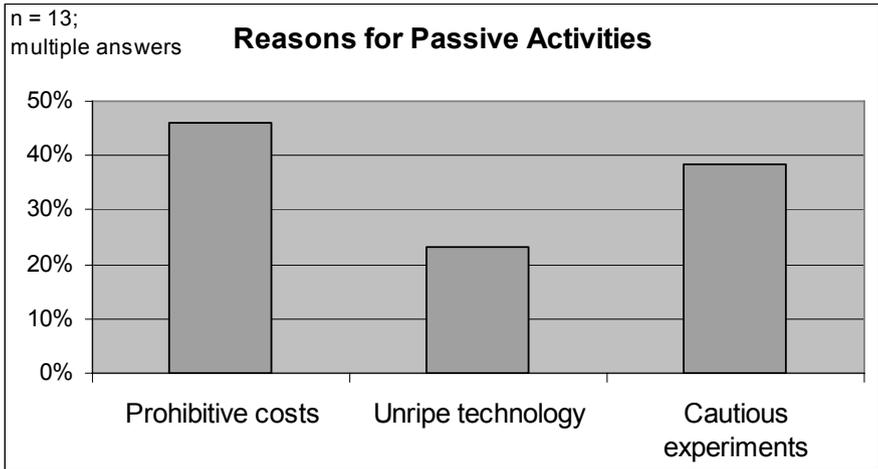


Chart 28: Reasons for passive Mobile Banking activities

Nearly half of the participants (46%) cited high operative costs as one reason for rather passive activities. 38% said, banks had become cautious after the dotcom burst and did not want to take decisions in a hurry. A relatively low number of 28% said, banks did not consider the technology to be ripe as yet.

One participant reported reservations in banks because of fears of high costs for user support; another cited missing customer demand as reason. Other reasons cited included security concerns and the phenomenon of “alibi offers” kept either to maintain image or not to disappoint technology-savvy affluent customers, who might ask for such services. One participant went on to state that these offers are presently rather meant for “VIP customers”.

Dominance of information services: The share of banks offering services of exclusively informational nature in the field of Mobile Banking was found to be quite high. Survey participants were asked what was, in their opinion, the reason for limited offers in the field of Mobile Accounting and Mobile Brokerage.

12 participants either offering or planning mobile services responded to this question. The participants were asked for their opinion on the impact of three potential reasons. Additionally, they could also give individual answers.

The responses were somewhat surprising: A staggering majority of 62% (8 out of 12 respondents) stated that many banks had security concerns when offering accounting or brokerage services via mobile devices, 7 respondents (54%) thought that services of purely informational nature were cheaper. A similar number (54%) said there was a greater demand for such services. The chart below illustrates the responses:

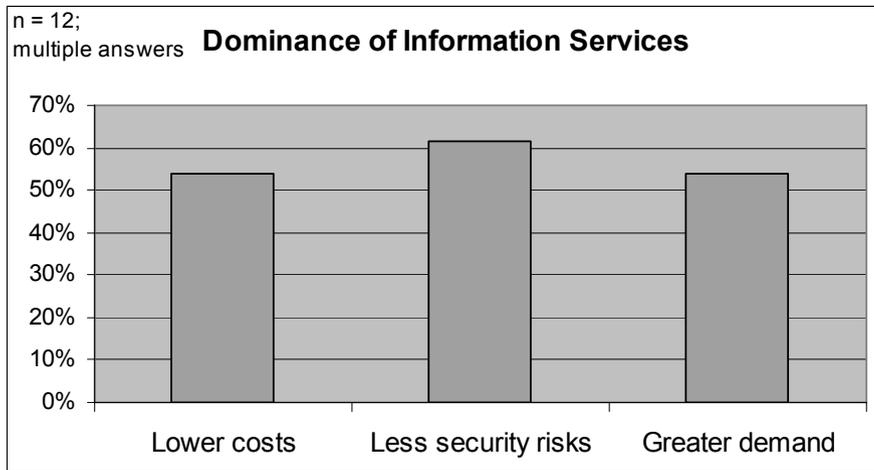


Chart 29: Reasons for domination of information services

Some other responses were:

1. missing know-how;
2. inflexible information technology (IT) department;
3. user-unfriendly authentication procedures on mobile devices; and
4. unsuitable devices.

One participant mentioned that information of purely informational nature could be outsourced by the bank to a specialised provider, who is allowed to retrieve information from the bank server and to forward it to the customer without having any rights to write on the bank server. This way a bank can provide modern services without incurring heavy costs.

Importance of inter- and intra-industry cooperation

None of the institutions reported intra-industry cooperation with other banks in the field of Mobile Banking. While 7 institutions (54%) had cooperation with an external IT firm, 8 institutions (62%) reported cooperation with telecommunication firms. It is important to note that purchasing SMS in wholesale from a network carrier cannot be considered as cooperation. Cooperation can be defined as taking place, when a network carrier gets integrated in the process of value creation as partner with certain responsibilities (e.g. outsourcing of information services) and incentives (e.g. profit-sharing). The role of a supplier or contractor alone does not qualify as business cooperation, as it is independent of the success of the project.

Just 1 participant reported cooperation with business consultants.

Coordination of Mobile Banking activities

Only 1 survey participant reported an internal division dealing exclusively with Mobile Banking. Another participant reported a product manager for Mobile Banking in a staff organisation. Other participants had an equal share of banks with inter-disciplinary teams looking after Mobile Banking and banks which had entrusted their IT divisions to look after Mobile Banking, in addition to other forms of Electronic Banking.

9.2.7 Arguments against Mobile Banking

This question was put to three participant banks that neither offered nor planned to offer mobile financial services in near future. One more participant, the bank with an “alibi offer” was also included in this group to understand its reluctant attitude towards Mobile Banking. All these banks had been offering active mobile financial services at the time of our last survey in 2001 and had at some point of time decided either to discontinue their offers or to scale down their activism. Participants were requested to specify their reasons for their decisions.

Participants were confronted with nine possible factors with a request to evaluate their possible inhibiting influence on the decision against Mobile Banking. The evaluation was to be undertaken on a scale of 1 (very significant hindrance) to 6 (no hindrance at all). Additionally, participants could name other hindrances that might have played a role.

The table below shows average ratings received by individual factors in ascending order; the nearer the rating is to 1, the higher is the hindering influence and vice versa. The ratings are calculated on the basis of the responses by above mentioned 4 respondents.

No.	Possible Hindrance	Average Rating
1	Lack of customer demand / acceptance	1.50
2	Mobile Banking has no significant utility for our customers	2.75
3	Prohibitively high costs of entry / operation	3.00
4	Our products are not suitable for mobile mediums	3.50
5	Compatibility problems with existing IT infrastructure	4.75
6	Security concerns (unripe technology)	5.25
7	Lack of necessary internal expertise	5.25
8	Lack of interest at the level of top management	5.75
9	Mobile Banking collides with classic channels of distribution	5.75

Table 30: Arguments against Mobile Banking

The table above suggests that banks that decided against (active pursuit of) Mobile Banking did so owing to “bad” experiences that they had to make in the aftermath of the dotcom burst. The primary motivation for their decision has been lack of customer demand. This lack of demand has been interpreted by banks to be an indicator for lack of utility, at least for their customers. High costs do seem to have played a certain role, even when not the crucial one.

