Critical Investigation of the Mobile Information Technology Expert's Perspective on the Impact of the Mobile Application Development within the German Financial Market and Service Industry

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II. Abstract

Just as the Internet did before, mobile information technology (IT) is radically changing the way we interact with the world. Already there have been many innovative applications of this technology based on the unique attributes of mobiles. IT companies and IT service providers rely on meaningful and provable information about the influence of technical possibilities and the views of IT experts on consumer needs.

The purpose and objectives of this research are to investigate the influence of mobile IT solution design and architecture on consumer behaviour related to a specific business area – the German financial market and services industry. The main research question was: "What shapes the development of mobile IT applications?" In this research, the focus was on the technical context; that means the key drivers of the technological development, as they are named (in alphabetical order): efficiency, engagement, flexibility, security, simplicity, and visibility. The literature review identified the factors influencing technology development and related these to the consumer behaviour theory.

The research methodology is based on the phenomenological approach in which the 'lived' experiences were described from the perspectives of interviewees'. Qualitative data were gathered related to the key drivers to understand what kind of influence factors are taking effect. Based on the assumption that IT experts will provide essential and significant inputs regarding the technical aspects, 18 semi-structured interviews were conducted. From the in-depth expert interviews, the key elements (variables) were determined and a conceptual framework was evolved with respect to literature and with the aim of answering the research question.

Based on the findings from field data, the framework forms a foundation for a retrospective analysis to study the influence factors and to emerge remarkably consistent patterns that influence the development of mobile solutions. Furthermore, the proposed framework provides the basis to describe the effect of technological development on an existing information system theory.

The thesis closes the gap left by the lack of a technical point of view in recent literature. This research identified consumer opinions and behaviours from the perspective of IT experts with regard to the perceived values and usability of mobile IT. The contribution to practice is that this study will bring together the technical viewpoint and the viewpoints of consumers. In addition, this study will provide a set of recommendations to clarify interactions between the architecture and design of mobile IT and the consumer behaviour.

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List of Abbreviation

1G ..... First Generation
2,5G ..... Second half Generation
2G ..... Second Generation
3G ..... Third Generation
3GPP ..... Third Generation Partnership Project
4G ..... Fourth Generation
5G ..... Fifth Generation
App/s ..... Application/s
ATM ..... Automatic Teller Machine/Cash terminal
BGB ..... German Civil Code (Bürgerliches Gesetzbuch)
BayernLB ..... Bayerische Landesbank
C-suite executives ..... Top senior executives
CAQDAS ..... Computer Assisted Qualitative Data Analysis Software
CEO ..... Chief Executive Officer
CIO ..... Chief Information Officer
CMO ..... Chief Marketing Officer
CTO ..... Chief Technical Officer
CV ..... Curriculum vitae
CxO ..... C-suite executives
D-A-CH ..... Deutschland, Austria, Confoederatio Helvetica
DBA ..... Doctor of Business Administration
DIN ..... German Institute for Standardization (Deutsches Institut für Normung)
DoI ..... Diffusion of Innovation
DTPB ..... Decomposed theory of planned behaviour
EDGE ..... Enhanced Data rates in GSM Environment
FDMA ..... Frequency Division Multiple Access
FM ..... Financial Market(s)
FM/S ..... Financial Market and Services
FX ..... Foreign Exchange
GBS ..... Global Business Services
GPRS ..... General Packet Radio Service
GSM ..... Global System Mobile service
GTS ..... Global Technology Services
GUI ..... Graphic User Interface
HCI ..... Human Computer Interaction/Interface
Helaba ..... Landesbank Hessen-Thüringen
IDT ..... Innovation Diffusion Theory
IMT ..... International Mobile Telecommunication
IP ..... Internet Protocol
IS ..... Information Service/System
IT ..... Information Technology
ITU ..... International Telecommunication Union
LBBW ..... Landesbank Baden-Württemberg

LTE ..... Long Term Evolution
MiFID ..... Markets in Financial Instruments Directive
MM ..... Money Market
NordLB ..... Norddeutsche Landesbank
OFDM ..... Orthogonal frequency division multiplexing
OTC ..... Over-the-counter
PC ..... Personal Computer
RI ..... Research Integrity
RQ ..... Research Question
SCT ..... Social Cognitive Theory
SLT ..... Structure Laying Technique
SSEM ..... Small-Scale Experimental Machine
STS ..... Software Technical Sales
TAM ..... Technical Acceptance Model
TPB ..... Theory of Planned Behaviour
TRA ..... Theory of Reasoned Action
UMTS ..... Universal Mobile Telecommunications System
UTAUT ..... Unified Theory of Acceptance and Use of Technology
UX ..... User experience
WAP ..... Wireless Application Protocol
WCDMA ..... Wideband Code Division Multiple Access
Wi-Fi ..... Wireless Fidelity
WLAN ..... Wireless network

1 INTRODUCTION

1.1 Introduction to the thesis

The overall goal of this study is to present a theoretically based, empirically grounded, and richly insightful framework that can be applied to the modern mobile application development to assist in building good mobile applications (also called 'apps') for consumers in the German Financial Market and Services (FM/S) industry. This study will firstly attempt to determine the factors influencing the key drivers of the technological development and will ultimately deliver an enhancement to an existing theory – the Technology Acceptance Model (TAM), which is an information systems theory that explains how users come to accept and use any technology (Davis, 1985) – to describe the relationship between the technological development and the consumers' expectations regarding a mobile application.

To address consumer needs, IT companies and IT service providers rely on meaningful and provable information about the influence of the technical possibilities and the views of IT experts on the consumer. Just as the Internet did a few decades back, mobile IT is radically changing the way we interact with the world. Everything, from how we transact with merchants, to how we educate our students, to how we entertain ourselves, is moving to mobile platforms with stunning speed. Many businesses, including the FM/S industry, are profoundly underestimating the full and lasting impact of this nascent revolution (IBM, July, 2014). Approximately ten times more smartphones and tablets are sold every day than babies are born (Meeker, 2014). The average person checks their smartphone 150 times a day, or nearly once every six minutes (Almanac, 2013). The market for wearable devices is projected to grow at least fivefold over the next four years (IDC Forecast, April 2015). The mobile transformation is evident all around us.

This chapter provides the background for this study and justifies the research question, the aim, objectives, scope, philosophy, and methodology used. It concludes with an assessment of the contribution to practice and finally provides a structure for the thesis. The topic under study in this research is named as follows:

1.2 Title

Critical Investigation of the Mobile Information Technology Expert's Perspective on the Impact of the Mobile Application Development within the German Financial Market and Service Industry.

1.3 Background to the study

It is indisputable that mobile IT has affected every aspect of our lives, personal and professional. For years already, there have been many innovative applications of the mobile IT technology: GPS devices that monitor driving habits and offer safe-driver insurance discounts; mobile payment systems in Africa; and location-based taxi-hailing applications in cities. These are just a few of the capabilities made possible by the unique attributes of mobile devices, which are portable, connected, personal, and intelligent. The use of mobile IT has taken customer experiences to an entirely new level. Researchers who have developed models for the mobile IT technology development have not yet considered the fact that mobile IT is much more than the application of a new channel through which an organization can transact with customers.

In this context, user acceptance is crucial to the success of new technologies, but it is difficult to predict the acceptance levels. User acceptance of new technologies that are not just incremental improvements on existing ones but cause remarkable changes in people's lives – the 'disruptive' technologies – is especially hard to predict because these technologies may take decades or longer to undergo the transition into everyday objects (Norman, 1998). However, some technologies (e.g., short message services on mobile phones) are quickly even without significant marketing.

The human-centred design approach (DIN, 1999) is already a commonly adopted solution to integrate user feedback into the design process. However, it is argued that human-centred design is focused on the design of individual products rather than information technology (Kaasinen, 2005).

The manner of designing intersections between, among others, mobile computing, social sciences, human-computer interactions, industrial design, and user experience design is called mobile interaction design. The term was coined by Bill Moggridge and Bill Verplank in the late 1980s, and it is about "designing interactive products to support the way people communicate and interact in their everyday and working lives" (Y. Rogers, Sharp, Preece, & Tepper, 2007, p. 8). More broadly, it is about "the design of everything that is both digital and interactive" (Moggridge & Atkinson, 2007, p. 660) with particular attention to its subjective and qualitative aspects. In other words, it is about creating life- and work-enhancing user experiences through the design, development, construction, and implementation of interactive products, devices, systems, and services.

Mobile interaction design as a variation of interaction design is concerned specifically with the creation of user experiences with interactive products, devices, systems, and services that are not stationary but that people can carry with them (Kjeldskov, 2013). With the emergence of more and more complex devices, the interaction design challenge revolved around developing new forms and shapes of devices and developing new types of applications for them. Today, the challenge of designing mobile interactions is mainly about the development of software applications (Kjeldskov, 2013).

Mobile interaction design is characterized by two different approaches to design: user-centred and technology-centred. A user-centred design is a design philosophy and overall methodological framework for conceiving interactive systems, which can be traced back to the "Design for People" (Dreyfuss, 1955). It is about designing interactive computer systems from the user's point of view emphasizing people rather than technology (Norman & Draper, 1986), and it does this by discovering unmet user needs and responding to these through design. In contrast to the user-centred approach,

the technology-driven design is about designing and building based on the possibilities provided by new technologies or by existing technologies in new combinations. Technology-driven designs are not solutions to problems expressed by users; instead, they are solutions to technical problems seeking possible application use (Kjeldskov, 2013).

Business and marketing research already have approaches where new technology is studied on a wider scale. The TAM (Davis, 1989) defines a framework to study user acceptance of new technologies based on perceived utility and perceived ease of use. Users perceive the characteristics of a technology in their own way, based for instance on the user's personal characteristics, attitudes, previous experiences, and social environment. The TAM has been evolved and applied widely, although mainly in the context of introducing ready-made products rather than in designing new technologies (van Heek, Schaar, Trevisan, Bosowski, & Ziefle, 2014).

In this dissertation, the focus is on the consumer behaviour of banking customers. Most customers in Germany are satisfied with the convenience of traditional banking services (Ernst & Young, 2014), but the expectations are constantly rising as new technologies and consumer behaviours develop. The technological advancement has challenged the providers of financial services. Financial institutions will be forced to deliver information and banking services via various electronic channels because the importance of traditional branch network has declined. Customer behaviours are changing and involves web, mobile, and social media (Ernst & Young, 2014).

Furthermore, this research will focus on the mobile channel because mobile banking is among the newest electronic delivery channels to be offered by banks. Innovations in mobile wireless communication have led to an extensive use of mobile devices in banking services and after business intelligence and analytics, the development of mobile solutions is of particular importance.

1.4 Justification and research question

Mobile IT strongly influences consumer behaviour; it is more complex than other types of information technology environments because it includes not only the hardware (mobile devices) and software (user interfaces and applications that run on these devices), but also the communication networks that make most of the mobile services possible (Jarvenpaa, Lang, Takeda, & Tuunainen, 2003).

This study addresses the gap in literature pertaining to the lack of a model that uses the technical context of mobile information technology for the German financial market. By applying survey-based studies, some researchers have argued that the characteristics of mobile services and/or applications are particularly relevant (Linck, Pousttchi, & Wiedemann, 2006). These studies indicated that consumers prefer simple, secure, and inexpensive services. Other researchers have aimed to develop a user-oriented classification of mobile IT solutions (Zmijewska, Lawrence, & Steele, 2004). They classify existing mobile applications and evaluate these applications based on a set of consumer-oriented criteria. Relevant classification dimensions include factors such as simplicity, security, and costs. To the best of my knowledge, there is no other study that analyses the acceptance of mobile IT by interviewing IT experts.

Furthermore, from the business perspective, the existing literature does not cover the link between the business requirements of the German FM/S industry and the technical feasibility of the mobile IT development. This dissertation looks beyond the consumer perspective and their applications and considers the full potential of mobile IT inside an enterprise. This is important because 84 percent of CIOs rated mobile solutions as a critical investment to get closer to customers (IBM, 2013a), whereas 94 percent of CMOs ranked mobile applications as crucial to their digital marketing plans. (IBM, 2013b).

This study critically investigates the perspective of the mobile IT experts to determine the impact on the mobile application development for the German FM/S industry. The researcher examined the perspective of mobile IT experts to show that mobile IT

development has influenced the development of mobile applications. The research focus is on the technical context; that means on building applications with highly intuitive visual interfaces and time, location, speed, temperature, and other situational dimensions embedded in the most appropriate form (smartphones, tablets, and wearables), which makes possible an anywhere-anytime environment.

The main research question is:

"What shapes the development of mobile IT applications?"

The supplementary research questions (RQs) are as follows:

- **RQ1**: How do mobile information technologies influence the engagement of companies for developing mobile solutions?
- **RQ2**: Has consumer behaviour significantly changed by using the latest user interface trends?
- **RQ3**: Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?
- **RQ4**: Does flexibility play a major role in the development of mobile applications?
- **RQ5**: What role does device management, data privacy, and security play in the development of mobile solutions?
- **RQ6**: How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?

The outcome of this research will empower IT companies and IT service providers to think about their mobile application development, especially the design and architecture of mobile applications to address industry-specific pain points, identify optimal user-acceptance preferences, and decrease mobile training costs. Furthermore, it will improve the mobile application deployment speed, quality, and consistency.

1.5 Aim and objectives of the research

The main aim of this study is to provide insights into why mobile IT is a game-changer across the German FM/S industry. The objective of this study is to identify the key drivers of technological development and analyse the factors that shape these key drivers in connection with the development of mobile IT solutions for the German FM/S industry. This research will explore the relationship between mobile IT and behaviours of consumers with the aim of enhancing the TAM to describe the relationship between technological development and the consumers' expectation regarding mobile applications.

In order to meet this aim, four objectives for the study were identified.

The first objective was to conduct a literature review on the topic. The literature review provides a solid foundation for the research. By conducting the literature review, the researcher identifies what is known and how it is known (Conrad & Serlin, 2011).

Literature review is an integral element of a research study. Ridley (2012) stated that the literature review provides

- historical background and current context for the study,
- relevant theories and concepts that underlie the research,
- terminology and definitions used in the literature, and
- supporting evidence and/or key findings (gaps) in literature that the research seeks to address.

In summary, the literature review considers the current knowledge (including substantive findings) and theoretical and methodological contributions. Furthermore, the literature review provides information about the study design and guides the choice of research questions and research method (H. Cooper, 2010; Marshall & Rossman, 2010).

The second objective was to conduct semi-structured expert interviews with professional mobile IT architects and specialists in a worldwide-acting IT company (IBM Corporation).

In the study, 18 IBM IT experts in the field of mobile IT development were interviewed by asking open questions related to the key drivers to gather the interviewee experience to gain a deep understanding of the mobile IT application design and its impact on consumer behaviour. The interview participants were determined by selecting IT experts from the IBM Mobile Center of Competence. The competence centre is a community within the IBM Corporation that helps to communicate and socialize the status of mobile web projects, services, and best practices. The competence centre is critical to interlock the vision and strategy for mobile IT solutions across the IBM Company. Within the competence centre community, the interviewees were selected by using the purposive sampling method based on their mobile IT knowledge. The key informant approach was also employed to identify participants. A key informant is a person who can provide detailed information based on expert knowledge in a particular field. Key informants were determined based on standard protocols for qualitative research, and were selected based on the possible insights they might have (John & Reve, 1982).