Compatibility problems with the existing IT infrastructure, need for internal expertise (know-how) or security concerns do not seem to have played a key role in the decision against Mobile Banking. All respondents assured that disinterest on the part of top management was not a factor.

Importantly, none of the respondents saw any conflict between Mobile Banking and other classic channels of distribution of banking services.

One participant mentioned lack of established standards (at that point of time) which led to many problems; for his institution could not cope with the magnitude of hundreds of different models of mobile phones, all differing not only in the look and size but also in technological features.

However, this is a positive report in many aspects, for it makes clear that banks are not fundamentally opposed to Mobile Banking, despite their past experiences. They would be fairly willing to include mobile financial services in their product portfolio once a positive customer demand is recognisable.

9.2.8 Theses about Mobile Banking

At the end of each interview or written survey we requested the opinion of survey participants about the implications of Mobile Banking in their perspective. This information is, on the one hand, intended to be used to cross-check the validity of answers regarding objectives and inhibiting factors of Mobile Banking. On the other hand, this evaluation is a useful source of information to assess the strategic relevance of Mobile Banking and its future prospects.

All participants, irrespective of the status of their offers on mobile financial services, were confronted with 9 thought-provoking theses regarding Mobile Banking. The theses could be evaluated on a scale of 1 (I agree completely) to 6 (I disagree completely). 15 participants provided responses; 1 participant did not wish to take part in it.

The theses were formulated in differing styles so that they required a well-thought response. For this purpose, some theses were formulated negatively. For example the thesis no. 9 ("Mobile Banking is nothing but a short-term fashion") in the next table would require a rating of 5 or 6 (disagreement), if one wished to evaluate Mobile Banking positively. Such arrangement was considered necessary to ensure that respondents did not provide habitual answers. Higher ratings, hence, do not necessarily mean negative evaluation of Mobile Banking. The ratings can be thus only interpreted meaningfully keeping in mind how the thesis is formulated. The ratings are shown in the table below in ascending order.

No.	Thesis	Average Rating
	Mobile Banking...	
1	...provides additional value vis-à-vis Online Banking!	2.67
2	...helps banks to differentiate themselves vis-à-vis other rivals!	2.67
3	...is just a new distribution channel!	2.73
4	...requires firms to forge alliances and to cooperate!	3.00
5	...activities of rivals are forcing banks to develop own strategies in this field!	3.20
6	...will increase the degree of rivalry amongst banks!	3.40
7	...will increase the threat of entry by external players (e.g. by network carriers)!	3.60
8	...will adversely affect the number of branches & employees!	4.80
9	...is nothing but a short-term fashion!	5.27

Table 31: Evaluation of theses about Mobile Banking

Mobile Banking is thus thought to provide additional value vis-à-vis Online Banking. The ratings suggest further that banks see in Mobile Banking a moderate potential to differentiate themselves vis-à-vis rivals. At the same time, they regard Mobile Banking as nothing more than a new, additional distribution channel.

Two theses attracted very clear and emphatic answers. Banks do not see any noteworthy, negative impact of Mobile Banking on the number of branches or employees. And, perhaps most important of all, banks do not regard Mobile Banking as a short-term fashion. That means most banks are convinced that Mobile Banking is here to stay.

In fact, 50% of all respondents (8 out of 16) rejected the thesis “Mobile Banking is nothing but a short-term fashion” with a rating of 6 (“I disagree completely”). Another 25% evaluated it with 5 (“I disagree”). In fact, 2 of the 3 banks that do not offer Mobile Banking rejected this thesis as well. This evaluation shows that banks have accepted Mobile Banking as an integral part of modern banking. The only question for some of them is of “when” and no more of “whether” to offer mobile financial services.

In the following, we highlight some important aspects of the survey results.

The Bank Survey – at a glance

- 12 of the 16 banks that participated in the empirical survey were offering mobile financial services; 1 planned to launch them in near future.
- In the field of Mobile Accounting, Mobile Remittance was offered extensively; other services were often offered by some and were at a planning stage for many others; thereby signalling increased activity in this field.
- Mobile Brokerage received a mixed response: some leading banks were offering or planning it while many others thought it unsuitable.
- Banks were generally quite in an enthusiastic mode for Mobile Financial Information, offering and/or planning a variety of services.
- Banks seem to prefer browser-based solutions for transaction services; client-based solutions generated certain scepticism in some quarters.
- Mobile Banking was stated to be safe. The same safety protocol (https) and encryption standards (128-bit) were reported for Mobile Accounting and Mobile Brokerage that are employed for Online Banking.
- SMS was treated as an important medium for non-transaction services.
- Banks were often motivated by “soft” strategic reasons (e.g. image and better CRM) in their decisions to introduce Mobile Banking.
- “Hard” factors, such as cost reduction, played only a subordinate role.
- Banks often saw those sections of the society as primary target groups of Mobile Banking which are expected to possess high technological affinity.
- Mobile Banking was seen by many as a useful instrument of differentiation vis-à-vis rivals.
- Banks that decided against mobile financial services were influenced by their past experience of low customer acceptance for Mobile Banking and what they termed was questionable utility for their customers.
- However, no bank saw any serious collision between Mobile Banking and other classic channels of distribution.
- All banks expected Mobile Banking to establish itself as an important channel of distribution in medium to long run.

Table 32: Results of the bank survey at a glance

10 Strategic Assessment of Survey Results

Having examined the views of potential customers as well as of banks on desirability and indeed the utility of Mobile Banking from their respective perspectives, we may now proceed on to examine the strategic relevance of Mobile Banking in order to derive implications for banks.⁹³

This chapter deals with the significance of Mobile Banking and possesses key relevance for all banks, worldwide, that are confronted with the challenges of Mobile Banking. At the same time the particularities of the German banking sector are taken into account by making a context-sensitive evaluation of opportunities and challenges for banks active here.⁹⁴

10.1 Relevance of Mobile Banking

The survey results have demonstrated unambiguously that Mobile Banking has staged a remarkable comeback. Whereas most banks and indeed many experts believed Mobile Banking to be dead after the dotcom burst, banks are seeing themselves increasingly forced to include mobile services in their product portfolios. The reasons for this extraordinary resurrection are:

The phenomenal growth of the telecommunication sector and the resultant (unparalleled) penetration of the society by mobile phones present unique business opportunities for protagonists in the market.

A new generation of technology- and innovation friendly consumers is taking over the centre stage in business- and social life of the society. This

⁹³ Opinions of five “external experts” were sought before beginning with the assessment. These experts are involved in some way or the other with the development of Mobile Banking in Germany but do not belong to any bank. The names of these experts are to be found in Appendix-A.

⁹⁴ A background paper on the German banking sector is attached as Appendix-E.

generation is more open to the opportunities presented by mobile telecommunication.

The ongoing process of globalisation and the integration of the world-economy are forcing working professionals to be on the move within national and international geographic boundaries. These professionals need to carry out their bank business also while on the move even when they do not necessarily have access to an Internet-capable computer. The “anytime, anywhere” feature of Mobile Banking is thus nothing less than a professional necessity for many of them.

Thus, on the one hand, the banks are forced to take cognisance of the needs and wishes of some of their most attractive customer groups. On the other hand, the advantages that mobile services potentially bring to a bank or any other provider of financial services, as seen in chapter 8, are too palpable to deny. In the following, we list some relevant factors that ought to be taken into account while making decisions on the launch, maintenance and scope of Mobile Banking.

10.1.1 Significant customer interest

The customer survey – particularly seen in combination with two other surveys of older dates – establishes beyond doubt that there are sufficiently large groups of customers interested in utilising various mobile financial services. A superficial evaluation often fails to gauge the true extent of the potential, as the phenomenon of “influence of ignorance” (see section 9.1.5) showed convincingly. Many potential customers tend to reject innovative services solely on account of missing information. The “Real Rejection Rate” of Mobile Banking – at least meanwhile – has gone down to 8% amongst the targeted customer groups. If the results of the customer survey are any indicator, then the time seems to be ripe for a proactive attitude on the part of banks in advertising their mobile financial services so as to induce customer demand.

Issues of costs & pricing: There are still issues like expensive tariffs of mobile networks which the carriers are willing to lower only if, and when, banks can increase the volume of the utilisation. Banks on the other hand demand lower tariffs in order to increase the volume. This contradiction was confirmed by several interview partners.

The fact however is that even though 60% of all participants plead for lower charges, 93% of *existing users* do not rate Mobile Banking as too expensive (see section 9.1.3.2). This shows that many potential customers probably *perceive* the usage to be more expensive than it really is. With smart client solutions and new flat rate tariffs by network carriers, which are based on the amount of transmitted data and not on the amount of time spent online, this issue should cease to play any significant obstacle.

10.1.2 Potential advantages of offering mobile services

Apart from fulfilling customer needs and wishes there is a range of “hard” advantages that banks might reasonably expect by offering mobile services, for instance increasing sales volume (see section 8.2). Catering to specific needs of particular customer groups can help generate not only customer goodwill and image but also hard cash.

This fact can be exemplified by the customer response to Mobile Brokerage. Whereas only 23% of all survey participants had rated the service “selling & purchasing financial instruments via mobile devices” with “very much willing” and “willing”; this acceptance increased to a massive 61% amongst the group of “Mobile Brokerage Admirers”, who formed 20% of all survey participants. 70% of them agreed to pay for the utilisation of this service. So the important question is of identifying suitable groups and offering them services tailored to their specific needs for a suitable price. Moreover, even 23% of customers from attractive customer groups are by all means a formidable group that should not be ignored.

10.1.3 Potential disadvantage of ignoring Mobile Banking

In no way of lesser significance are the disadvantages that a missing offer on mobile financial services could potentially cause. Apart from lost revenues and fees there are customers who are willing to change their bank if it neither offers nor plans to offer mobile services.

Surprisingly, 15% of all survey participants reiterated this position. Certain groups were even more defiant, with as many as one third of their respondents claiming readiness to change their bank, if it failed to provide mobile services (see section 9.1.3). That this answer is not a mere rhetoric exercise is amplified by the example of *First Direct* of England, whose

every eighth new customer (12%) stated to have switched to them owing to their service of free SMS alerts.

In addition to financial losses that such a scenario might cause, there are other indirect losses too, as the response of one interview partner revealed. The interview partner, when informed of the lower number of survey participants from his group of banks who were willing to change their bank due to missing mobile services, exclaimed that it was a worrisome news for him. He saw it as an indicator for a lower share of sophisticated and innovation-friendly customers in his bank.⁹⁵

10.1.4 Issues of image & competition

Almost all of the surveyed banks offering or planning mobile services agreed that fostering an innovative image was one of the most important criteria for their decision to launch mobile services. Almost all saw in it a moderate potential to differentiate oneself vis-à-vis rivals. On the other hand, most claimed that Mobile Banking was “just a new distribution channel”.

This “just a new distribution channel” however gains strategic relevance, as soon as it is employed as an instrument of differentiation.

Even if we were to assume that Mobile Banking does not bring any advantages for banks offering it; by all means, it does seem to possess the potential to adversely affect the image of banks that ignore this medium altogether. The fact that many banks recognise this danger is proved by the “alibi” Mobile Banking offers of some and by the passive offers of others. It seems recommendable not to be left out in creating and sustaining this distribution channel.

10.2 Appropriate scope of Mobile Banking

The above discussion shows that Mobile Banking offers could become indispensable for banks in a not-so-distant future. The question here is not more of “whether” but of “when”. Even more important seems the question of “what, how and whom”, if one wishes to avoid mistakes made in the

⁹⁵ The need for sophisticated customers is discussed by [Porter,1990, pp. 86-97].

past. That is, what services (scope) should be offered how (mediums) and to whom (target groups).

Apart from the fact that the scope of the offered services should be selected carefully to suit one's own customers, the following two factors ought to be kept in mind.

10.2.1 Need for a clear business focus

Mobile financial services should be seen as proper business services with clearly focussed business objectives of strategic nature. After all, the objectives that banks seek to follow with Mobile Banking are clearly motivated by strategic thinking (see section 9.2.5).

One of the past mistakes, it seems, was that the technological solutions were given central focus. The impression gained during bank interviews was that Mobile Banking was driven in its first phase by enthusiastic IT divisions which wanted to make use of the newest technologies available then. Purely technology-motivated solutions can, however, prove counter-productive as they run a non-negligible risk of ignoring actual scopes of customer needs and wishes.

Business divisions, and not IT divisions, should therefore decide on the product portfolio and mediums of Mobile Banking, based on plausible market studies. While IT divisions undoubtedly play a key role in the implementation of the mobile strategy and should be involved, e.g. within the framework of an interdisciplinary team, in the conception and management of mobile services, the primary area of their work should remain within the realm of technological implementation.

10.2.2 Concentration on right customer groups

A related issue is that of concentration on "right" customer groups. One of the past mistakes, it seems, was that banks – or rather their IT divisions – put high emphasis on groups that can be termed as "technology fans". Members of this group are however known to have very heterogeneous financial backgrounds and cannot be considered to be *per se* attractive for banks. The technological affinity of a customer, though a necessary prerequisite for using Mobile Banking, is not sufficient in itself to make him a target customer for it.

This risk seems to be still present to a certain extent. 75% of the surveyed banks reported that technologically well-versed sections of the society were treated as top target group for Mobile Banking. In contrast only little over 20% reported targeting white-collar salaried class. The disparity in the supply and demand can be gauged by the fact that as many as 40% of all existing users of Mobile Banking amongst our survey participants had belonged to this group.

The increased need for the mobility has affected working professionals (salaried class, top management and self-employed) the most and they seem to be – as the customer survey revealed and as many telephone interview partners and other experts confirmed – most interesting target groups for Mobile Banking: They are financially well-settled, often on the move and technologically well-versed.

There seem to be some resistance against Mobile Banking in certain business divisions. One interview partner pointed to a potential “risk” of Mobile Banking. He feared a “cannibalising effect” of mobile services as they could, in his opinion, prevent customers from coming to the branch office and reduce the personal contact between the bank and the customer. This reduction could in turn lead to lesser chances of cross-selling products and services, he opined.