The semi-structured expert interview was geographically based in D-A-CH (Deutschland, Austria, Confoederatio Helvetica), which includes Germany, Austria, and Switzerland. The FM/S industry of the brand Global Business Services (GBS), which is responsible for application innovation and IT knowledge, was studied. The focus was on the key drivers of technological development based on the informants' profile (age, years of experience) and key skills. Furthermore, IT experts across the GBS brand are considered to have an outsider's view on the topic and to allow further innovation (M.B. Miles & Huberman, 1994; Yin, 2012).

The third objective was to evolve a conceptual framework and develop an enhancement to an existing information system theory.

This research investigates the interaction between technical features of services and the usage behaviour of consumers. This dissertation argues that information technology acceptance models are useful tools for understanding the behaviours of users for services, such as mobile banking applications. These models combine the aspects of various technologies and service goods from the perspective of behavioural sciences. From the research point of view, several theories have emerged to understand the user acceptance process; the best known theory is the TAM (Davis, 1985). The benefit of TAM is that it provides a framework by which the effect of external variables on system usage can be assessed. In this study, the researcher developed an extension based on Davis' model, where the evolved conceptual framework was considered.

The fourth objective was to provide recommendations to the practitioners.

Based on the key findings an overview was composed related to the key drivers of technological development. This overview details the main aspects for the development of mobile applications.

1.6 Scope of the study

In this study, the technical points of view were analysed by conducting expert interviews with professional mobile IT architects and specialists in a worldwide-acting IT company, the IBM Corporation. IBM is one of the world's biggest suppliers of information technology (hardware, software, and services). The solution portfolio ranges from super computers, software, and services (including consulting services) to financing. In this dissertation, the focus is on the consulting, software, and services sector (line of business) called Global Business Services (GBS), Software Technical Sales (STS), and Global Technology Services (GTS) because of their focus on application innovation services including mobile IT.

Furthermore, this study focuses on the German FM/S industry. This market was chosen to analyse the impact of IT experts on application development because it is an online trading market with region-specific requirements regarding business regulations and mobile IT infrastructure. This study examines the influence of technology aspects

(infrastructure, hardware, and software) on wireless communication especially for mobile devices, such as smartphones, tablets, and surfaces.

1.7 Research philosophy

Business research is closely tied to different visions of how organizational reality should be studied. The methods to do business research are not merely neutral tools; they are linked to the ways in which social scientists envision the connection between different viewpoints about the nature of social reality and how it should be examined (Bryman & Bell, 2011, p. 4). Business research is driven by an organizational problem and stimulated by personal expertise and interest. A perspective is often determined by the profession of the researcher. In this study, the researcher would like to investigate the factors influencing mobile IT from the technical point of view – that is, from an IT expert's perspective. Furthermore, he would like to understand how these factors are linked to consumer behaviour.

However, the researcher would also like to provide some room for interpretation. This will ensure that the meaning is not discovered as an 'objective' truth but constructed within a social context. In this research, the 'background' is thoroughly understood; this includes mobile IT knowledge and the method for obtaining the results and targets. The researcher looks behind the surface of the statements provided by IT experts to determine whether these perspectives are in accordance with the consumer's points of view.

Therefore, this research is located between the two extremes of an objectivist and a subjectivist position in which reality is not created but constructed through the human interpretation of the 'social actors' under investigation. The interpretivist approach allows for explanations and gives answers to the 'why' questions. This study seeks to provide answers to fundamental questions, such as why, when, and how do consumers use the mobile channel and applications. Summarizing the approach will deliver not only quantitative and descriptive results but also qualitative data and appropriate explanations.

1.8 Research methodology

Although the general focus of the research is to find out what can be derived from the research (Moghaddam, 2006), the researcher does not follow the aim to build a theory from the ground. Instead, the researcher follows a qualitative phenomenological research approach that describes the 'lived' experiences of a phenomenon from the interviewee's perspective (Van Manen, 1990). The phenomenological research approach is data-driven and qualitative data was gathered relating to the key drivers to understand the different kinds of influence factors that are considered.

Based on the assumption that IT experts will provide essential and significant inputs regarding the technical aspects of the application development, the researcher conducted semi-structured interviews (Harrell & Bradley, 2009). The in-depth expert interviews of 18 mobile IT experts consider the key drivers of technological development, such as efficiency, engagement, flexibility, simplicity, security, and visibility. Along the key drivers, the researcher gain insights into the thinking process of the IT experts with the aim to classify the statements as well as the IT expertise.

1.9 Contribution to practice

The contribution to practice is in bringing together the technical viewpoint and the consumers' viewpoints and to provide a set of recommendations to assist decision makers for the mobile development, especially the chief executive officer (CEO), the chief technical officer (CTO), and the chief marketing officer (CMO), in the German FM/S industry. This will enable a clearer interaction between the architecture and design of mobile IT and consumer behaviour, which will improve the mobile enterprise strategy. In this connection it is important and of relevance for academia and business to know the minor and major influencing factors of mobile IT and their effect on the set of key drivers, with the aim to evolve a conceptual framework and to develop an enhancement to an existing information system theory.

1.10 Thesis structure

Chapter one (the current chapter) introduced the topic in general, and outlined the main purpose of this research, its scope, and its significance. It also highlights the research questions to be broached in this study.

Chapter two reviews current literature on mobile IT and consumer behaviour based on both the organizational and consumer perspectives. The chapter concludes by identifying the research gap in literature and providing insights to bridge this gap. To assist the reader and improve comprehension of the themes covered, a conceptual framework has been applied, which is followed by data analysis to clarify the various insights.

Chapter three covers the methodological approach and research design used for this study. It covers data collection including sampling, data analysis, and interpretation and presents why the interpretive, inductive, qualitative, thematic analysis of semi-structures expert interview questions is the most appropriate method for investigation from the researchers perspective and for reaching the research aim.

Chapter four is a synthesis of the research and an analysis of the findings. It details key themes and relationships between technological development and the information system theory.

Finally, chapter five summarizes the thesis, reflecting back on the thesis aim and questions and reviews the main findings. A summary framework of what the research recommends is developed and presented as a tool for practitioners to consider in future mobile IT development projects. This chapter also considers the broad implications for academics and practitioners and outlines the study limitations, ethical considerations, and the opportunities for future research in the field.

2 LITERATURE REVIEW

2.1 Introduction

This chapter examines current knowledge including substantive findings, as well as theoretical and methodological contributions. Furthermore, it informs the study design and guides the choice of research questions and research methods (H. Cooper, 2010; Marshall & Rossman, 2010).

The literature review starts with the definitions related to the topic, followed by a brief summary statement regarding the relevance of various terms to the topic. The literature review examines the competing theoretical models concerning the acceptance of technology. Within the current literature the effect of buying behaviour and decision making on personality is not considered because of the psychological context: this comprises human decision processes as well as human behaviour and strategies in context of medical sciences.

The literature review deals with the influence on the business by technology aspects (infrastructure, hardware, and software) with focus on wireless communication in the form of mobile devices like smartphones, tablets, and surfaces. Other device types as well as communication channels are excluded from the study because of the different application architecture and design approach. Furthermore, the thesis focuses on the German FM/S industry because it is an online trading market with region-specific requirements regarding business regulations and mobile IT infrastructure.

This chapter investigates existing literature in relation to the factors influencing consumer behaviour and identifies a gap in the research pertaining to the use of the perspectives of experts on mobile application development. Based on this information, the key drivers of technological development are identified. The literature review ends with a conclusion.

2.2 Information technology

Information technology (often abbreviated as IT) refers to anything related to computing technology, such as networking, hardware, software, the Internet, or the people that work with these technologies. Information technology, has been defined in a range of ways throughout the literature. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. In a broad sense, information technology is "technologies dedicated to information storage, processing, and communications" process, which focus on "the hardware, software, telecommunications, and office equipment that transform raw data to useful information, adding new value in the process" (R. Cooper & Zmud, 1990; Huff & Munro, 1985; Lai & Mahaptra, 1997). In other words information technology is the application of computers and telecommunications equipment to store, retrieve, transmit, and manipulate data (Daintith, 2009), often in the context of a business or computing in general.

Several industries are associated with information technology, including computer hardware, software, electronics, semiconductors, Internet, telecom equipment, e-commerce and computer services (Chandler & Munday, 2011). However, the involvement of most managers with information technology is limited to two types of computer systems: those that store and manipulate data, and those that provide fast and efficient communication between people and businesses (Sleight, 2000).

The rapid development of IT in the past couple of decades has underscored the importance of understanding historical patterns and predicting future trends. Knowing what has occurred in the past few years can help researchers better predict and plan for future development. This argument is illustrated in top senior (C-suite) executives (CxO) studies conducted by the IBM Institute for Business Value, (IBM, 2015). In these studies 5,247 CxOs were interviewed in more than 70 countries to determine the relevance of IT for their business. One of the most notable trends in the past decade has been the increase in the significance that chief executive officers (CEOs) attributed to the

technology factor. Ten years ago, technology was placed sixth on the list of most important external factors they thought exerted an influence on their enterprises. Now, it consistently tops the features on their agenda (see Figure 2-1).

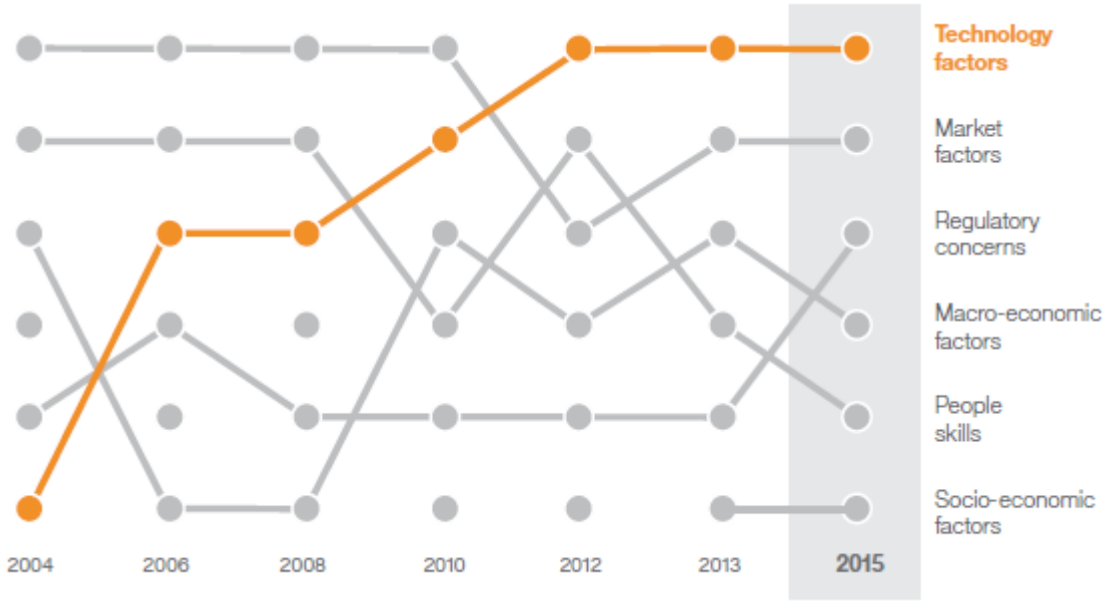

Figure 2-1: CEO Ranking of external influences on enterprises (IBM, 2015)

In general, CxOs think that technology factors will be the main drivers for change in the near term (i.e., in three to five years). However, CxOs in the FM/S industry placed regulatory concerns well ahead of technology and market factors (see Figure 2-2).

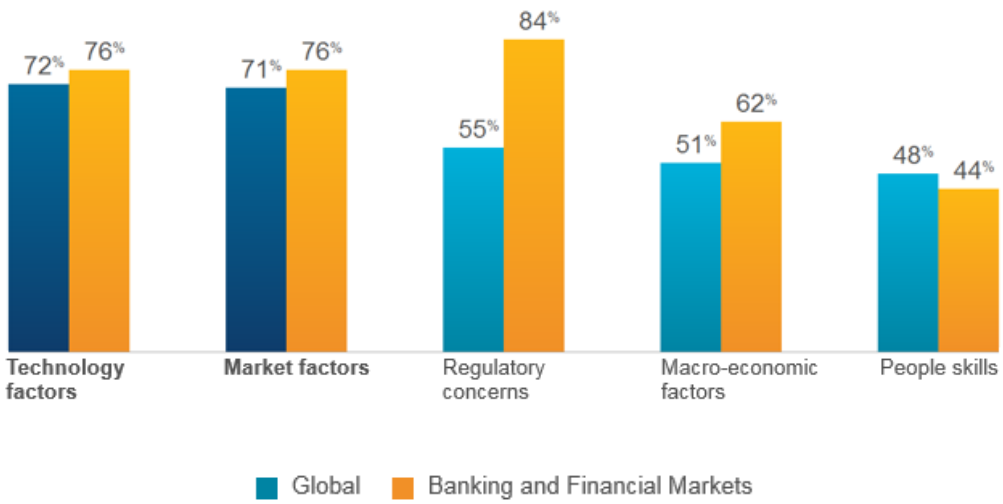

Figure 2-2: Percentage of CxOs consider external forces impacting the enterprise (IBM, 2015)

This study argues that CxOs recognize in principle that the confluence of technologies magnifies the impact of those technologies across the markets and also in the FM/S industry. This dissertation focuses on a critical review of literature pertaining to the IT for communication devices (i.e., smartphone, tablets and surfaces).

2.3 Mobile IT

Mobile IT is composed of the words 'Mobile' and 'IT' and is derived from the word 'mobility'. Mobility describes the movement of or the ability to move things (e.g., information, services, goods, or peoples) from point A to point B (Sørensen, 2015). In spite of the surge in mobility concerns in our social lives, literature has defined the notion of mobility quite narrowly-exclusively in terms of humans' independence from geographical constraints (Kakihara & Sorensen, 2002).

In connection to mobile communication, there are two types of mobilities: user mobility and device portability. User mobility refers to a user who has access to the same or similar telecommunication services at different places, that is, the user can be mobile and the services will follow the person (Joshi, 2014). Examples for mechanisms supporting user mobility are simple call-forwarding solutions from the telephone or computer desktops that supporting roaming facilities (i.e., the desktop looks the same no matter which computer user logs into the network). With device portability, the communication device moves (with or without the user) without any physical connectivity (Schiller, 2003). Mechanisms in the network and inside the device have to ensure that communication is possible while the device is moving. This kind of communication was formerly referred to as biotelemetry and is known today as 'wireless' (Neuman, 2011). A typical example for systems supporting wireless device portability is the mobile phone, where the system itself hands the device from one transmitter (also called base station) to the next if the signal becomes too weak.

Many national and international projects in wireless communication were started in the 1980s, the first generation (1G) of analogue cellular networks became available for voice services based on the known radio transmission techniques. These first-generation technologies used Frequency Division Multiple Access (FDMA) which had certain inherent limitations in the use of radio channels and the use of circuit-switched technologies in the network core (Sharma, 2013).

The second generation (2G) of mobile systems were introduced in the end of 1980s and are characterized by digitization and compression of speech. 2G communication is generally associated with global system mobile (GSM) services; 2.5G usually identified as being fuelled by General Packet Radio Service (GPRS) along with GSM (Shukla & Pandey, 2012).