His objection however does not seem to hold ground considering that Mobile Banking is primarily used by customers that use Online Banking (75%) and anyway do not visit a branch office regularly. Secondly, Mobile Banking is not expected to be used as a primary medium of banking. It is rather thought to be useful for emergency situations. Thirdly, the bank survey did not reveal any such widespread fear. And finally, as one expert put it, it is now anyway too late to worry about the “cannibalising effect”– this ought to have been done before introducing Online Banking.

Summarising, we can state that a stage seems to have been reached where it is prudent to include offers of mobile financial services in product portfolios. The exact scope of the services to be offered and prices to be charged should be decided keeping in mind the bank-specific customer structures.

11 Conclusions and Outlook

Previous chapters have shown that Mobile Banking has gained non-negligible relevance in the past couple of years. It is a remarkable development for a matter which was thought by many to be dead and out, not too long ago.

Reasons for this change of perception are well-founded and range from technological innovations in the field of telecommunication to the increased need for mobility in today's society and last, but not least, the technological affinity of younger generations that are slowly but surely taking the centre stage.

Developments in the banking sector, e.g. increased competition on account of technological developments coupled with the process of globalisation have produced new challenges for banks. The increasing role of direct banks and pan-regional offers of competitors from around the globe are just some of the indicators for the precarious situation in which banks are today. The eroding customer loyalty increases this insecurity even further.

Mobile Banking presents an opportunity for banks to retain their existing, technology-savvy customer base by offering value-added, innovative services. It might even help to attract new customers who miss these services in the product portfolio of their current bank.

Mobile Banking undoubtedly presents chances to generate extra revenues for banks. Its main contribution, however, can be expected to take place in the strategic field. Mobile Banking is set to become an instrument of differentiation.

Nevertheless, most banks recognise this threat and are taking preventive measures by introducing their own mobile services. The foremost significance of Mobile Banking would be therefore of a rather defensive nature.

Instead of providing a positive differentiation, Mobile Banking would be employed to thwart negative differentiation vis-à-vis rivals. Owing to

this reason, we may expect to see Mobile Banking follow in the footsteps of Online Banking, i.e. to become a standard service offered by every bank worth its name.

As far as the outlook for Mobile Banking is concerned, the actual scope of offered services will most probably vary from bank to bank, depending on the individual customer structure. For instance Mobile Brokerage can be expected to find greater emphasis with direct banks than with savings banks or cooperatives.

In the field of price policy an intelligent mix of free-of-charge and paid-for services is to be recommended in order to induce demand. Services that anyway involve a fee by bank, e.g. transaction services, should not draw any surcharge for mobile usage. Information services, on the other hand, may be levied with a fee; the fee should ideally be differentiated. Standard (i.e. often used) services can be offered against a moderate monthly fee. Unusual services, offered on specific customer request or to select groups, can on the other hand involve a “pay per use” fee.

Cooperation, for instance in the offering of news, weather reports etc., along with financial information, is not expected to take place as banks would not like to – and justifiably so – get distracted from their core business. Moreover, combining non-banking services with Mobile Banking might offend prospective customers because customers generally associate banks with serious business. Preservation and nurturing of this precious asset “image” is therefore of paramount importance.

As far as mediums of Mobile Banking are concerned, banks might decide to go for browser-based solutions owing to simpler maintenance and larger customer demand. The niche group of those customers who prefer client-solutions can be served by cooperation with specialised, external providers. This way banks can offer a complete spectrum of services to different clientele.

Summarising, Mobile Banking seems to possess the potential to become one of the widely spread and accepted applications in the field of Mobile Commerce, particularly in the backdrop of its high acceptance across various commercially important sections of the society.

The next few years promise to be very interesting even as we observe whether a “Mobile Commerce / Mobile Banking” era can unfold itself on the lines of “Electronic Commerce / Electronic Banking”.

Be as it may; we can predict with a high degree of certainty that the future of Mobile Banking and Mobile Commerce is intertwined in many respects and that Mobile Banking is all set to play a central role for the future of Mobile Commerce.

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Appendix-A

List of Participant Banks and Interview Partners

Following is a list of banks as well as of external experts that were interviewed either with the help of a written questionnaire or in a telephone/personal interview.

The authors would like to thank all concerned for their cooperation, friendliness and valuable inputs. The list is sorted in alphabetical, ascending order.

Banks

1822direkt, Frankfurt, telephone interview, Produktmanager *Vertriebssteuerung & Produktmanagement*, 24.08.2005.

Baden-Württembergische Vereinsbank Stuttgart, written information, Referentin *Elektronische Vertriebswege*, 29.08.2005.

Bayerische Hypo- und Vereinsbank AG (HVB), München, written information, Systemverantwortlicher *Online Banking*, 26.08.2005.

Citibank Privatkunden AG & Co. KGaA, Düsseldorf, written information, Projektmanager *Internet Solutions*, 29.08.2005.

Comdirect Bank AG, Quickborn, written information, Gruppenleiter *Produktmanagement*, 26.08.2005.

Credit Suisse (Privatkunden Schweiz), Zürich, written information, Product Manager, *Mobile*, 22.09.2005.

Deutsche Bank Privat- und Geschäftskunden AG, Frankfurt, written information, Leiter *Online-Operations Management & Online Banking*, 05.09.2005.

Deutsche Postbank AG (Postbank), Bonn, written information and telephone interview, Product Manager *Geschäftsbereich Direktvertrieb, Abteilung eFinance Retail*, 01.09.2005.

Dresdner Bank AG, Frankfurt, telephone interview, *Abteilungsleiter Unternehmensbereich Personal Banking, Bereich Internet Banking, Sales & Brokerage Services*, 29.08.2005.

Hamburger Sparkasse (Haspa), Hamburg, written information and personal interviews, *Leiter Multikanalstrategie und Medialer Vertrieb, Produktmanager Mobile Banking*, 24.08.2005 and 02.09.2005.

Sparda-Bank Hamburg eG (Sparda-Bank), Hamburg, written information, *Leiter Neue Medien / Internet Service / Promotion*, 05.09.2005.

Sparkassen Broker, Wiesbaden, telephone interview, *Projektleiter i-mode*, 23.08.2005.

Sparkassen Direkt, Halle, telephone interview, *Bereichsleiter Organisation*, 22.08.2005.

Sparkasse KölnBonn, Köln, written information and telephone interview, *Referent Online Banking*, 19.08.2005.

UBS (Privatkunden Schweiz), Zürich, telephone interview, *Project Manager Client Workbench*, 24.08.2005.

Volksbank Hamburg, Hamburg, telephone interview, *Abteilungsleiterin Marketing*, 25.08.2005.

Non-Bank Experts

Dr. Gerald Junkermann, Senior Vice President *Business Development*, Meridea Financial Software Ltd., Helsinki, telephone interview, 12.09.2005.

Mr. Werner Karsch, Editor, *die bank*, Berlin, telephone interview, 12.09.2005.

Mr. Sascha Langfus, Director *Partner Sales*, Sevenval AG, Köln, telephone interview, 29.08.2005.

Mr. Clément Mengue, Senior Consultant *Banking & IT Management*, Deloitte Consulting, Düsseldorf, electronic correspondence, 01.06.2005.