Subsequently, with the introduction of technology platforms, independent data providing services, and a global network design standard, the 3G was born (Mishra, 2004). The 3G technology used Enhanced Data rates in GSM Environment (EDGE). Although EDGE technology made high-volume data movement possible with an information transfer rate of at least 2 Mbps, packet transfer on the air interfaces behaved like a circuit-switches call. The International Telecommunication Union (ITU) defined the demands for 3G mobile networks (which was a leading network in Europe) with UMTS (Universal Mobile Telecommunications System) based on the air-interface technology standard Wideband Code Division Multiple Access (WCDMA) (Sharma, 2013).

In March 2008, the ITU-Radio communications sector (ITU-R) specified a set of requirements for 4G standards called the International Mobile Telecommunications Advanced (IMT-Advanced) specifications. This was based on the first successful field trial conducted in Tokyo, Japan (23rd June 2005). The 4G framework established real-time packet transmission up to 1GBbps called All-IP, and it uses the Mobile IPv6 – the standardized IP-based mobility protocol. Furthermore, 4G achieves new levels of user experience and multi-service capacity by integrating all extant mobile technologies that exist, such as IMT-2000, Wireless Fidelity (Wi-Fi), and Bluetooth (Pereira & Sousa, 2004).

With the design and optimization of upcoming radio access techniques and the evolution of existing systems, a collaboration between groups of telecommunications associations, the Third Generation Partnership Project (3GPP) laid down the foundations of the Long Term Evolution (LTE) advanced standards – the 3GPP candidate for 4G (Parikh & Basu, 2011). The emergence of new technologies in the mobile communication systems and the increasing growth of user demand (Jalil, Latif, & Masrek, 2009) have triggered researchers and industries to come up with the fifth generation (5G) of mobile and wireless communication. This communication is defined by the requirements of the Next Generation Mobile Networks Alliance (NGMN) Alliance. This alliance has opined that 5G should be rolled out by 2020 to meet business and consumer demands (El Hattachi & Erfanian, 2015).

Figure 2-3 presents a short chronological history of cellular radio systems, including abbreviations for the major standards and classifications from their initial stages in the 1980s till 2020s (Osseiran, Monserrat, Marsch, Dohler, & Nakamura, 2016).

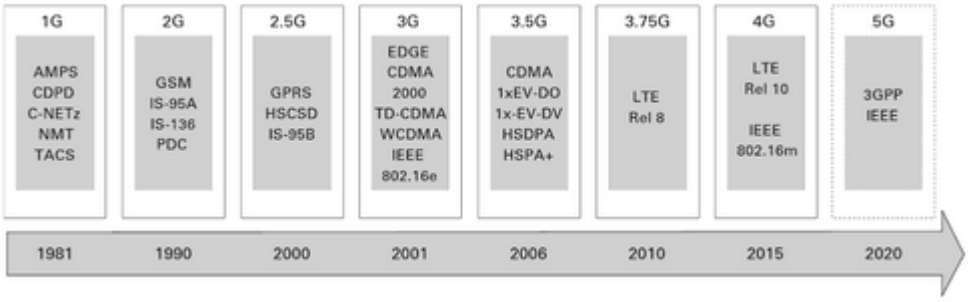

Figure 2-3: Evolution of cellular standards (Osseiran et al., 2016)

The consistent evolution of mobile wireless communication is the technological basis for this present investigation. This allows the researcher to focus on the application layer, which is on top of all transmission-oriented layers (physical, data link, network, and transport layer). The transmission layer is the underlying basic reference (Schiller, 2003). In the broadest sense, it is technological basis for the mobile application development to provide online trading for the consumer.

2.4 Consumer

The term ‘consumer’ defines someone who purchases a good (product or service) for personal use (Hirsch, Kett, & Trefil, 2002). This means a person takes a certain amount of a product/service and uses it for certain purposes until nothing more exists to purchase afterwards. This process is also called ‘consumption’, from which the term ‘consumer’ is derived. From the economics and marketing perspectives, the consumer is the one who pays to consume the goods and services produced (Aarthi & Priya, 2012). Consumers play a vital role in the economic system of a nation. In the absence of effective consumer demand, producers would lack one of the key motivators to produce: to sell to consumers. The consumer also forms part of the chain of distribution. In paragraph 13 of the German Civil Code (BGB), the term ‘consumer’ describes a person who concludes a legal transaction that is not associated with the person’s commercial or self-employed professional work (Federal Ministry of Justice and Consumer Protection, 2015).

2.5 Behaviour

Minton (2013) argued, that behaviour is the range of actions and mannerisms made by individuals, organisms, systems, or artificial entities in conjunction with themselves or their environment, which includes other systems, organisms, and the (inanimate) physical environment. It is the response of the system or organism to various stimuli or inputs, whether internal or external, conscious or subconscious, overt or covert, and voluntary or involuntary In connection with humans, the term ‘behaviour’ describes what anyone does (or does not do) and in the way (how) this happens (Skinner, 1953).

2.6 Consumer behaviour

Consumer behaviour is the study of the processes involved when individuals or groups select, purchase, use or dispose of products, services, ideas or experiences to satisfy needs and desires (M.R. Solomon, 2008). The academic field of consumer behaviour has long been associated with the marketing discipline (Kernan, 1995). However, the field of consumer behaviour is interdisciplinary (Jacoby, Szybillo, & Berning, 1976); it is composed of researchers from many different fields who share an interest in how people interact with the marketplace. These disciplines can be categorized by the degree to which their focus is on micro (individual consumer) or macro (group consumer) level. The study of customer behaviour is based on consumer buying behaviour with the customer playing three distinct roles (personas): user, payer and buyer (Martell, 2015). User personas work with the products, solutions or services on a daily basis. Payer personas solved their initial problem by choosing the products, solutions or services. Buyer personas are focused on prospects looking to solve a problem or meet an objective that the products, solutions or services help them to achieve.

Research has shown that consumer behaviour is difficult to predict, even for experts in the field (Armstrong, 1991). Furaiji, Łatuszyńska, and Wawrzyniak (2012) have argued that consumer behaviour involves psychological processes that consumers undergo to recognize their needs, find ways to solve these needs, make purchase decisions (e.g., whether to purchase a product and, if so, which brand and where), interpret information, make plans, and implement these plans (e.g., by engaging in comparison shopping or actually purchasing a product).

Consumer behaviour research attempts to understand the buyer decision-making process, both individually and collectively (Furaiji et al., 2012). It studies individual consumer characteristics such as demographics and behavioural variables in an attempt to understand people's wants. Consumer behaviour research allows for improved understanding and forecasting concerning not only the subject of purchases but also purchasing motives and purchasing frequency (Schiffman & Kanuk, 2007).

One of the current fundamental assumptions in consumer behaviour research is that individuals often purchase products (in the context of this study, e.g., a financial asset or service) for their subjectively perceived values rather than their primary functions (Stávková, Stejskal, & Toufarová, 2008). This does not mean that the products' basic functions are not important, but that the contemporary role of a product is more than its basic use-value (M. R. Solomon, 2004). Frequently, consumers do not rate products according to their core attributes (i.e., the primary utility they provide) but, according to the so-called real product (i.e., the qualities of particular products' qualities) and the extended product, which represent the set of intangible factors that confer a desired perceived advantage for the consumer; this also includes image, consultancy, and after-sales service (Foret & Procházka, 2007).

Many factors influence the consumer purchasing decisions and buying behaviours. Literature often classifies and structures these factors. The five major factor groups are cultural factors, social factors, physical factors, personal factors, and the marketing mix (Obaidat, 1995; Stávková et al., 2008; Suleiman, 2000). Descriptions for the major factor groups and their sub-factors are presented in Table 2-1:

Major factors	**Sub-factors**	**Description**
Cultural factors	Culture	Factors refer to the set of basic values, wants and behaviours learned by society members from the family and other important social institutions.
	Sub-culture	Each culture contains smaller sub-cultures. The sub-culture includes nationalities, religions, racial groups, and geographic regions.
	Social class	Society's relatively permanent and ordered divisions, the members of which share similar values, interests, and behaviours. Social class can be determined by a combination of factors, such as occupation, income, education, wealth, and other variables.
Social factors	Groups	A group refers to two or more individuals who interact to accomplish individual or mutual goals. A person's behaviour is influenced by many small groups or reference groups. These groups involve family, religious groups, friends circle, neighbours, and so on.

Major factors	Sub-factors	Description
	Family	Members can strongly influence a buyer's behaviour. Marketers are interested in the roles and influences of spouses, significant others, and children on the purchase of different products and services.
	Roles & statuses	The person's position in each group can be defined in terms of both role & status. Each role carries a status that is conferred by society.
Personal factors	Age & life cycle stage	People change their purchase choices over their lifetimes. Marketers define their target markets in terms of family life-cycle stage and develop appropriate plans and products for each stage.
	Occupation	A person's occupation affects the goods and services bought.
	Economic situation	A person's economic situation affects product choices. Marketers of income-sensitive goods should monitor trends in personal income, savings, and interest rates.
Psychological factors	Motivation	When consumers recognise that they have a need, the inner drive to fulfil the need is called motivation. A motivated person is ready to act.
	Perception	It is the process by which people select, organize, and interpret information to form a meaningful picture of the world.
	Learning	When people act, they learn. Learning can be described as changes in an individual's behaviour arising from experience.
Marketing mix	Product	It is a tangible good or an intangible service that is mass produced or manufactured on a large scale with a specific volume of units.
	Price	The price is the amount a customer pays for the product.
	Promotion	It represents all the communications that a marketer may use in the marketplace. Promotion has four distinct elements: advertising, public relations, personal selling, and sales promotion.
	Placement	A way of getting the product to the consumer and/or the ease of access to consumers.

Table 2-1: Major factor groups and its sub-factors (Hasslinger, Hodzic, & Obazo, 2007; Kotler & Armstrong, 2007; Stávková et al., 2008)

In the context of marketing in general, the cultural factors are examined by Narayyana and Raol (1993), Keegan (1995), Lancaster and Reynold (1998), and Kotler and Armstrong (2007). Cross and Peterson (1987), Zikmond and Arnico (1993), Keegan (1995), and Stanton (1997) focused on the social factors. The physical factors were studied amongst others by McCarthy and Perreault (1993), Narayyana and Raol (1993), Lancaster and Reynold (1998), and Kotler and Armstrong (2007). In their studies, Eris (1974), Dibb and Etal (1991), and Setlow (1996) examined the personal factors whereas Cohan (1991) and Setlow (1996) examined the marketing mix. In the context of purchasing mobile IT products and services, the cultural factors, social factors, and physical factors were studied amongst others by Agyeman (2013). Ling and Siou (2013) examined the personal factors whereas Eric (2012) focused on marketing.

Besides the major factor groups, Straughan and Roberts (1999) focused on the demographic factors and lifestyle whereas Zidmond and Amico (1993) and Setlow (1997) suggested the importance of environmental factors. The attitudinal factors were explored by Stanton (1997) and Pride and Ferrell (2000), whereas Zikmond and Amico (1993) analysed the individual factors. Keegan (1995) inspected the geographical factors. Furthermore, the consumption is influenced by conscious motives and unconscious processes (Chartrand, Huber, Shiv, & Tanner, 2008), emotions (Dawson, Bloch, & Ridgway, 2002), values (Kasser, 2002), and experiences (J. W. Hutchinson & Eisenstein, 2008)

However, all these studies describe the influence of consumer purchasing decisions and buying behaviours in principle and are also valid in the context of mobile IT, that means if the consumer purchase financial assets or services. The major factors and their sub-factors influence the consumer purchasing decisions and buying behaviours also in case of the online trading of financial assets or services by the application of mobile IT. However, in addition the researcher investigates the influence of mobile IT solution architecture and design on consumer behaviours – that means the impact of mobile information technology (the technical viewpoint).

2.6.1 Consumer segments in banking and FM

Consumer interactions have been moving increasingly from face-to-face (i.e., offline interactions) to digital/virtual interactions (i.e., online interactions). This movement is described in the literature on basis and analysis of consumer segments, channels and service access which is discussed in detail in Appendix I.

However, mobile banking is among the newest electronic delivery channels to be offered by banks. Innovations in mobile wireless communications have led to an extensive use of mobile devices in banking services. Mobile IT has become a key area for the banking sector. After business intelligence and analytics, the development of mobile solutions is of particular importance. Researchers have argued that consumer behaviour is influenced by known major factor groups and their sub-factors (see Table 2-1), which did not consider technological progress, especially in the area of mobile IT (Obaidat, 1995; Stávková et al., 2008; Suleiman, 2000). To find out, how this gap is related to existing information theories, different approaches about the user acceptance of technology are discussed in the following.

2.7 Theoretical models concerning the acceptance of technology

Many competing theoretical models co-exist in the innovation acceptance and adoption literature; each theory has a different focus and has been tested in different contexts. However, most of these models attempt to build theories to explain how and why innovations or technologies are adopted, and they predict the level of acceptance and adoption. One stream of research focuses on the acceptance and adoption of innovation at an individual and societal level (Compeau & Higgins, 1995; Davis, Bagozzi, & Warshaw, 1989), whereas other streams focus on implementation success at the organizational level (Leonard-Barton & Deschamps, 1988).

Many of the empirically researched models, such as Theory of Reasoned Action (TRA), Motivational Model, and Theory of Planned Behaviour (TPB), have been drawn from social psychology; other models, such as Social Cognitive Theory (SCT) and Innovation Diffusion Theory (IDT) have been from sociology (Taniar, 2008). Other models apply technology adoption theories to specific situations, for example, Human-centred Design process, contextual design, and Technology Acceptance Model (TAM). Several hundred studies have been conducted using these models to explain the innovation adoption behaviours of end users. Each of these models made unique contributions to the literature on technology acceptance and adoption; however, most of them theorize behaviour intention and/or usage as the key dependent variable to explain the acceptance of IT because behavioural intentions are motivational factors that capture how hard people are willing are trying to adopt a certain behaviour (Ajzen, 1991). For example, TPB suggests that behavioural intention is the most influential predictor of behaviour; after all, a person does what he or she intends to do. In a meta-analysis of 87 studies, an average correlation of 0.53 was reported between intentions and behaviours (Sheppard, Hartwick, & Warshaw, 1988). A number of models have been frequently quoted in the technology acceptance and adoption literature are discussed below to explain the differences.

2.7.1 Theory of reasoned action (TRA)

The Theory of Reasoned Action is considered to be a general theory and has been applied to explain behaviour beyond that of adoption of technology. It is the most systematic and extensively applied approach to attitude and behaviour research (Taniar, 2008). This model proposes that an individual's actual behaviour is determined by the person's intention to perform the behaviour, and this intention is influenced jointly by the individual's attitude and subjective norms. Attitude is defined as “a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object” (Chau & Hu, 2001, p. 6). A person's attitude towards a behaviour is largely determined by salient beliefs about the consequences of that behaviour and the evaluation of the desirability of the consequences (Fishbein & Ajzen, 1977). A subjective norm is defined as the person's perception that most people who are important to them think that they should or should not perform the behaviour in question (Dillon & Morris, 1996). In brief, TRA asserts that attitude and subjective norm and their relative weights directly influence behavioural intention.