Mr. Marcel Pirlich, Manager *Partnering & Content*, E-Plus Mobilfunk GmbH & Co. KG, Düsseldorf, telephone interview, 29.08.2005.

Appendix-B

List of German Banks Surveyed During 2nd Tier Research

Following is a list of German banks whose product portfolio was examined during second-tier research, as described in chapter 7. The list also entails an overview of employed mediums of Mobile Banking (Status: June 2005).

A cross (“x”) in a column means that some of the Mobile Banking services are offered by the bank using the type of technology described in that column. It does NOT contain any information about the scope of the offered services.

No.	Bank	Browser based	Messaging based	Client based
1	1822direkt	x		
2	BHF Bank			
3	Citibank		x	
4	Comdirekt Bank	x		
5	Commerzbank			x
6	Deutsche Bank			x
7	Dresdner Bank			
8	Fimatex	x		
9	Frankfurter Sparkasse (FRASPA)			x
10	Hamburger Sparkasse (HASPA)		x	
11	HSH Nordbank AG			
12	Hypo-Vereinsbank			x
13	ING DiBa	x		
14	LBBW			
15	Netbank		x	x
16	Norisbank		x	
17	Postbank	x		
18	Sparda-Bank Hamburg	x	x	
19	Sparkasse Chemnitz	x		
20	Sparkasse Goslar/Harz	x	x	
21	Sparkasse Harburg-Buxtehude			x
22	Sparkasse KölnBonn	x		x
23	Sparkassen Broker	x		
24	Stadtsparkasse München	x		
25	Volksbanken Raiffeisenbanken	x		

Table 33: List of German banks surveyed during 2nd-tier research

Appendix-C

List of International Banks Surveyed During 2nd Tier Research

Following is a list of international banks whose product portfolio was examined during second-tier research, as described in chapter 7. The list also entails an overview of employed mediums of Mobile Banking (Status: June 2005).

A cross (“x”) in a column means that some of the Mobile Banking services are offered by the bank using the type of technology described in that column. It does NOT contain any information about the scope of the offered services. Further, even though utmost care has been taken during research, certain errors in case of banks from non-English and non-German speaking countries cannot be ruled out completely.

No.	Bank	Country	Browser based	Messaging based	Client based
1	Banca Intesa	Italy		x	
2	Bank of Japan	Japan	x		
3	Bank of Punjab	India		x	
4	Bank of the Philip-pines Islands	Philippines	x		
5	BankDirect	New Zealand	x		
6	Barclays Bank	UK			
7	Citibank	Australia	x		
8	Citibank	Philippines		x	x
9	Citibank	UK			
10	Citibank	USA		x	
11	Credit Suisse	Switzerland	x		
12	Dexia Bank	Belgium		x	
13	First Direct	UK		x	
14	Garanti Bank	Turkey		x	
15	HDFC Bank	India	x	x	
16	ICBC	China		x	
17	ICICI Bank	India		x	
18	IDBI Bank	India	x	x	
19	ING Postbank	Netherlands		x	
20	Kookmin Bank	South Korea		x	
21	Maybank	Singapore	x		
22	Nordea	Finland	x	x	
23	Société Générale	France	x	x	
24	Standard & Chartered Bank	UK			
25	UBS	Switzerland	x	x	

Table 34: List of international banks surveyed during 2nd-tier research

Appendix-D

German-English Terminological Equivalents Used

Following is the list of some important German language terms relevant to this study and their English language equivalents, as used in this study.

<i>Angestellte</i>	Salaried class (including in the public sector)
<i>Beamte</i>	Government employees (generally with employment guarantees till reaching retirement age)
<i>Dauerauftrag</i>	Standing order
<i>Depotführung</i>	Brokerage
<i>Geschäftsführung</i>	Top management
<i>Großbank/en</i>	Big bank/s (the term used by the Bundesbank to refer to Germany's five largest banks)
<i>Kontoführung</i>	Accounting
<i>Kontostandabfrage</i>	Balance enquiry
<i>Kontoumsatzabfrage</i>	List of transactions (statement of account)
<i>Kreditgenossenschaftsbank</i>	Cooperative bank
<i>Selbständige</i>	Self-employed
<i>Sparkasse/n</i>	Savings bank/s
<i>Staborganisation</i>	Staff organisation
<i>Überweisung</i>	Remittance / money transfer

Appendix-E

Background Paper on German Banking Sector

In order to undertake a context-sensitive assessment of situation specific to the German banking sector it is imperative to have at least a brief overview of the composition of the banking sector in Germany, so that meaningful recommendations can be derived from the survey results.

Germany's banking system consists of a large number of credit institutions. At the year-end 2004, there were 2,400 credit institutions in Germany, running a network of 45,467 full-fledged branches [Bundesbank, 2005b, p. 129].⁹⁶

The following table shows the contrast in the number of credit institutions with an obligation to maintain minimum reserves with the European Central Bank (ECB) in selected European countries at the year-end 2004 [ECB, 2005, p. ix].

Germany	France	Italy	Netherlands	Spain
2,148	897	787	461	346

Table 35: Credit institutions with minimum reserve obligation to ECB

The German banking sector is obviously fragmented and, almost necessarily, consists of a large number of small players. Often described as a three-pillar system (“*Drei-Säulen-Modell*”)⁹⁷ it can be divided into three main categories:⁹⁸

⁹⁶ This network included the *Postbank AG*, the erstwhile banking-related business of the German Postal Department (*Deutsche Post*) and now organised as a legally independent, publicly listed subsidiary with the *Deutsche Post* as major shareholder. Its branches are usually located in the same office spaces as those of the *Deutsche Post*.

⁹⁷ There are banks, however, that are assigned to an extra category “others”.

⁹⁸ See for this complete section [Brunner et al., 2004, pp. 2-6] unless specified otherwise.

Public sector banks

The public sector banks comprise of savings banks (“Sparkassen”), organised on a regional basis, and their head institutions known as “Landesbanken”, usually organised on a provincial basis.⁹⁹ The development banks (e.g. “Landesbausparkassen”) also belong to this group. The public sector banks control almost half of the banking market in Germany. The *Sparkassen* and *Landesbanken* control over two third of this share. The public sector banks are expected to promote the economic development of their respective regions e.g. by financing viable business plans and subsidising local public goods. They therefore do not follow the objective of profit maximisation and are allowed to operate only within the geographic region of their owner, usually a municipality. The competition amongst *Sparkassen* is for this reason virtually non-existent. The *Sparkassen*, which are required by law to open a current account (giro account) for anyone interested, enjoy state guarantees in return. The state carries a liability obligation (“*Gewährträgerhaftung*”) as well as a maintenance obligation (“*Anstaltslast*”). So that public sector banks carry virtually no risk of default. However, state guarantees are now being phased out due to sustained pressure from the EU that regards them as a distortion of competition. Obligations entered into after 18th July 2005, thus, do not enjoy outright state guarantees. The state however retains the ownership of these banks and may step in to save a bank from defaulting, subject to approval from relevant competition authorities of the EU. There were 477 *Sparkassen* and 12 *Landesbanken* in Germany at the year-end 2004 [Bundesbank, 2005a, p. 104]

Cooperatives

The cooperatives usually adhere to regional principle but are not required to do so. They are often the main, sometimes the only, competitors of the *Sparkassen* in small towns and rural areas that are not lucrative enough for private sector commercial banks. Cooperatives are owned by their members, whereby each member can only own a certain amount of shares. Also

⁹⁹ In recent years, there have been instances of mergers amongst “Landesbanken” (e.g. *Hamburgische Landesbank* and *Landesbank Schleswig-Holstein* have merged into a new entity called *HSH Nordbank*).

cooperatives do not work for profit maximisation. The main source of their funding are retained earnings and equity contributions from new members. There were 1,338 cooperative banks and their 2 head institutions at the year-end 2004 [Bundesbank, 2005a, p. 104].