2.7.2 Theory of planned behaviour (TPB) and Decomposed theory of planned behaviour (DTPB)

TPB, which generalizes TRA by adding a third construct – perceived behavioural control (Ajzen, 1991) – has been one of the most influential theories in explaining and predicting behaviour, and it has been shown to predict a wide range of behaviours (Sheppard et al., 1988). TPB asserts that actual behaviour is determined directly by both behavioural intention and perceived behavioural control. Perceived behavioural control was included to account for the availability of both cognitive and situational resources required to perform the behaviour (Ajzen & Madden, 1986). Behavioural intention is, therefore, formed by one's attitude, subjective norm, and perceived behavioural control (Ajzen, 1991).

Further, a decomposed TPB (DTPB) includes constructs, such as relative advantage, compatibility, influence of significant others, and risk, which are derived from the innovation diffusion literature; it decompose the three perceptions in TPB into a variety of specific belief dimensions. This model offers several advantages over TPB, such as the identification of specific salient beliefs that may influence IT. Furthermore DTPB is considered more complete and management-relevant by focusing on specific factors that may influence adoption and usage (Teo & Pok, 2003).

2.7.3 Motivational theories

Motivation theories are rooted in psychological research to understand acceptance of information technology by individuals (Davis, Bagozzi, & Warshaw, 1992; Igbaria, Parasuraman, & Baroudi, 1996). These theories distinguish between extrinsic and intrinsic motivations. Extrinsic motivation refers to the performance of an activity in helping achieve valued outcomes, whereas intrinsic motivation place emphasis on the process of performing an activity (Calder & Staw, 1975; Deci & Ryan, 2013). For example, perceived usefulness is an extrinsic source of motivation (Davis et al., 1992), whereas perceived enjoyment (Davis et al., 1992), perceived fun (Igbaria et al., 1996), and perceived playfulness (Moon & Kim, 2001) are intrinsic sources of motivation. Both sources of motivation affect usage intention and actual usage. Therefore, in addition to ease of use and usefulness, intrinsic motivators, such as enjoyment, which are affect-based, will also play a role in such a usage environment that IT applications are used both for work and play (Moon & Kim, 2001).

2.7.4 Human-centred design process and contextual design

in his book *Usability Engineering*, Nielsen (1994) defined usability engineering that is concerned generally with human-computer interaction and specifically with devising human-computer interfaces that have high usability or user friendliness. Nielsen's usability concept was mainly related to user interfaces; thus the usability engineering practices that he proposed were also focused on designing user interfaces. Subsequently, the focus of human-centred design has been shifting more towards the contexts of use. The definition of usability given by the German Institute

for Standardization (Deutsche Institut für Normung; in the abbreviated form 'DIN') emphasizes the context of use. Also, the definition of human-centred design process in ISO 13407: 1999 (DIN, 1999) places a strong emphasis on the intended contexts of use. The ISO 13407: 1999 standard defines the design process to make systems usable. The standard is targeted at project managers, and it defines how to organize and manage a human-centred design process.

According to the ISO 13407: 1999 standard, the incorporation of a human-centred approach is characterized by

- active involvement of users and a clear understanding of user and task requirements,
- an appropriate allocation of functions between users and technology,
- the iteration of design solutions, and
- a multidisciplinary design.

According to the standard, the goals for individual evaluation activities can be to assess how well the system meets the user or organizational goals to (a) diagnose potential problems and identify needs for improvements, (b) select the proposed design option that best fits the user and organizational goals, and/or (c) elicit feedback and further requirements from users.

The human-centred design process consists of successive cycles for specifying the intended context of use, specifying the user and organizational requirements, producing design solutions, evaluating the solutions against the requirements, and again refining the context of use (Bevan & Bogomolni, 2000).

The ISO 13407: 1999 standard has been criticized (Jokela, 2002; Jokela, Iivari, Matero, & Karukka, 2003) because it does not take into account the latest software engineering practices. Currently, software engineering is based on system modelling. However, the prototyping suggested by the human-centred design approach is technically very difficult, especially because the systems are getting more complex, services are being distributed, and design work is undertaken concurrently. Gulliksen, Blomkvist, and Straub (2003) claimed that this basic difference in the approaches is an obstacle to the adoption of human-centred design in software engineering. Pekka Ketola (2002) raised the same theme is his dissertation.

In some approaches, the main focus of the design is on the usage situations. Contextual design (Beyer & Holtzblatt, 1997) emphasizes the significance of clarifying the task context, including the goals and conditions for action. Information technology products need to be designed in parallel with the redesign of working practices. User experience research focuses on studying how different users experience the usage of a product in different situations (Battarbee, 2004).

Norman (1998) pointed out that designers need answers in hours, not in months. According to him, applied science does not need the precision of traditional scientific methods used in social and behavioural sciences. In product design, the focus is on seeking big phenomena, and these can be found with simpler methods. Norman (1998) proposes rapid ethnography as a research method to invent new product classes. Rapid ethnography includes not just observing potential users but also enabling these participants to discovery their real needs.

Kallio and Kekäläinen (2004) also pointed out that product lifecycles of mobile services are short, varying from one month to one year. In this kind of development environment, less time-consuming and expensive methods are required. Kallio and Kekäläinen proposed an approach for improving the collaboration between the Human-Computer Interaction (HCI) department and the marketing department within a company. Marketing departments conduct focus group interviews; therefore, the participants of the focus groups can be involved in usability tests immediately after the group sessions. To facilitate several test users in parallel, tests are conducted by having user-pairs in the tests and non-expert moderators. In the study by Kallio and Kekäläinen (2004), the user-pair tests revealed nearly half of the problems that were identified in individual usability tests.

Regarding technology research, a major shortcoming of both the human-centred design approach and the contextual design approach is their 'product-centredness' (Kaasinen, 2005). Both approaches are designed to guide a design team that already has the mission of designing a certain kind of product. User feedback is collected to guide the design for this individual product. In technology research, the aim is to identify how a certain technical solution can be utilized in different applications; it demonstrates these applications and studies user acceptance of these applications to obtain information to guide future commercial development. This indicates that the focus needs to be enhanced to business and marketing research methods, such as the TAM and the IDT, which are described below.

2.7.5 Technology acceptance model (TAM)

TAM can be seen as an adaptation of TRA; it was developed to explain individual system use in the workplace (Davis, 1989). The key difference between TAM and the TRA is that the TAM does not include the variable subjective norm in their model whilst TRA and TPB do. This model further suggests that two beliefs – perceived usefulness and perceived ease of use – are instrumental in explaining the user's intentions for using a system (see Figure 2-4). Perceived usefulness refers to the degree to which "a person believes that use of the system will enhance his or her performance" whereas perceived ease of use is the degree to which "a person believes that using the system will be free of effort" (Dholakia & Dholakia, 2004). In other words, technology that is easy to use and is useful will lead to a positive attitude and intention towards using it.

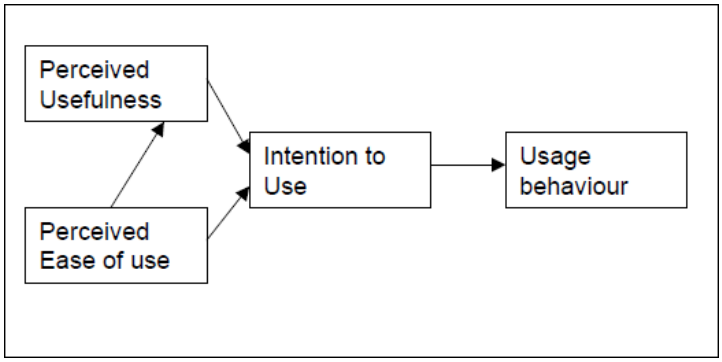

Figure 2-4: Technology Acceptance Model (TAM) by Davis (1989)

The main advantage of this model over others is that the two related beliefs can be generalized across different settings. Thus, some argue that it is the most robust, parsimonious, and influential model for explaining IT adoption behaviour (Elliot & Loebbecke, 2000; Teo & Pok, 2003; Venkatesh, Morris, Gordon, & Davis, 2003). Since its development, TAM has received extensive empirical support through validations, applications, and replications for its prediction power (S. Taylor & P. Todd, 1995; S. Taylor & P. A. Todd, 1995; Venkatesh & Morris, 2000). A number of modified TAM models were proposed to suit new technologies including Internet and intranet (Agarwal & Prasad, 1998; Chau, 1996; Chau & Hu, 2001; Horton, Buck, Waterson, & Clegg, 2001).

A major theoretical limitation of TAM is the "exclusion of the possibility of influence from institutional, social, and personal control factors" (Dillon & Morris, 1996, p. 49). Thus, the suitability of the model for predicting general individual acceptance needs to be re-assessed because the main TAM constructs do not fully reflect the specific influences of technological and usage-context factors that may alter user acceptance (King et al., 1994; S. Taylor & P. A. Todd, 1995). In response to this, a number of modifications and changes to the original TAM models have been made. Van der Heijden (2004) refines the model by adding perceived enjoyment is a stronger predictor of web page acceptance than perceived usefulness. In addition, Lu, Yao, and Yua (2005) extended the TAM for wireless Internet adoption by incorporating concepts such as social influences and personal traits. Wu and Wang (2005) enriched TAM with constructs related to perceived risks, cost, and compatibility, whereas Yang (2005) added individual characteristics, such as innovativeness, past adoption decisions, and knowledge about technology, as external antecedents of TAM constructs. Further, Kim, Chan, and Gupta S. (2007) developed the value-based adoption model, which include benefits and sacrifices in the adoption process of mobile Internet. Massey, Khatri, and Ramesh (2005) identified technology readiness and wireless web page interface usability as key factors influencing the uptake of mobile commerce and services.

The most prominent variation of TAM is the Unified Theory of Acceptance and Use of Technology (UTAUT), a unified model that integrates constructs across eight models (Dholakia & Dholakia, 2004). UTAUT provides a refined view of how the determinants of intention and behaviour evolve over time; it assumes that there are three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of usage behaviour (intention and facilitating conditions). However, both TAM and UTAUT have been criticized for the difficulty in applying these models beyond the workplace and/or organization for which they were originally created (Carlsson, Hyvönen, Repo, & Walden, 2005). This criticism is applicable to mobile services also because mobiles are used in all spheres of life: work, home, and leisure. However, a major benefit of using the TAM is that it provides a framework for assessing the effect of external variables on system usage (Yan & Yang, 2015). To adapt

the TAM to this study, the thesis' proposed theoretical framework will extend David's model by using the viewpoints of IT experts – the IT expertise – as external variables.

2.7.6 Innovation diffusion theory

The innovation diffusion theory (IDT) is concerned with how innovations spread, and it consists of two closely related processes: the diffusion process and adoption process (E. M. Rogers, 1995). Diffusion is a macro process concerned with the spread of an innovation from its source to the public whereas the adoption process is a micro process that is focused on the stages individuals undergo when deciding to accept or reject an innovation. The aggregate adoption process is subsequently an S-shaped function of time. Key elements in the entire process are the innovation's perceived characteristics, the individual's attitudes and beliefs, and the communication received by individuals from their social environment. Factors pertaining to innovation, such as relative advantage, complexity, trialability, observability, and compatibility, were considered important in influencing an individual's acceptance of innovation (E. M. Rogers, 1995). The IDT has been used, for example, to explain Internet-based service adoption.

2.7.7 Domestication approach

While diffusion theories focus on the macro process of adoption, domestication research typically studies how technologies are adopted in everyday life (Silverstone & Hirsch, 1992). Sociologists focused on the societal consequences of the process through which the use of technology becomes integrated into a person's everyday life (Pedersen, 2005). It is appropriate to consider this approach in the adoption of mobile services because with mobile phones and related services the boundary between leisure and work is often blurred. That is, services that are adopted for personal use in leisure time are often also adopted for professional use in work contexts (Leysia Palen, Salzman, & Youngs, 2001). Therefore, the domestication approach is relevant for this study because it helps highlight the non-utilitarian character of mobile services adoption and use, such as enjoyment or expressiveness of personality, status, and image in a public context (Bouwman, Carlsson, Molina-Castillo, & Walden, 2007; Nysveen, Pedersen, & Thorbjørnsen, 2005a).

2.7.8 Theoretical models in the context of mobile IT

Mobile IT services differ from traditional systems in that mobile services are ubiquitous, portable, and can be used to receive and disseminate personalized and localized information (Keng Siau, Ee-Peng, & Shen, 2001; Teo & Pok, 2003). The theories and models examined in the previous section and the underlying constructs have been tested in organizational settings in which individuals use new technologies for work. In general, users who adopt mobile services for personal non-work purposes incur both data transmission charges and charges for using the service, which may limit mobile services usage and affect the motivation to use them. In addition, as suggested earlier, users may adopt mobile services to seamlessly meet their everyday needs in different spheres of life including work, home, and leisure (Dholakia & Dholakia, 2004; Knutsen, Constantiou, & Damsgaard, 2005; Nysveen et al., 2005a; Nysveen, Pedersen, & Thorbjørnsen, 2005b). It follows that theories and models examined in the previous section and the underlying constructs may not be readily applicable for the adoption of mobile services. Drawing from domestication research, innovation diffusion, and motivational studies, we identify constructs that predict the adoption of new mobile services that may be empirically tested. Using an eclectic approach, that means a combination of various approaches and methodologies, can provide a deeper and richer understanding of the mobile services adoption phenomenon (Konana & Balasubramanian, 2005).

With the knowledge concerning the theoretical models of innovation acceptance and adoption, the sector of this study will be discussed. The context of the sector is important to understand the adoption of new mobile services in this business area. Therefore, the financial market in general and region-specific requirements regarding business regulations and IT infrastructure are discussed.

2.8 Financial Market (FM)

A financial market is a marketplace where buyers and sellers participate in the trading of assets, such as equities, bonds, currencies, and derivatives (Investopedia, 2016). Financial markets are typically defined by reflecting supply and demand and by having transparent pricing, and basic regulations on trading, costs, and fees (Sawlikar, 2012). The market forces determine the prices of financial securities, commodities, and other fungible items of value (i.e., instruments that are equivalent and, therefore, interchangeable) that are traded.

Financial markets are generally regarded as the forerunners of globalization. Leading banks and investment houses have a presence in financial centres worldwide. In the financial markets, there is 24-hour trading in foreign exchange and other financial instruments. Advances in communications and computer technologies have enabled anyone with a personal computer and/or a mobile device to access financial information and trading and investment opportunities from any part of the world.

2.8.1 History of German financial system

The development of the German financial system has been characterized by two key features, both of which have their origins in the country's pattern of industrialization in the second half of the 19th century. The first key feature is that the bank-based financial system. Germany required large amounts of capital to industrialize rapidly, and this was mobilized primarily by banks (Gerschenkon, 1962). Large joint-stock banks, which were established in the early 1850s and the early 1870s, played a major role to this. The second key feature is that, in addition to profit-oriented commercial banks, the German financial system also included two other sectors that were not primarily motivated by the profit motive, namely, the publicly owned savings banks and the cooperative banks. By 1913, the German banking system consisted of a private sector (dominated by eight big banks), a large public savings bank sector, and a somewhat smaller cooperative sector. In the 1920s, the big private banks faced major challenges because of inflation and competition from foreign banks, and three big banks emerged as a result of mergers and failures. At the end of the Second World War, the three big

private banks shut down because of their complicity in German war crimes, but after successful lobbying, they were allowed to re-establish themselves as unified institutions in the 1950s. The big banks played a major role in financing larger firms during Germany's post-war reconstruction, whereas the savings banks and the cooperative banks contributed significantly to the growth of Germany's very successful small- and medium-sized enterprises (Detzer, Dodig, Evans, Hein, & Herr, 2013).