Commercial banks

At the year-end 2004, the third pillar of Germany's banking sector comprised of 357 private sector commercial banks that included 5 large domestic banks that are referred to as "big banks" ("Großbanken")¹⁰⁰, 128 foreign banks with branches in Germany and 224 other domestic, smaller sized banks [Bundesbank, 2005b, p. 4]. The private sector commercial banks operate on the principles of free-market economy and have no restrictions on their area of operations. They do not enjoy state guarantees and are obliged to maintain statutory minimum reserves with the ECB.

Main characteristics of the German Banking Sector

In the following, we discuss some main characteristics of the German banking sector in order to identify the challenges facing it.

Pressure to consolidate: The banking sector in Germany has seen a decline in the number of credit institutions from 2697 in the year 2001 to 2400 in the year 2004 [Bundesbank, 2005b, p. 104; Brunner et al., 2004, p. 2]. Banks are under tremendous pressure to consolidate [Karsch, 2005, pp. 1-2]. They are even being encouraged by the government to actively look for mergers within national boundaries to avoid hostile takeovers by foreign banks, see e.g. [Hulverscheidt/Hönighaus, 2003, p. 1; Krosta, 2003, p. 1]. Even public sector banks are now planning to coordinate their moves in order to better protect themselves against commercial banks and to follow aggressive market-strategies [Schmid et al., 2005, p. 23]. The competition is at the same time, however, seriously distorted since there is little or no competition within the public sector and cooperative segments as of now.

¹⁰⁰ The "big banks" are *Deutsche Bank AG*, *Bayerische Hypo- und Vereinsbank AG*, *Dresdner Bank AG*, *Commerzbank AG* and *Deutsche Postbank AG*. *Deutsche Postbank AG* was included in this category in December 2004 [Bundesbank, 2005a, p. 104].

Increased competition from foreign banks: The number of active foreign banks in Germany increased from 79 in the year 2001 to 128 in the year 2004 [Bundesbank, 2005b, p. 104; Brunner et al., 2004, p. 2] Hence it may be assumed that foreign banks regard Germany as an important and/or attractive market. The recent takeover of *Bayerische Hypo- und Vereinsbank AG* by *Unicredit* of Italy is a proof for an increased interest of foreign banks. The ongoing globalisation and the integration of the EU are expected to further intensify this trend.

Relative low profitability: The profitability of German banks across all pillars of the banking system is relatively low in comparison to other developed countries [KfW Research, 2005, p. 1; Brunner et al., 2004, p. 8]. The profitability has fallen over recent years which might be partially explained by increased competition. Brunner et al. [2004, p. 30] suggest that the low level of profitability is caused, among others, by a weak revenue-to-asset and a high cost-to-asset ratio, existence of a large public sector for which profit maximisation is not the primary objective and finally a lower proportion of high-value-added activities.

High productivity and customer satisfaction: German banks are regarded to work efficiently. Their productivity growth is higher than in most other sectors of the German economy. In international average, only Japan amongst developed countries is reported to exceed productivity gains of German banks [KfW Research, 2005, p. 13]. A flip side of the low profitability seems to be cheaper services for the customers [Brunner et al., 2004, p. 30]. Over 85% of Germans are reported to be satisfied with the services of their bank and 79% welcome their technological innovativeness [Die Bank, 2005, p. 1].

Growing role of direct banks and other institutions: Direct banks communicate with their customers via phone, Internet or other such mediums without maintaining branches or offering advisory services. Since a significant number of bank customers is, meanwhile, able to make use of the Internet to get information and carry out transactions, direct banks can indulge in a price-oriented competition. The growing clout of direct banks can be gauged from the fact that *ING DiBa*, the largest direct bank in Germany, meanwhile boasts of a customer base of 4.4 million, comparable to the 5 million customer base of *Dresdner Bank*, the third largest commercial bank in Germany [Maier et al., 2005, p. 1]. Such developments are causing

alarm in the banking sector. Though some commercial banks run their own direct bank subsidiaries, the public sector banks had until now by and large refrained from this form of banking and as a result lost a considerable market share to direct banks [SZ, 2005, p. 1]. Some Landesbanken, e.g. *Bayrische Ladensbank* and *Landesbank Hessen Thüringen*, have begun to set up or acquire direct bank subsidiaries that operate without geographic restrictions [Einecke, 2005, p. 26]. If this trend continues, it would ignite competition within the segment of public sector banks. Additionally, there is an ever-increasing number of other financial institutions specialising in niche products. They provide brokerage and other investment services designed to suit the special needs of particular customer groups.

Growing competition to win retail customers: Many commercial banks in Germany had reduced their retail activities (“Privatkundengeschäft”) in the boom years of the late 1990’s, in order to concentrate on the corporate sector. The subsequent economic downturn and the resultant decline in the business volume have forced banks to increasingly look towards private customers once ignored. *Dresdner Bank*, for instance, announced in May 2005 an offensive price war to win back private customers [Maier et al., 2005, p. 1].

The above discussion shows that the banking sector in Germany can be characterised as one with a significant amount of inter-pillar competition. The intra-pillar competition is expected to grow further owing to sinking state influence and the increasing role of direct banks and other financial institutions. The banking sector is already working efficiently so that there is little scope of further cost-cutting without consolidation. The consolidation process is however hampered by political and regional interests on the one hand and the rigid three-pillar system on the other.

In this situation banks are more than ever forced to win and retain retail, private customers and animating them to avail of more financial services. For this purpose they need to employ innovative strategies while finding ways to cross-sell their products in order to increase revenues.

Appendix-F

Questionnaire “Customer Survey”

This appendix contains an English-language version of the questionnaire (from page 168 to page 170) used for conducting the customer survey.



Survey of the utility of mobile financial services

Mobile Banking – carrying out bank business with the help of mobile devices, such as mobile phones and PDAs – is gaining increasing relevance for banks in Germany, particularly in respect to customer relations management (CRM). The University of Hamburg is conducting a study to assess which applications and services are cherished by customers and the extent to which customers are willing to pay for them.

Your kind support is essential to find plausible and convincing answers to these questions. We request you to take a few minutes to answer this questionnaire.

Your kind support is deeply appreciated.