The German financial system has historically been a prime example of a bank-based system, although in contrast to most other developed capitalist countries, a significant part of the banking system has consisted of publically-owned savings banks and cooperative banks that are not driven primarily by the profit motive. By 2014, private banks, publically owned savings banks, and cooperative banks accounted for 36 percent, 34 percent, and 18 percent of banking assets, respectively (Deutsche Bundesbank, 2015).

	Total assets		*Loans to non-banks*		*Deposits and borrowing from non-banks*	
	2000	***2014***	***2000***	***2014***	***2000***	***2014***
Private commercial banks	28%	39%	26%	28%	26%	36%
Big banks	16%	25%	15%	12%	14%	15%
Regional banks and others	10%	11%	10%	15%	12%	17%
Branches of foreign banks	2%	3%	1%	2%	0%	4%
Savings banks group	35%	28%	35%	36%	39%	34%
Savings banks	16%	14%	19%	22%	26%	25%
Landesbanken and DekaBank	20%	14%	16%	14%	13%	9%
Cooperative banks group	12%	14%	12%	16%	18%	18%
Cooperative banks	9%	10%	11%	15%	17%	17%
Central institutions	4%	4%	2%	2%	1%	1%
Other banks	24%	20%	26%	20%	17%	12%
All banks (in billion Euros)	6.148	7.853	3.479	3.901	2.261	3.339

Table 2-2: Market share by banking groups in 2000 and 2014 (Deutsche Bundesbank, 2015)

The official statistics are slightly confusingly; they refer to the first group as commercial banks, presumably to signify their profit-making orientation; however, all three groups performed what is usually referred to as commercial banking activities (i.e., accepting deposits and providing loans), and they also engaged in investment banking activities (i.e., advising and dealing in activities related to securities markets) to varying degrees. To avoid confusion, the profit-driven capitalist banks will be referred to as the 'private sector'. In addition to the universal banks, there are also a small number of other banks

that accounted for 12 percent of banking assets in 2012. (Deutsche Bundesbank, 2015). The total number of banks in Germany is high compared with other major European countries, both in absolute numbers and in relation to the size of the population, with 1830 institutions in 2014 (P. Behr & R. H. Schmidt 2015). However, this is slightly misleading because a large number of local savings banks and credit cooperatives are linked within their respective sectors through mutual guarantees and regional or central institutions (IMF, 2011).

The official statistics published by the Deutsche Bundesbank distinguishes between three forms of private banks: big banks, regional banks, and branches of foreign banks. Six institutions were designated as big banks in 1980 but, as a result of failures, mergers, and takeovers, the number had fallen to four by 2010; subsequently, the number has remained unchanged (relbanksinfo, 2014).

Rank	Bank	Sector	Total assets (in billions of EUR)
1	Deutsche Bank AG	Private	1,636.57
2	Commerzbank AG	Private	574.26
3	KfW Group	Public	464.00
4	DZ Bank Group	Cooperative	386.98
5	HypoVereinsbank (UniCredit Bank AG)	Private	297.70
6	Landesbank Baden-Württemberg (LBBW)	Public	285.00
7	Bayerische Landesbank (BayernLB)	Public	257.74
8	Norddeutsche Landesbank (NordLB)	Public	197.42
9	Landesbank Hessen-Thüringen (Helaba)	Public	176.50
10	Deutsche Postbank AG	Private	158.43

Table 2-3: The ten largest banks in Germany ranked by total assets (relbanksinfo, 2014)

Despite the decline in the number of institutions, the share of the big banks in the total bank assets rose quite markedly – it stood at approximately 10 percent in the 1980s and during most of the 1990s, but it increased to 18 percent in 1999 and to 25 percent in 2010.

The Deutsche Bank is the largest of the big banks, and it is Germany's only major international player. In 2010, its assets amounted to 1.64 trillion euros, which was almost three times as much as the assets of the next largest German bank (see Table 2-3). Prior to the onset of the financial crisis, the bank famously strove for a rate of return on equity of 25 percent. The bank has pursued an aggressive policy of international expansion and was an important participant in the provision of subprime mortgages and the packaging of subprime mortgages in opaque securities in the United States, where it has faced numerous civil and criminal court cases. In December 2012, a former staff claimed that the bank had only managed to avoid requesting a government bailout at the height of the crisis because it did not reveal large losses on the value of dubious securities that it held. (Detzer et al., 2013).

The Commerzbank is the second largest big bank with assets of 754 billion euros in 2010. In 2009, it took over the Dresdner Bank, which had been the second largest bank but had suffered several losses. The Unicredit Bank, which was formed from the merger of two medium-sized Bavarian banks in 1998, is the third largest of the big banks, with assets amounting to 372 billion euros in 2010. The Bundesbank also includes the Postbank in its category of big banks; Postbank had split from the Deutsche Post in 1990 and was sold off in 2004. It had assets amounting to 214 billion euros in 2010. However, the Deutsche Bank, which had first purchased shares in the Postbank in 2008, raised its holding to 93.7 percent in 2012; therefore, it cannot be regarded as a separate institution (Detzer et al., 2013).

Big private banks had traditionally functioned as house banks to big industrial companies, but investment and borrowing by industries declined after the 1970s. In the mid-1980s, the big private banks responded by promoting the development of securities markets in Germany with the aim of increasing their earnings from investment banking activities. This resulted in some strengthening of the role of securities markets since the 1990s, although banks continued to occupy a predominant position in the German financial system. Amongst non-bank financial institutions, insurance companies have historically been the most significant, although investment funds expanded very rapidly

in the 1990s and are now almost equally large. Pension funds have been much less significant. Highly leveraged financial institutions, such as hedge funds and private equity funds, have also had a relatively limited presence in Germany (Detzer et al., 2013).

Financial markets can be classified in different ways based on the financial instruments in which they trade (e.g., securities including stocks, bonds, and their derivatives and commodities including precious metals, agricultural goods, and their derivatives), features of services they provide, trading procedures, key market participants, and the origin of the markets (Reszat, 2005).

The generalized financial market classification is given in Table 2-4:

Criterion	**Features**	**Examples**
Products	Tradability, transferability, ownership, maturity, denomination, substance	Equity, debt instruments, derivatives
Services	Technical advisory, information and knowledge- based, administrative	IT support, research and analysis, custody
Ways of trading	Physical, electronic, virtual	Over the counter, exchange, internet
Participants	Professionals, non-professionals, institutions, officials	Banks, central banks, non-bank financial companies, institutional investors, business firms, households
Origin	Domestic, cross-border, regional, international	National markets, regionally integrated markets, Euromarkets, domestic/foreign currency markets, onshore/offshore markets

Table 2-4: Financial market classification (Reszat, 2005)

From the perspective of country of origin, the financial market can be broken down into an internal market and an external market. The internal market, also called the national market, consists of two parts: the domestic market and the foreign market. The domestic market is where issuers domiciled in the country issue securities and

where those securities are subsequently traded. The foreign market is where securities are sold and traded outside the country of issuers (F.J. Fabozzi & Drake, 2009).

From the perspective of features, Drake and Fabozzi (2010) argued that the external market is the market where securities with the following two distinguishing features are traded: (a) at issuance, they are offered simultaneously to investors in a number of countries and (b) they are issued outside the jurisdiction of any single country. The external market is also referred to as the international market, offshore market, and the Euromarket (despite the fact that this market is not limited to Europe).

2.8.2 Types of financial sector markets

The financial sector market types are listed in the breakdown below:

Financial sector market type	**Description**
Capital markets	
Stock markets	Provide financing through the issuance of shares or common stocks, and enable subsequent trading
Bond markets	Provide financing through the issuance of bonds and enable subsequent trading
Commodity markets	Facilitate the trading of commodities
Money markets	Provide short-term debt financing and investment
Derivatives markets	Provide instruments for the management of financial risks
Futures markets	Provide standardized forward contracts for trading products at some future date (see also forward market)
Insurance markets	Facilitate the redistribution of various risks
Foreign exchange markets	Facilitate the trading of foreign exchange

Table 2-5: Financial sector market types (Wikipedia, 2014)

Financial markets can be classified as cash markets and derivative markets. The cash market, also referred to as the spot market, is the market for the immediate purchase and sale of a financial instrument (F.J. Fabozzi & Drake, 2009).

When a financial instrument is first issued, it is sold in the primary market. In a secondary market, financial instruments are resold among investors. No new capital is raised by the issuer of the security. Trading takes place among investors. Secondary markets are also classified in terms of organized stock exchanges and over-the-counter (OTC) markets. Stock exchanges are central trading locations where financial instruments are traded. In contrast, an OTC market is generally where unlisted financial instruments are traded (Darškuvienė, 2010).

Financial markets provide the following three major economic functions: price discovery, liquidity, and reduction of transaction costs (Frank J. Fabozzi & Modigliani, 2003) which also be taken into account in connection with the development of mobile applications for the online trading of financial assets or services in the various market types.

2.8.3 Financial regulation

In general, financial market regulation is aimed at ensuring the fair treatment of participants. Many regulations have been enacted in response to fraudulent practices. One of the key aims of market regulation is to ensure business disclosure of accurate information for investment decision making. When information is disclosed only to a limited set of investors, these investors would have a major advantage over other groups of investors. Thus, a regulatory framework ensures that equal access is provided to disclosures by companies. The recent regulations were passed in response to large bankruptcies. The overhauled corporate governance measures helped to strengthen the role of auditors in overseeing accounting procedures (Darškuvienė, 2010).

The regulatory regime in Germany from the 1930s (when a wide range of new measures were introduced) to the 1990s could be characterized as a stakeholder-oriented and bank-based model. Regulations stabilized the widespread system of house-banks and the extensive cross-holdings of shares between big financial and industrial companies. Formally, a universal banking system existed, but investment banking was unimportant in practice. This started to change in the 1990s and gained momentum following

the election of the Schröder government in 1998. It triggered a transition to a regime where shareholders' interests began to gain importance in regulations. From 1995, Germany initiated changes that aimed to move the financial system in the direction of a more Anglo-Saxon type of system. Regulatory changes, besides other Basel I/II/III and the Markets in Financial Instruments Directive (MiFID) I/II, aimed at strengthening the power of shareholders and at limiting the influence of banks. This led to a threefold decline in the direct involvement of banks in corporate governance, which included a decline in (a) the number of bank representatives on company supervisory boards, (b) the majority ownership of banks in large firms, and (c) the role of banks in proxy voting. The regulatory changes were promoted by German governments in an attempt to strengthen the position of Germany as a host for international financial markets. The European Commission also promoted these regulatory changes because they pushed for financial market harmonization in Europe as part of a neoliberal agenda (Detzer et al., 2013).

However, the German banking system is quite unique because it comprises three pillars of high importance: (a) privately owned commercial banks (including large banks with extensive branch networks); (b) smaller, privately owned, and regionally focused credit cooperatives; and (c) public banks (i.e., banks with government involvement) comprising the small, regional savings banks, and the larger Landesbanken. These three categories of banks have coexisted for more than 150 years with relatively little structural changes occurring over time. The German banking system has been relatively stable, with no major banking crisis in recent history, although some of the commercial banks – in particular, Commerzbank, Hypo Real Estate, and some of the Landesbanken branches – were massively affected by the global financial crisis of 2007/2008; they needed strong government support to sustain or were forced to merge with other banks. Some observers and empirical researchers (Kick & von Westernhagen, 2009) have attributed the overall stability of the German banking system to its unique structure and the stabilizing role that the savings and cooperative banks have on the local economic development because of their low lending cyclicality (P. Behr & R. H. Schmidt 2015).

The various regulatory changes introduced over time, have established laws and business regulations that have strengthened the rights of the banking consumers, including the protection of their privacy. Among other things, laws governing marketing practices and consumers in Germany provide consumers with significant rights for products and services. The implementation effort (cost) for applications which consider the business regulations through appropriate functions leads the organization to a restrained engagement in mobile IT solutions; therefore, the provision of mobile services in the recent past. Furthermore, the German banking system comprises an extensive branch network with various organizational and technological dependencies, which make it difficult for the banks to keep pace with the rapid technological changes in the area of mobile IT.

2.8.4 Relevance of mobile IT for the FM

Most authors explore the financial market with regard to service areas and global and/or regional market shares (Hartmann, Maddaloni, & Manganelli, 2003). The literature review for this study focuses on online trading in the German financial market for the region-specific requirements pertaining to business regulations and mobile IT infrastructure (as described in previous sections). This segment will be analysed in order to provide financial service applications that are used by the front-office trading departments. The consumer, who is a mobile trader, expects to sell and purchase assets via applications in an easy and intuitive but also error-free way.

The simultaneous and increasing diffusion of mobile phones and especially WAP-enabled devices has made the transformation of banking applications to mobile devices a logical development in electronic banking (Pousttchi & Schurig, 2004). Indeed, mobile banking has emerged as a wireless service delivery channel providing increased value for the banking transactions of customers. However, despite its many advantages, the use of mobile phones in banking services is still in its infancy and the Internet retains its position as the leading channel in electronic banking (Bissyandé & van Stam, 2014). With the advent of cloud computing and services, the development of mobile solutions has attained utmost importance (see Figure 2-5). Moreover, CxOs in the banking and

FM/S industry expect that over the next three to five years, the strongest business impact will be made by mobile solutions, which will also be the main driver for the development of mobile solutions (IBM, 2015).

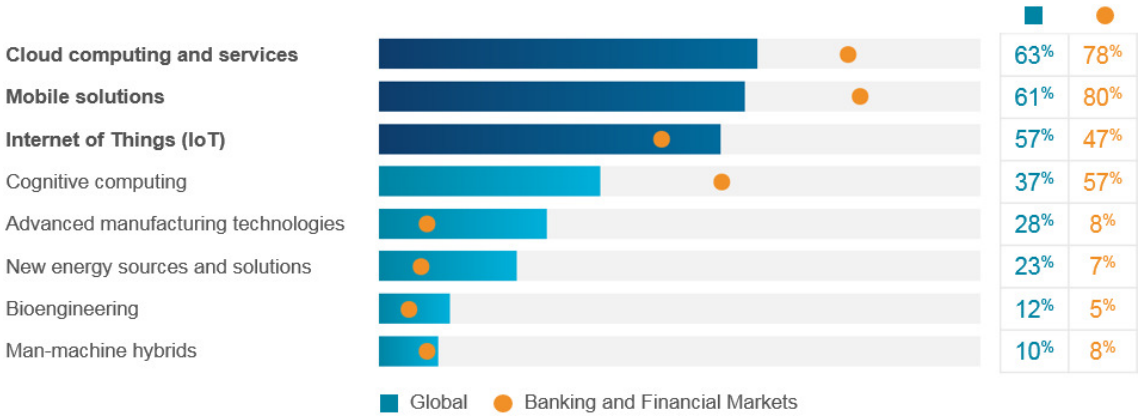

Figure 2-5: Percentage of CxOs who expect the strongest impact from mobile solutions (IBM, 2015).

The importance of mobile IT is also reflected by the number of mobile user devices (see Figure 2-6). In Germany the number increased from 6.31 billion in January 2009 to 46 billion in July 2015 (Statista, 2015). The compound annual growth rate for mobile applications is by 9.8 percent, and in 2015, it reached value of $335.2 billion. The compound annual growth rate for the market from 2011 to 2015 was 17.6 percent (MarketLine, 2016).

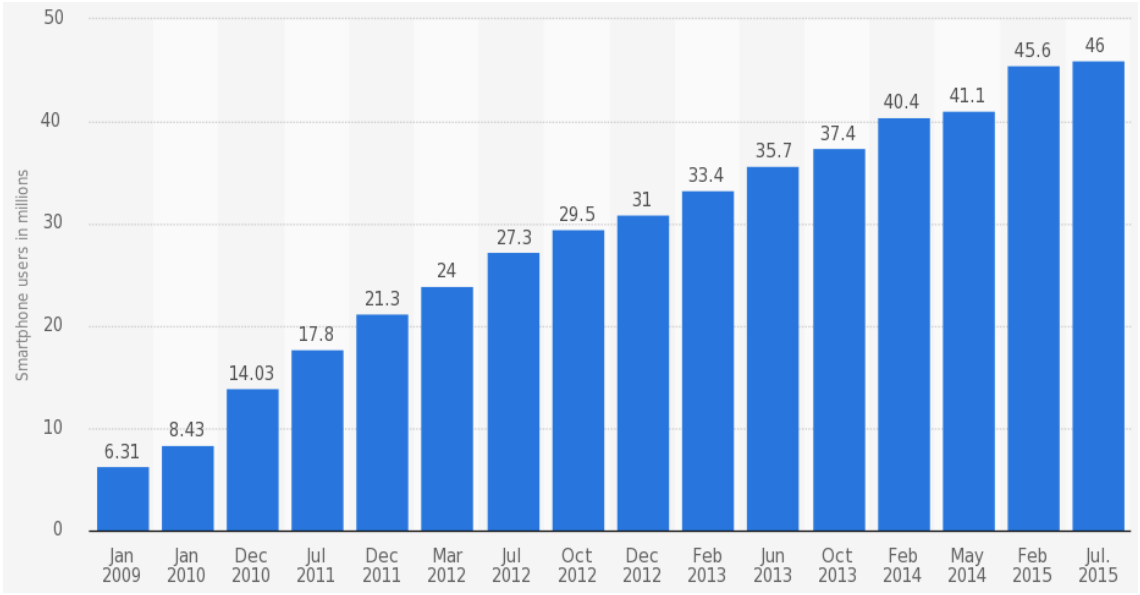

Figure 2-6: Number of smartphone users (in millions) in Germany (MarketLine, 2016)

According to a study (Portio Research, 2013) more than 7 billion mobile subscriptions exist worldwide, which almost equals the number of human beings on earth. The Internet is used by approximately 1.8 billon people, and 1.2 billion people have landlines. By 2013, mobile phones overtook personal computers as the most common web access device worldwide (Gartner, 2013). Mobile users have increased nearly tenfold from 730 million in 2000. Currently, there are approximately 114 subscriptions per 100 people in the developed world, and approximately 70 subscriptions per 100 people in the developing world (International Telecommunication Union, 2011). The figures above underpin the statement that mobile IT is of importance for IT companies and IT service providers.

For financial market companies, mobile information technology becomes important because every project includes some aspects of mobile IT, and mobile IT strongly influences consumer behaviour. Mobile computing is fundamentally changing how businesses interact with their clients. The online trading volumes in the UK, for example, have reached double-digit growth (Deloitte, 2007; IMRG/Capgemini, 2008), whereas traditional shopping is languishing at zero growth or less (British Retail Consortium, 2008).

Financial services delivery and consumption has experienced major changes during the last years. Technological development has reshaped the business environment. As illustrated in Figure 2-5, the banking and FM/S industry is one of the sectors that leads in the adoption and use of the Internet and mobile technology in consumer markets; consequently, its service delivery has undergone unprecedented transformations.

On one hand, the development of electronic banking services via multiple electronic channels (cf. Appendix I) has made it possible to provide new kinds of added value for customers. On the other hand, using the Internet for focusing solely on cost reduction may lead to high supply-chain effectiveness while potential customer value opportunities may be ignored (Jonsson & Gunnarsson, 2005). Therefore, understanding service user behaviour and value perceptions are fundamental prerequisites for service development. Customers are now less willing to visit traditional branches, less loyal,

more receptive to new electronic channels, and more sophisticated in demanding better service quality including 24-hour service availability (Coelho & Easingwood, 2003).

In addition, according to some projections, mobile marketing using smartphones will become a dominant retailing channel for many products and services (Leppäniemi & Karjaluoto, 2005). Shankar, Venkatesh, Hofacker, and Naik (2010) provided an excellent overview for this emerging technology and its implications for marketing.

2.9 Gap in literature

This study seeks to close the gap in literature arising from the lack of studies on the influence of mobile IT on the German financial market. Currently, there is no model or theory that examines the technical impact of mobile IT on the German financial markets. By applying survey-based studies with respect to mobile payment applications, some researchers have argued that mobile services and/or applications are particularly relevant (Linck et al., 2006). These studies indicated that consumers preferred simple, secure, and inexpensive services. Other studies aimed to develop user-oriented classifications for mobile IT solutions (Zmijewska et al., 2004). They classified existing mobile applications and evaluated those applications based on a set of consumer-oriented criteria. Relevant classification dimensions included factors such as simplicity, security, and costs. To the best of my knowledge, there is no empirical work that analyses the acceptance of mobile IT by interviewing IT experts to gain the viewpoint of the experts for technological development.

From the business perspective, the existing literature does not cover the link between the business requirements of the financial market and technical feasibility of the mobile IT development. This study focuses on the development of mobile IT solutions for the German FM/S industry and identifies the key drivers of technological development (see Figure 2-7); it also examines the underlying factors that shape these key drivers.

Figure 2-7: Key drivers of technological development

This research will explore the relationship between mobile IT and consumer behaviour with the aim of delivering an enhancement to the Technology Acceptance Model (TAM) proposed by Davis (1989). TAM provides a framework by which the effect of external variables on system usage can be assessed to describe the relation between the technological development and the consumer's expectation regarding a mobile application.

2.10 Summary regarding the key terms

In the literature review, specific key terms were introduced, namely, information technology, mobile IT, consumer, behaviour, and consumer behaviour. Furthermore, the literature review examined the competing theoretical models concerning the acceptance of technology, and how these models will be applied in the context of mobile IT. However, the review was conducted without taken into account the effect of buying behaviour and decision making on the personality because of the psychological context: this comprises human decision processes as well as human behaviour and strategies in context of medical sciences. After reviewing the theoretical background, the (German) FM/S industry was examined, including the region-specific requirements regarding business regulations and information technology, especially mobile IT.

Literature proves that the consumers in the area of financial market and services stand to benefit by information technology, especially mobile IT, based on models how users accept and/or adopt technology. However, existing literature does not highlight the key drivers of technological development from a specific business-related and technical viewpoint. This study draws on the views and expertise of IT architects and specialists in order to gain an in-depth understanding of the factors that influence the architecture and design of mobile IT applications in the German FM/S industry. The aim of this research is to identify the factors influencing mobile IT from a technical point of view and subsequently to refine/adapt the TAM for the context of the German FM/S industry.

2.11 Conceptual Framework

A conceptual framework has been developed for the TAM using the key drivers of technological development, which contain the influence factors (variables) based on the results of the semi-structured interview with IT experts. The aim was to provide answers to research questions. The conceptual framework is important for the current research design and describes the concepts, assumptions, expectations, beliefs, and theories that support and inform the research (M.B. Miles & Huberman, 1994). M.B. Miles and Huberman (1994, p. 18) defined a conceptual framework as a visual or written product, that “explains, either graphically or in narrative form, the main things to be studied – the key factors, concepts, or variables – and the presumed relationships among them”. Within the current research, the term is used to refer to the actual ideas and beliefs of the researcher about the phenomena studied. Also, the key drivers of technological development are engagement, simplicity, efficiency, flexibility, security, and visibility (Figure 2-7), which are placed in the framework to understand the functioning on the model related to key themes. The key drivers have been discussed in more detail in subsequent sections to construct the conceptual framework based on the TAM. This section concludes with the framework evolved using the key themes that emerged during the review.

2.11.1 Engagement

Defining engagement has always been a challenge for marketers. While most researchers agree that engagement involves an interaction between a brand and its potential customers (Verhoef et al., 2009), few can specify what it actually defines. Engagement can be as passive as clicking a 'Like' button; however, many people feel that the interaction needs to be more substantial.

The rise of mobile IT has only added more complexity to this debate. While the medium adheres to the same principles of engagement as other marketing channels, keeping people engaged on mobile devices requires a fundamentally different approach. This is because mobiles introduce several new paradigms on how people interact with technology.

Perhaps the most defining characteristic of mobiles is that they are very personal. Mobile devices are with us all the time. They are in our hands, pockets, or purses from the moment we wake up to the moment we go to bed. An average person has approximately 150 interactions each day with a mobile device (Pietrzak, 2012). Therefore, people engage with their mobile devices in a very different way than computers, TVs, or billboards.

Mobile is also inherently immersive. On touchscreen devices, we physically touch the content and transform it with natural gestures. The growing popularity of motion sensors and wearable technology will push these boundaries even further, giving marketers the ability and impetus to create more engaging experiences.

Finally, mobile IT is a permission-based channel. Just like we do not invite strangers into our homes, we hesitate to invite unknown companies into our smartphones. Any brand that tries to engage potential customers on their mobiles must first obtain their permission and respect this privilege.

By bringing all of these ideas together, we can define mobile engagement as an intimate, immersive, and permission-based interaction between a customer and a company (Pietrzak, 2012). This definition is very different from the existing notions of engagement. However, it provides marketers (financial market organizations) with guidelines on how to engage people on mobiles (Pietrzak, 2012).

Financial market organizations will engage with customers, partners or employees, regardless of who owns the device. They will extend the channels from machines to a broad spectrum of smart devices that can carry out business dealings anywhere using ubiquitous, trusted, and secure transactions. Mobile IT will provide appropriate technology for the continuously changing business environment and will provide more accurate information to businesses (IBM, 2011).

Mobile phones enable us to live in a socially well-connected world. Mobile IT helps people to connect to their social networks anytime and anywhere. The boundaries between the office and home are fast dissolving (Puro, 2002). Mobile devices are emerging as gateways for people to sense their digital contexts (Rhee, Kim, & Chung, 2006). Mobile technology is pushing us to redefine how we manage our interactions in both physical and social spaces. We are already using mobile technology in our social lives in a big way. In banking services, mobile banking will be the most widely used banking channel by 2020, if not sooner (Mobile Banking, 2010). In the area of banking services the mobile banking will be the most widely used banking channel by 2020 if not sooner (Mobile Banking, 2010) because of the adoption rate among smartphone users based on the innovations in mobile wireless communications.

2.11.2 Simplicity

Based on the advances in mobile computing and communication technologies, diverse mobile services including local information providers, search engines, shopping options, and e-mail services are being developed. Mobile phone users can access and use mobile services anytime and anywhere (Cui & Roto, 2008). Therefore, mobile service providers have improved their current services making web portal services compatible with mobile environments. According to several academic studies on mobile services,

browsing-enabled mobile phones (such as smartphones), high-speed wireless networks, and special tariffs are essential factors for the success of these services (Jindal, Crutchfield, Goel, Jain, & Kolluri, 2008). A variety of contents, web pages, and services may be delivered in mobile environments. Although mobile services extend the fixed web services into the mobile environment, mobile services do not merely replicate the fixed web services. Mobile services are more personalized, developed, and simple (Ho & Kwon, 2003). Smartphone users are limited by small display sizes although technical advances are being made in mobile hardware to improve display resolution. In addition, the mobile network (wireless communication) is still relatively slower than the fixed (twisted-pair hard-wired) network.

Diverse mobile technologies including the Wireless Application Protocol (WAP), have been developed to help organizations to design simple web pages for mobile phones (M. Chen, Zhang, & Zhou, 2005). The latest smartphones are able to provide users with 'full-browsing' mobile browsers with relatively wide display sizes to navigate and use web pages while on the move; however, several issues arise because of the small screen sizes of smartphones. To overcome these small-screen issues, service providers (such as web portal sites) need to select important contents and functions to be displayed on their web pages designed specifically for smartphones (Chae & Kim, 2004). The issue of small screen sizes for mobile devices commonly results from the complexity of service provider web pages. To solve this problem, service providers must simplify and organize their service structures with efficient trade-offs, such as selection and concentration. Web service companies, including Internet portals, operate their mobile services in diverse ways. For instance, several portals focus on extraordinary and specific contents to be displayed on mobile web pages whereas others try to show as much content as possible and design their mobile services to be consistent with their services for PCs (i.e., fixed web pages).

There are diverse academic studies on simplicity in the design and use of computer technology, especially in Human Computer Interaction (HCI) studies, which investigate the interfaces between people (users) and computers. Simplicity is one of the key factors in designing easy-to-use products, which is also important to develop the usability of information (D. Lee, Moon, & Kim, 2007a, 2007b; Maeda, 2004, 2006; Tischler, 2005). According to previous studies, simplicity in HCI represents not only simple page layouts but also includes interface organization, functionality, structure, workflow, and framework. Based on this definition, diverse studies classify simplicity into the four sub-constructs: reduction, organization, integration, and prioritization (D. Lee et al., 2007a, 2007b; Maeda, 2006; SAP Design Guild, 2004) (see Figure 2-12).

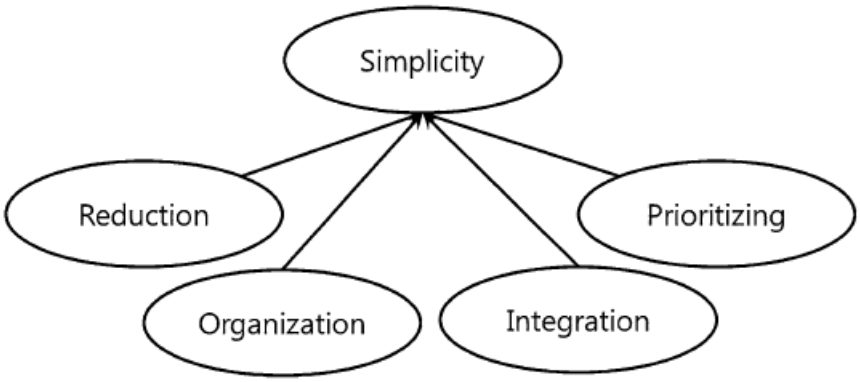

Figure 2-8: Simplicity model (D. Lee et al., 2007a)

Carstens and Patterson (2005); Koohang (2004a, 2004b); Koohang and Ondracek (2005); D. Lee et al. (2007b) explain simplicity as an important factor affecting usability; the latter is defined as the degree to which a software can be used by specified consumers to achieve quantified objectives with effectiveness, efficiency, and satisfaction in a quantified context of use (Institution, 1998). Chae and Kim (2004) noted that the small screen sizes of mobile devices may negatively affect user perceptions of site effectiveness. Simplicity is expected to exert a positive influence on the perceived ease of use, which is one of the meaningful constructs of usability. Dianne, Milena, and Alex (2006) explained that adherence to design simplicity for a mobile web pages will positively affect perceived usability.