- General information:** male female
- 18-20 years 21-30 years 31-40 years 41-50 years ≥ 51 years
- student salaried employee govt. employee top management self-employed other

Monthly net income: ≤ € 1000 € 1001 - 2500 € 2501 - 4000 > € 4000

Do you use Online Banking? * yes no (* directly via website of your bank)

Do you use Home Banking? ** yes no (** with the help of a special software, e.g. StarMoney)

Do you own a mobile phone? yes no

 ... if yes, how old is your mobile phone? ≤ 2 years > 2 years

Do you own a PDA or a comparable device (e.g. Smartphone) yes no

 ... if not, are you planning to purchase such a device? yes no

With which bank group(s) do you maintain a bank account? (multiple choices possible)

<i>Bank group</i>	<i>Account</i>
Big bank (e.g. Commerzbank or Deutsche Bank)	<input type="checkbox"/>
Direct bank (e.g. Advance Bank or comdirect)	<input type="checkbox"/>
Savings bank / "Landesbank"	<input type="checkbox"/>
Cooperative bank (Volksbanken, Raiffeisenbanken)	<input type="checkbox"/>
Other banks (e.g. private banks or automotive banks)	<input type="checkbox"/>
I do not own a bank account!	<input type="checkbox"/>

Does your bank offer Mobile Banking“? yes no do not know

 ... If not, would you be interested in such an offer of your bank? yes no

Have you ever utilised mobile financial services? yes no

 ... If yes, do you still use these services? no regularly rarely

What are, in your opinion, the advantages of Mobile Banking? (multiple choices possible)

- ubiquitous (“anywhere, anytime”) conducting of bank business
- fast reaction to market developments (e.g. in case of turbulences in stock market)
- overview over bank account/s (e.g. SMS alerts for large transactions)
- nothing
- other/s (please specify:

What are, in your opinion, the disadvantages of Mobile Banking? (multiple choices possible)

- security concerns / risks
- complicated / uncomfortable usage of mobile devices
- too expensive
- nothing
- other/s (please specify:

What could, in your opinion, make Mobile Banking more attractive? (multiple choices possible)

- mobile devices with bigger display
- better input devices (e.g. an external keyboard for mobile phones)
- higher speed of data transmission
- cheaper costs of utilisation
- other/s (please specify:

Which of the following mobile services could you conceive to use? (multiple choices possible)

- Mobile Accounting
- Mobile Brokerage
- Mobile Financial Information
- None

Which of the following mediums of Mobile Banking would you prefer to use? (multiple choices possible)

- SMS
- Internet access via in-built, standard browser (as in Online Banking with PC)
- Client software, installable on the mobile device (as in Home Banking with PC)
- No preference

Can you conceive to switch to a bank offering mobile financial services:

- ... in case it offers you better conditions (e.g. cheaper) than your current bank?** yes no
- ... in case your current bank neither offers nor plans to offer mobile services?** yes no

Main part:

The table on the next page contains a list of possible services in the field of Mobile Banking. Please evaluate the utility of each service from you personal perspective. (Please proceed for the evaluation to next page; navigating in **each row, from left to right**).

Possible mobile services	Utility/Enthusiasm						Willingness to pay			
	(Scale of the perceived utility: 1 = very much willing; 2 = willing; 3 = unsure / rather willing; 4 = unsure / rather unwilling; 5 = unwilling; 6 = not at all)						None	Monthly fee (see below)	„Pay per Use“ (payment for each transaction)	
	1	2	3	4	5	6			up to € 0,25	up to € 0,50
a) Mobile Accounting										
Money transfer / remittances	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Standing orders for bill payments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Subscribing standard insurance policies (e.g. travel insurance)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access administration (e.g. ordering new PIN/TAN)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Card management (e.g. blocking lost cards)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Mobile Brokerage										
Selling & purchasing financial instruments (e.g. stocks and securities)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Order book administration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Access administration (e.g. ordering new PIN/TAN)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) Mobile Financial Information										
Balance enquiries and statement requests (all types of accounts)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Transaction thresholds (SMS alert for predefined transactions)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Balance threshold (SMS alert on reaching a predefined level)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stock market thresholds (SMS alerts for stock prices)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Enquiry of branch and ATM locations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information on the completion status of an order	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stock market enquiries and reports	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exchange rate and interest rate enquiries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Product information, current offers and conditions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other/s?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Which monthly fee would you be willing to pay for services that you just selected with this option?

none below € 3 between € 3 and 5 between € 5 and 10 above € 10

Would you accept advertisements (e.g. via SMS) in order to get free-of-charge mobile services?

yes no

Appendix-G

Questionnaire “Bank Survey”

This is a translated copy of the original German language questionnaire (from page 172 to page 176) used for the bank survey.



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**Research Project: The Mobile Commerce Prospects
A strategic Analysis of Opportunities in the German Banking Sector**

http://www.rrz.uni-hamburg.de/m-commerce/banking/index_e.html

August 2005

Dear Sirs,

Mobile Banking – conducting of bank business and utilisation of financial services via mobile devices, e.g. mobile phones or PDAs – is gaining increasing popularity and acceptance in today's banking world, particularly as a means to strengthen customer relations and services. The University of Hamburg is conducting a research project to survey the potential of mobile services and their utility for the customer as well as for the banks in order to measure the strategic importance of Mobile Banking, if any, from the banks' perspective.

This study is being conducted on two planes. The first plane is built by an in-depth analysis of universal challenges and opportunities arising out of Mobile Banking. The second plane deals with the consequences of these challenges and opportunities for the German banking sector. For this purpose we are surveying 25 renowned, international banks, along with a similar number of banks from Germany. In order to achieve meaningful results, we need your valuable assistance and cooperation. Therefore, we request you to spare us approx. 15 minutes to answer this questionnaire and to fax it back to us on the no. mentioned above. Any data provided shall be used confidentially and only in anonymous form. The findings of the study shall be made available to all survey participants interested in them.

We thank you sincerely for your kind cooperation and support.

General information about the participating bank (domestic business) & the answering person

Bank / City / Country _____

Bank category

- "Big" bank (e.g. Deutsche Bank or Citibank) Direct bank
 Public sector bank Cooperative bank Other

No. of retail customers

- <= 100.000 <= 500.000 <= 1.000.000 <= 5.000.000 > 5.000.000

Your position _____

How many of your retail customers make use of online banking* (in %)? ____ (* directly via bank website)

How many of your retail customers make use of home banking (in %)?** ____ (** using a client software)

Do you offer Mobile Banking?

- Yes**, for past _____ (year/s or month/s)

If yes, how many of your retail customers make use of this channel (in %): _____

- No**, but we intend to offer Mobile Banking in _____

- No**, we do not intend to offer Mobile Banking

If you neither offer nor intend to offer Mobile Banking, please proceed directly to question no. 13 (p. 4)!!

Do your Mobile Banking services attract additional charges for the customer?