Interface credibility relates to the display of the computer product as well as to the interaction experience and is based on user perceptions from simple inspection (Fogg & Tseng, 1999). Several studies (Fogg & Tseng, 1999; Kuiper, 2004) have described the effects of interface design on perceptions of credibility, such as the influence of interface design features and balanced layout on perceived trustworthiness. For instance, credibility can be affected by the user's impression of the visual design of a simple web page (Fogg & Tseng, 1999).

Koohang and Ondracek (2005) suggested twelve factors affecting the usability attributes: Simplicity, Comfort, User friendliness, Control, Readability, Information Adequacy, Navigability, Recognition, Access time, Relevancy, Consistency, and Visual presentation. Carstens and Patterson (2005) cited the studies of Nielsen (1994a) and Shneiderman and Plaisant (2005) to explain consistency as one of the usability heuristics affecting perceived usability attributes. P. Ketola, Hjelmeroos, and Raiha (2000) explained that internal and external consistency should be considered to provide the interface with functionality and usability when mobile services including WAP service are designed.

Usability is described in diverse academic studies as significantly affecting user satisfaction. Satisfaction is an affective consumer condition derived from a global evaluation of all the aspects that make up a consumer's relationship with a service or product (D. Lee et al., 2007b; Muylle, Moenaert, & Despontin, 2004). Casalo, Flavian, and Guinaliu (2008) explained that satisfaction is affected by perceived usability and loyalty can be affected by satisfaction and usability. Based on a study by Roy et al. (2001), Schmidt-Belz (2003) explained that perceived site usability has a positive impact on the perceived trustworthiness. Fogg et al. (2000) explained that enhancing the usability of web pages may be related with the site's perceived credibility.

Loyalty is widely accepted to be related to diverse variables known as 'accumulative inertia'. According to Casalo et al. (2008), the level of usability may be related to the user's belief on the value—the perceived value—of a web page in the same category, and usability may enhance the level of lock-in and loyalty. Loyalty can be measured

by attitudinal and behavioural methods. Increased satisfaction also affects user loyalty and behavioural intention (Bagozzi, 1992; Oliver, 1999).

Simplicity shows a great effect on usability and credibility than consistency does although consistency also shows a significant effect (J. Lee, Lee, Moon, & Park, 2013). In this regard, developing mobile web services to be simple by following the selection and concentration strategy can be an effective strategic approach.

User interfaces must be easy and obvious from the consumer's perspective. Typing should be minimized. The 'first look' at a web page (and a mobile application) and the page/application content is crucial for gaining and holding the attention and interest of consumers (Geissler, Zinkhan, & Watson, 2001). The web page design therefore relies on opinion and personal observation or experience and not on empirical research (D'Angelo & Little, 1998).

2.11.3 Efficiency

Mobile users require efficient and timely access to information. Geissler, Zinkhan, and Watson (2006) examined the amount and type of information that should be included on a web page (and also a mobile application) to facilitate effective communication. The designer (or developer) of the organization has to ensure that an optimal balance is maintained in presenting the appropriate amount of information, which should be neither too less or too much.

While determining the differences in customer value perceptions between the Internet and mobile banking, Laukkanen (2007) indicated that efficiency, convenience, and safety are the most important requirements for bank customers. Efficiency mainly derives from service access locations. In the case of Internet bill paying, home access saves time by eliminating the need to leave home or office for paying bills. Similarly, location-free Internet access and mobile bill paying is linked to the ability to use the service from any location. However, the results do not provide more detailed reasoning for Internet services. The users of mobile fund transfer services claimed that the ability to use these services from any geographical location enables immediate action (e.g., transfer

of money or payment of bills), which is perceived as efficient because it saves time (Schierholz & Laukkanen, 2007).

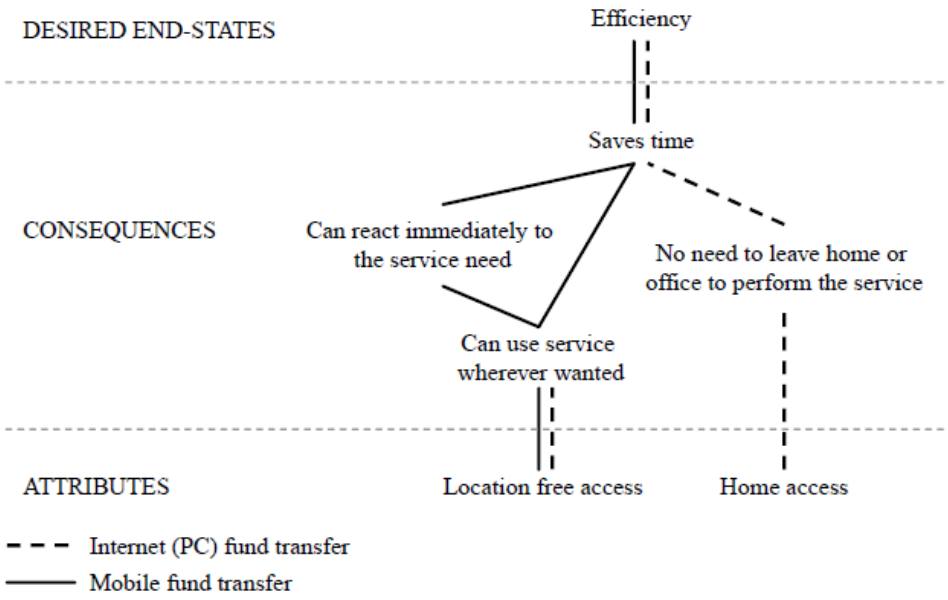

Figure 2-9: Relation between efficiency and time saving (Laukkanen, 2007)

The most important contribution to mobile banking is the ability to use the service from any location (Laukkanen, 2005), which ensures immediate action and time savings. Schierholz and Laukkanen (2007) argued that keyboards and device displays are major inhibitors for the use of mobile bill paying services, whereas these features are advantageous for PCs. Technological development in the mobile sector, like optimized wireless communication networks and improved displays of the devices, will likely change the current situation and improve wireless service consumption. However, data input may still be a bottleneck in the consumption of some mobile financial services unless improvements are made in the input methods (Schierholz & Laukkanen, 2007).

Laukkanen (2007) argued that theoretically efficiency and convenience were overlapping concepts in electronic service consumption. The relationship between convenience and efficiency seems to be somewhat obscure in current literature also. Berry, Seiders, and Grewal (2002) defined efficiency as an aspect of convenience. On the contrary, Holbrook (1994, 1999) placed convenience under the concept of efficiency.

However, the authors agreed that efficiency refers to the perceived benefits received by customers in relation to the sacrifice or costs. This efficiency perception means that consumers cognitively perceive the ratio of benefits obtained and sacrifices made. (Laukkanen & Kantanen, 2006). For example, when a consumer perceives that mobile bill paying saves time compared to his earlier way of paying, the perception of efficiency is formed. The arguments by Schierholz and Laukkanen (2007) show that convenience is a multi-dimensional construct including cognitive appraisals and hedonic emotions; it is purely related to the economic ratio between benefits and sacrifices. However, the relationship between convenience and efficiency concepts needs more attention in future studies.

2.11.4 Flexibility

Mobile users today expect high-fidelity mobile access to the same information that they access on their desktops, and this information is to be presented in an easy-to-learn, mobile-friendly format (cf. Appendix I). The rapid and accelerating move towards the adoption and use of mobile technologies has increasingly provided people (consumers) with the ability to be flexible (mobile).

One of the most widespread terms in the conceptualization of mobility, in research and in practice-oriented literature, is that of ‘anytime, anywhere’. This seems to capture the spatial and temporal dimensions of mobility. One of its chief proponents, (Weiser, 1991) argued that the combination of portable computing with portable communications is changing the way we think about information processing. We now recognize that access to computing and communications is necessary not only from one’s ‘home base’, but also while one is in transit and/or when one reaches one’s destination (Kleinrock, 1996). Access is required ‘anytime, anywhere’.

The transportation of a document between a desktop computer at an office and a laptop in a hotel room constitutes a different level of mobility (or spatial granularity) than the ‘anywhere’ associated with (micro-)mobility of documents (or any other artefacts) in response to the ongoing demands of a particular task (P. Luff & Heath, 1998). The granularity differences in spatial shifts in these two examples demand a different

set of affordances from the information embodiments used to support them. Therefore, a laptop is able to receive a document at any location where a network connection can be established with a computer located elsewhere; this can be done by a mobile device also. However, once the document is received, the laptop (or mobile device) cannot be spatially reoriented at the micro level (without being online or replicated), for example during a face-to-face interaction, in the way that a paper embodiment of the same document could have been reoriented (R. Harper & Sellen, 1995; Luff, Heath, & Greatbatch, 1992). The notion of 'anywhere' also assumes a geometric notion of space in which all places are assumed to be functionally equivalent. We can also look at the social facets of 'anywhere' and consider spaces in terms of the different properties and social norms governing the kinds of activities that can take place there. For example, the kinds of mobile phone conversations one can have in a public place is different from the kinds of conversations one could have in a private place (Churchill & Wakeford, 2001). In this instance, 'anywhere' access is possible but not desirable.

For the illustration of the notion of 'anytime', consider the task of writing a document on a laptop while needing to reference some information from a source document. The level of time granularity associated with a quick glance access of information from a paper document located adjacent to the laptop is very different from the time granularity associated with obtaining the same information by downloading the document from the Internet (Perry, O'Hara, Sellen, Brown, & Harper, 2001). The different embodiments of the information in these two instances offer very different values and properties in terms of the way they can be drawn upon as a resource for the ongoing activities. To ignore these different facets is to ignore the very features of the competitive artefact ecology within which new mobile devices must operate. As with notions of space associated with the term 'anywhere', the term 'anytime' often assumes a linear notion of time. This is opposed to the facet of 'anytime' characterized by social norms and properties of time that affect information access and communication behaviours (Perry et al., 2001).

2.11.5 Security

The consumers expect the base framework of the mobile device to be secure enough or at least robust enough to inform the consumer about any potential harm from applications developed by third-party developers. Security issues in mobile devices are becoming more threatening and similar to desktop systems.

The lack of security as perceived by online consumers is one of the main obstacles to the development of electronic commerce (Chou, Yen, Lin, & Hong-Lam Cheng, 1999; Dong-Her, Hsiu-Sen, Chun-Yuan, & Lin, 2004; Furnell & Karweni, 1999) by an organization (or service provider). The reason for this is the possibility that financial data might be intercepted and put to fraudulent use (Jones, Wilikens, Morris, & Masera, 2000). Kolsaker and Payne (2002) maintained that security includes perceptions regarding the reliability of the payment methods used and the mechanisms of data transmission and storage. Perceived security may be defined as the subjective probability by which consumers believe that their personal information (private and monetary) will not be viewed, stored, and manipulated during transit and storage by fraudulent parties.

Therefore, technical aspects need to ensure the integrity, confidentiality, authentication, and non-recognition of transactions. The integrity of an information system refers to the impossibility of the transmitted or stored data being modified by third parties without permission. (Flavián & Guinalíu, 2006). Confidentiality involves the data being seen by authorized individuals. Authentication allows a certain operation to be carried out only after identifying the third party (e.g., a web page) or after obtaining some safety guarantees. Finally, Flavián and Guinalíu (2006) argued that non-repudiation refers to procedures that prevent an individual or organization from denying that they had carried out a certain operations (e.g., a purchase order).

Similarly, studies have shown that perceived security and trust in vendors and payment systems are significant determinants of mobile commerce success (K. Siau, Sheng, & Nah, 2004; Xu & Gutiérrez, 2006), and trust has a positive impact on customer loyalty and satisfaction towards mobile commerce (Lin & Wang, 2006). Trust is a significant determinant influencing customers' willingness to conduct electronic commerce

transactions (D. Gefen & Straub, 2003; Jarvenpaa et al., 2003). The problems of security (and privacy) and their effect on Internet trust and loyalty have been analysed in various research studies (Gavish & Gerdes, 1998; Kruck, Gottovi, Moghadami, Broom, & Forcht, 2002).

Consumers' concerns about the privacy and security of mobile solutions are commonly related to authentication and confidentiality issues and concerns about secondary use and unauthorized access to user-sensitive data (Dewan & Chen, 2005). Perceived security and trust are thus expected to impact the adoption of mobile solutions. Therefore, ethical issues are also to be considered. The field of information ethics was originally established by the mathematician Norbert Wiener in the 1940s (Cavalier, 2005). The following ethical points are important in connection with mobile technologies:

- Delivery of unsolicited information
- Access to and secondary use of sensitive information
- Monitoring of activities

That means in context of mobile, the IT service providers have to prevent providing spam, virus and other programs, control and protect unauthorized access to personal data, and serve audit functionality to deliver trust and confidence, which are necessary for the enterprise and individuals to embrace mobility.

2.11.6 Visibility

The amount of time and money that a consumer spends in a web store may be shaped by its design (look and feel) and the layout (arrangement of content). Likewise the colours, backgrounds, and fonts used for an online shopping web page may be important factors for consumers. Consumer behaviour is shaped among other things by the web page design (Mandel & Johnson, 2002). There are five factors that influence the development of a 'perfect' graphic unit interface: web page length, number of graphics, number of links, amount of text, and the use of animation (Geissler et al., 2006). These factors may also be applicable in the context of mobile devices.

For mobile devices, the small screen and numeric keypad layout of the handset may present physical constraints, such as reading difficulty and interactivity restrictions related to the use of fine motor skills when operating the keypad (Buchanan et al., 2001; L. Palen & Salzman, 2002). Despite these limitations, studies have suggested that users are able to deal with the physical requirements of new mobile environments. For example, Rahman and Muter (1999) examined reading efficiency in different types of small-display presentations. Their findings suggested that reading comprehension is not affected by the type of display because users are capable of physically adapting to smaller screen sizes by reducing their eye movements.

In the area of visual and motor skills, Buchanan et al. (2001) studied three types of navigations in an application that delivered news headlines to mobile users. Each navigation scheme (horizontal scrolling, vertical scrolling, and paging) required a particular keystroke and resulted in a different visual effect. Their results indicate that while vertical scrolling is more natural than horizontal scrolling, any scrolling is potentially tedious when used extensively. In contrast, paging (moving through pages) represents a trade-off because it is less monotonous than scrolling but adds a layer of complexity to the interaction. However, their study found that user errors with each type of navigation scheme were very low and not significantly different from one another.

In addition to featuring differing keypad layouts and screen sizes, mobile devices operate differently from one another, depending on the device type (Benbunan-Fich & Benbunan, 2007). Even if users are familiar with their handsets, they may not be well versed in using these devices for receiving data or downloading content-based applications. With experience, users develop a set of skills and relevant knowledge that leads to effective performance with a particular technological environment (Schenk, Vitalari, & Davis, 1998). However, lack of familiarity is likely to result in a wider range of challenges for new users of mobile data services as compared to users who have experience with other mobile data services. To distinguish between new and experienced users, we use the terms ‘novice’ and ‘advanced’, respectively. In their study

on orthogonal frequency division multiplexing (OFDM) wireless network (WLAN), Heiskala and John Terry (2001) defined a novice as someone with a background in engineering and mathematics and some knowledge of communication theory; they defined 'advanced' users as engineers or scientists who are familiar with basic concepts. This circumstance is of importance because it results into various approaches for the architecture and design of mobile applications.