- Yes**: i) a monthly fee of _____ € ii) pay per use _____ €

- Currently not, but planned**: i) a monthly fee of _____ € ii) pay per use _____ €

- No, also not planned**

Questions regarding Mobile Banking

- 1) **Which of the following mobile financial services are offered or planned by your bank? Are there services that you think are unsuitable for Mobile Banking?** (If a service is neither offered nor planned but still considered to be suitable then please leave the corresponding fields blank)

Mobile Service / Application	Available	Planned	Unsuitable
a) Mobile Accounting			
Money transfer / remittance			
Administering standing orders for bill payments			
Subscribing standard insurance policies (e.g. travel insurance)			
Access administration (e.g. ordering new PIN/TAN)			
Card management (e.g. blocking credit/debit cards in case of loss)			
b) Mobile Brokerage			
Selling & purchasing financial instruments (e.g. stocks)			
Administering order book			
Access administration (e.g. ordering new PIN/TAN)			
c) Mobile Financial Information			
Balance inquiries & statements of account (for all types of accounts)			
Information per SMS for transaction thresholds			
Information per SMS for balance thresholds			
Information per SMS for stock price thresholds			
Branches & ATM locations			
Status confirmation after execution of an order			
Stock market quotes, bourse reports and commodity prices			
Foreign exchange rates and interest rates information			
Product information, conditions and offers			
Other/s (please specify)			

- 2) **Which of the three possible mediums of Mobile Banking do you offer, or intend to offer, your customers?**
- Messaging-based applications (e.g. via SMS)
 - Browser-based applications (direct access to Internet via mobile phone or PDA)
 - Client-based applications (special software installed on the mobile device)
- 3) **SMS is internationally often used as a medium to conduct transactions in Mobile Banking. It has however so far failed to generate the same level of interest in Germany. Are there in your opinion certain drawbacks of SMS when used as a medium for Mobile Banking?**
- Complicated usage (learning & typing of relevant commands)
 - Security concerns
 - Other/s (please specify) _____

- 4) **How do you rate “SMS Toolkit” (STK), the hybrid System containing elements of both messaging- and client-based applications?**
- Positive, while no need for learning and typing commands unlike with SMS
 - Negative, while similar security concerns as with SMS
 - Positive / Negative, while _____
- 5) **Can client-based Mobile Banking applications, in your opinion, generate a better customer response than applications based on messaging (SMS) or browsers (WAP, i-mode)?**
- Yes, while it requires less time and effort to operate locally installed software
 - Yes, while offline preparation of transactions reduces online charges
 - Yes, while client software generally provides better security and encryption techniques
 - No, while the installation process acts as an inhibition for many customers
 - Yes / No, while _____
- 6) **The PDA-based “Mobile” Banking may be referred to as *online banking in mini format*. Do you think that this concept may prove to be a success story?**
- Yes, while our target customer groups have a high ownership rate of PDAs
 - Yes, while PDAs are expected to substantially increase market penetrance
 - No, while the market penetrance of PDAs is too low to be successful
 - Yes / No, while _____

7) **What are your objectives for offering Mobile Banking?**

(Please answer only if you are either already offering or planning to offer mobile services.)

(1 = Very high significance up to 6 = without any significance)

	Significance					
	1	2	3	4	5	6
Fostering an innovative image						
Better customer relations management						
Attracting new customers						
Differentiation vis-à-vis rivals						
Increased efficiency of the workflow						
Cost reduction						
Increase in the turn-over						
Increased motivation of the workforce						
Higher flexibility in business processes						
Other/s (please specify)						

8) **Which customer groups are in your opinion particularly relevant for Mobile Banking?**

- Students Business professionals Higher management / self-employed High income groups
- Technology fans Other/s (please specify) _____

9) **An increasing number of banks is now offering Mobile Banking. Many, however, refrain from advertising them. What in your opinion could be the reason for this reserved attitude?**

- High operative costs per user owing to altogether low utilisation by customers
- Security concerns due to unripe technologies
- Banks wish to first carefully test the customer response
- Other/s (please specify) _____

10) **Banks in Germany often restrict their Mobile Banking offers to certain services of informational nature. Why would a bank, in your opinion, make limited offers in this field?**

- Low costs of information services (compared to transaction services e.g. accounting or brokerage)
- Security-related concerns in mobile transaction services
- Greater customer demand for mobile information services
- Other/s (please specify) _____

11) **Did your firm enter into an alliance or cooperation in order to develop/offer mobile services?**

↑ **Yes**, with firm(s) from following branches

- IT Telecommunication Banks Business consultancy Others

↑ **No**, but cooperation/alliances are planned with firm(s) from following branches

- IT Telecommunication Banks Business consultancy Others

↑ **No**, cooperation or alliances are not planned

12) **Who is responsible for coordinating your Mobile Banking activities?**

- Independent section/department Inter-disciplinary Team Subsidiary
- Other/s (please specify) _____

13) **Why did your bank decide against launching/retaining Mobile Banking?** (Please answer only if you are currently neither offering nor planning to offer mobile services!!)

(1 = Very high significance up to 6 = without any significance)

	Significance					
	1	2	3	4	5	6
Our products are not suitable for mobile mediums						
Mobile Banking has no significant utility for our customers						
Mobile Banking collides with classic channels of distribution						
Security concerns e.g. for transactions (unripe technology)						
Compatibility problems with existing IT infrastructure						
Lack of interest at the level of top management						
Lack of necessary internal expertise						
Prohibitively high costs of entry / operation						
Lack of customer demand / acceptance						
Others (please specify):						

14) How do you evaluate the following hypotheses regarding Mobile Banking?

(1 = I agree completely, 2 = I agree, 3 = not sure / probably yes, 4 = not sure / probably no, 5 = I disagree, 6 = I disagree completely)

	1	2	3	4	5	6
Mobile Banking is nothing more than a short-term phenomenon!						
Mobile Banking activities of rivals are forcing banks to develop own strategies in this field!						
Mobile Banking activities help banks to differentiate themselves vis-à-vis other rivals!						
Mobile Banking will increase the degree of rivalry amongst banks!						
Mobile Banking is <u>nothing more</u> than a new distribution channel!						
Mobile Banking will increase the threat of entry by external players (e.g. network carriers)!						
Mobile Banking requires firms to forge alliances and cooperate!						
Mobile Banking provides additional value vis-à-vis online banking!						
Mobile Banking will adversely affect the no. of branches & employees!						

15) Would you be willing to grant us a (telephone) interview, if thought to be needed?

yes no

Please let us know your name and the preferred method of contact, if you wish to receive a copy of the results of this study.

Mr./Ms./Mrs. _____

Address _____

Telephone: _____ (preferred calling time: _____)

Fax: _____ E-Mail: _____

We thank you sincerely for your participation in this survey. Should there be any questions regarding this study, please feel free to contact:

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Mobile Commerce has gained increasing acceptance amongst various sections of the society in previous years. The reasons for its growth can be traced back to technological and demographical developments that have influenced many aspects of the socio-cultural behaviour in today's world. The need (and/or wish) for mobility seems to be the driving force behind Mobile Commerce. The launch of UMTS technology has provided Mobile Commerce with the necessary verve.

Mobile Banking presents an opportunity for banks to retain their existing, technology-savvy customer base by offering value-added, innovative services and to attract new customers from corresponding sections of the society. The customer survey provides evidence that such sections in the meanwhile include the affluent and financially relevant groups of the society in Germany. The time seems to be ripe to convert this non-negligible customer interest into business-driving customer demand. A proactive attitude on the part of the banks seems to be therefore recommendable.

Many banks in Germany have come to regard Mobile Banking as a necessary tool for thwarting negative differentiation vis-à-vis rivals and to foster/retain an innovative image. This self-reinforcing dynamism is expected to gain currency in near-future so that Mobile Banking services could soon advance to a standard product – on the lines of Online Banking – offered by more or less each and every bank.

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