Overall, the results of prior empirical studies suggest (van Sinderen, van Halteren, Wegdam, Meeuwissen, & Eertink, 2006) that user performance with new applications largely result from a user's understanding and subsequent ability to adapt to the physical environment provided by the mobile IT artefact (device and application), given the requirements of the current task. The theory of automaticity (Logan, 1992) assumes that automatic performance is based on single-step direct-access retrieval of prior solutions from memory and is applied to present problems. New users are likely to experience more adaptation challenges than advanced users, who can apply their prior experience with mobile applications to a relatively new but similar context. If the application is well designed, advanced users will exhibit a higher degree of automaticity than novice users, despite the fact that both types of users will be interacting with the mobile application for the first time (Benbunan-Fich & Benbunan, 2007).

An analysis of systematic errors by both types of users offers the opportunity to improve the mobile application. For example, knowledge-based errors, though more frequent for novice users, are reduced with better instructions. In contrast, rule-based errors tend to be the result of general misconceptions and occur among all users, regardless of their level of expertise. When these rule-based errors are made by a portion of the user base, more accurate descriptions of the application are warranted. Similarly, systematic skill-based errors or slips indicate the need for alternative actions to minimize the likelihood of these slips. The occurrence of errors in systematic patterns may shed some light on the features of an IT artefact that are not well understood by users or not properly designed (Benbunan-Fich & Benbunan, 2007).

2.12 Summary

The literature review was expansive, because of the presence of diverse literature on the impact of mobile IT on consumer behaviour. This chapter attempted to understand the scope and scale of the key drivers of technological development with a focus on the current issues and the practicalities of the task. The objective was to not only to obtain a pre-research understanding of the key terms but also to identify relationships between these key drivers and the theoretical models with respect to the researcher's experiences.

The literature review has uncovered gaps in the research that could deliver practical and well-needed insights. The thesis closes the gap left by the lack of a technical point of view in the recent literature.

The literature described the interaction between customer and company with the focus on the interaction between brand and customers without highlighting the technical aspect. However, people want, seek, and expect useful, intuitive and meaningful mobile IT interactions with financial institutes whenever required. That means people interact with technology and the question is what a company has to do in order to inspire and keep clients? This leads to the first research question:

- **RQ1**: How do mobile information technologies influence the engagement of companies for developing mobile solutions?

The current literature is essentially concerned with the question how mobile technology simplifies the work. The authors provided arguments why it is important to deliver easy/simple financial services for various input channels in a complex mobile IT world. The interfaces between people and devices were investigated to achieve quantified objectives with effectiveness, efficiency and satisfaction in a quantified context of use. The literature describes the current usability in general. Does the focus on this aspect has changed the user behaviour? This assumption is addressed by the second research question:

- **RQ2**: Has consumer behaviour significantly changed by using the latest user interface trends?

In the literature, service access and availability are of particular importance for the consumption of financial products and services. It is agreed that efficiency refers to the perceived benefits received by customers in relation to the sacrifice or costs. Do sophisticated architecture and design lead to sufficient mobile solutions? Therefore the third research question emerging from the literature is:

- **RQ3**: Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?

The literature discussed flexibility from the user's viewpoint through the terms 'anywhere' and 'anytime'. The technological aspect, especially in conjunction with the development of mobile application for the FM/S industry, was not considered and will be considered by the fourth research question:

- **RQ4**: Does flexibility play a major role in the development of mobile applications?

The literature showed that perceived security and trust are significant determinants of mobile commerce. Perceived security and trust are thus expected to impact the adoption of mobile solutions. It thus follows that the security aspect is transferred to the application layer. However, security influences the architecture and design of the mobile solutions for the German FM/S industry. Therefore the fifth research question derived from the literature is:

- **RQ5**: What role do device management, data privacy, and security play in the development of mobile solutions?

The length of time and money that a consumer spends with a mobile application may be shaped by its design (look and feel) and the layout (arrangement of content). The current literature suggests that user performance with new applications result largely from the user's understanding and subsequent ability to adapt to the physical environment provided by the mobile IT artefact (device and application). This is reflected by the final research question:

- **RQ6**: How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?

Academics have lain the foundations to what phenomena are influencing the mobile IT development. However, there appears to be a lack of rigorous literature that describes how practitioners in the field should address this. As mentioned in chapter 1.6, and 2.7.5, the TAM provides a framework by which the effect of external variables on system usage can be assessed. This allows the researcher to evolve a conceptual framework comprising the key drivers of technological development under consideration of the research questions (see Figure 2-10).

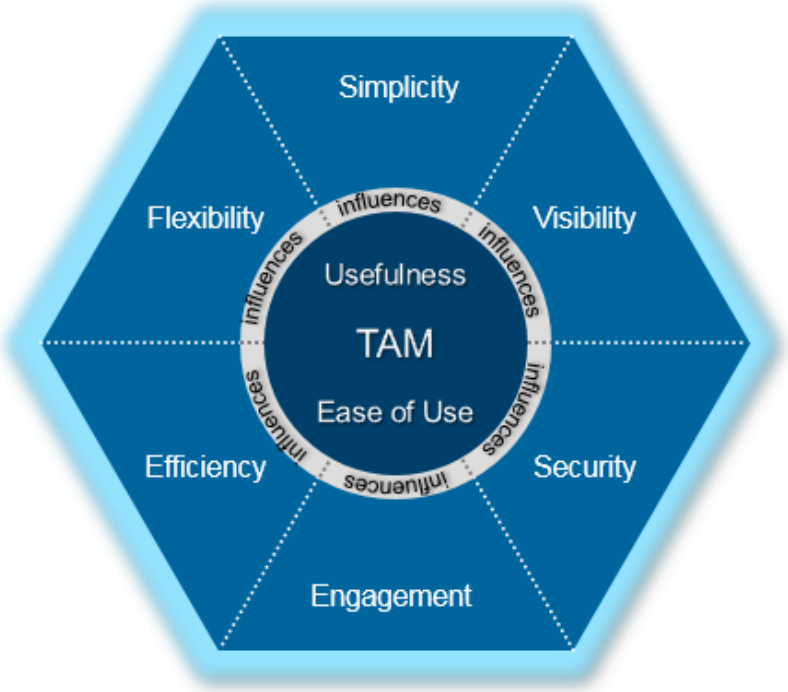

Figure 2-10: Conceptual framework

This framework is the basis on which the company IBM can develop their mobile applications. Based on the framework the researcher provides recommendations for practitioners. In the next chapter, the research methodology used to help uncover insights within this under-researched area will be discussed and will lay the foundations for a support mechanism for practitioners.

3 METHODOLOGY

3.1 Introduction

This DBA journey has been borne out of a burning desire (and need) to make a practical contribution to the FM/S industry and also to act as a conduit between two diverse spectrums (academics and practise) enabling practitioners to readily apply new theories and knowledge. In compiling this thesis, the practical application issue has been a constant consideration and a cornerstone for the research methodology. Kelemen and Bansal (2002) recognized the occasional failure of business management research to communicate with practitioners, and they highlighted how relatively little management research is published in practitioner journals. They said that it was possible that the interests of researchers may not always coincide with those of management practitioners; nevertheless, academic research tends to be functionalist and written in a style that alienates most practitioners. Kieser and Leiner (2011) also demonstrated that it is extremely difficult to integrate knowledge that has been generated in the different contexts of science and practice. It is therefore imperative that the knowledge that is created engages with and has some form of impact on managerial practice (Hodgkinson, 2001; Tranfield & Starkey, 1998). Business research is driven by an organizational problem and stimulated by personal expertise and interest. However, the relationship between theory and practice as mentioned by Gummesson (2000, p. 9) must be guaranteed to agree with the fundamental understanding of the main philosophical approaches in business management research.

This chapter describes the methodologies used for conducting this research. It has four sections. The first section highlights the philosophy chosen for this study on the basis of the research paradigm (see Appendix II). This is followed by a section that outlines the research methodology and methods. The third section contains a description of the data collection procedures including sample selection while the last section describes the methods employed to analyse data.

3.2 Research philosophy

The approach selected can depend on criteria, such as philosophical standpoint, availability of materials, time availability, and audience under scrutiny (Cresswell, 2003). This research uses the inductive approach, which has allowed for real in-depth exploration and analysis and flexibility to fully understand the situation (Bryman & Bell, 2011). The researcher explored the practitioner perspectives and aimed to adapt a technology acceptance model to incorporate the practitioner perspective. The inductive approach tends to create clusters of data where patterns begin to emerge and from which data themes can be generated (Jenkins, 2011). Newman (2003) suggested that the inductive approach can be affected by the opinions of the researcher (i.e., subjectivity); however, when the researcher has intimate experience of the subject area (e.g., a long-serving practitioner), then this effect may actually be positive depending on the nature of the phenomenon being studied (Diefenbach, 2009). Based on the nature of the subject of inquiry and the qualitative methodology, the inductive approach appeared most suitable for this study to elicit the subjective data and uncover and identify the necessary themes to deliver insights for practitioners (Parker, Saundage, & Lee, 2011).

The researcher focus on the mobile IT experts' knowledge intently and how this meaning is constructed in the world of mobile IT. The research deals with the critical investigation of the IT expert's perspective to specify the impact on the mobile application development for the German financial market and services industry. It is the curiosity of the researcher to explore the factors influencing technology development. Therefore multiple, local and specific constructed realities on the topic were emerged based on the expert's expertise and the known literature. The researcher gets involved to understand the viewpoint of the IT experts and gain insights into their thinking process. In contrast to a reductive approach based on positivism the researcher is not a detached observer and not independent of the subject. Although the interviewer and respondents are linked, this approach allows that the knowledge is divested from

the interaction. The researcher considered this approach as the preferred paradigm for addressing the research questions and defining the format for the current research.

To determine the drive paradigm, the researcher's personal philosophical tenets were considered against a few academic models, such as Fisher's framework and the Burell and Morgan (1979) matrix. Fisher's framework hones the key differentiating philosophical assumptions and the impact they have on design. The Burell and Morgan (1979) matrix was particularly useful in analysing competing paradigms. This continuum of interpretive paradigms and some personal reflections helped determine the researcher's own philosophical standpoint and the nature, breadth, and depth of the research question. No specific rules were engaged for this process, and ultimately this resulted in greater clarity and confidence in the final shape of the design. This research project is based on establishing some fundamental insights (Jefferson & King, 2011) that may assist practitioners to counterbalance the observed breakdown in mobile IT and consumer behaviour affinity (taken from the IT experts' perspectives) by a deeper mobilization of narrative and storytelling. Considering both the nature of what is being researched and the researcher's own philosophical/ontological position, the interpretivist/inductive approach was considered the most suitable approach for this research. This approach helped uncover rich insights (Easton, 2010) to phenomena existing in the social world for which one has to rely heavily on subjectivity and interpretations from observations (D. Harper & Thompson, 2011) to meet the stated research aims and objectives.

For this thesis, the researcher has followed a qualitative phenomenological approach that describes the 'lived' experiences of a phenomenon from the interviewee's perspective (Van Manen, 1990). Phenomenology has its origins in the thinking of the German philosophers Husserl (1913) and Heidegger (1927) as well as the French phenomenologist Merleau-Ponty (1945) who adopted the classical phenomenological approach (Crotty, 1996). Giorgi (1989) stated that four core characteristics hold across all variations – the research (a) is rigorously descriptive; (b) uses phenomenological reductions, (c) explores the intentional relationships between persons and situations,

and (d) discloses the essence, or structure, of meaning immanent in human experiences by the use of imaginative variation. The phenomenological research approach is data-driven and enables explanations of phenomena. Researchers have to be "extraordinarily diverse in their interests, in their interpretation of the central issues of phenomenology, in their application of what they understood to be the phenomenological method, and in their development of what they took to be the phenomenological programme for the future of philosophy" (Moran, 2000, p. 3). This diversity is reflected in phenomenological research, where the application of philosophical ideas to the empirical project provokes both uncertainty and controversy.

The researcher agrees that the central concern of the phenomenologist is to return to embodied, experiential meanings (Finlay, 2012). They aim for fresh, complex, rich descriptions of a phenomenon as it is concretely lived. As Wertz (2005, p. 175) explains: "Phenomenology is a low-hovering, in-dwelling, meditative philosophy that glories in the concreteness of person-world relations and accords lived experience, with all its indeterminacy and ambiguity, primacy over the known". In case of the current research an interpretive (hermeneutic) phenomenology by Heidegger (1927) is applied which focuses on the relationship between the event and the person, and how meaning is formed in that relationship.

In general, the interpretivist usually emphasizes words rather than quantifications in the collection and analysis of data. Based on the views of Weber and Winckelmann (2002), the researcher would like to understand (*Verstehen*) the viewpoints of IT experts, gain insights into their thinking processes, and classify IT expertise to explain (*Erklären*) the relationship between the factors influencing technology development and TAM based on the experts' knowledge and experience. TAM was chosen, because the theory has been applied widely and it provides a framework by which the effect of external influence factors on system usage can be assessed. In the context of the current thesis, the factors derived from the examination of an experience in relation to other influences, which is to "get beneath" the subjective experience. The researcher gathered business expertise and innovative and radical viewpoints. The interpretivist approach

helps to answer the fundamental question from the viewpoint of the IT expert why the consumer uses the mobile channel and when and how often mobile IT is used. These personal pointers and knowledge about the philosophical paradigm led to an interpretive axiology with phenomenological epistemology (as a form of interpretivism) based on constructionist ontology as the starting point (see Figure 3-1).

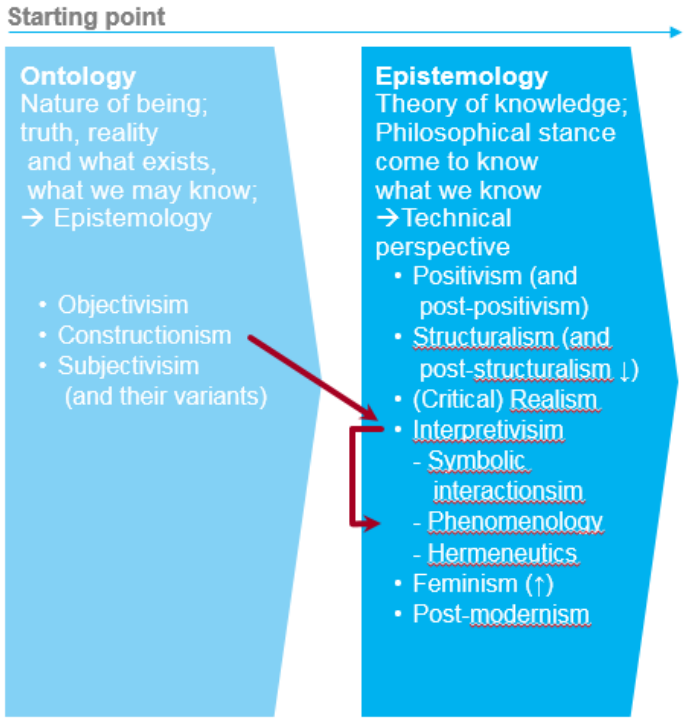

Figure 3-1: Philosophical paradigm of the researcher

3.3 Research methodology and method

3.3.1 Research methodology

Although the general focus of the research was to discover the main concerns about occurrences in the research situation (Moghaddam, 2006), the researcher did not follow the aim to build a theory from the ground. Instead, the researcher followed a qualitative phenomenological research approach to provide explanations for the phenomenon. The impact of mobile IT is described in relation to an existing information system theory, the Technology Acceptance Model (TAM), which is the underlying model for this research. The TAM is a well-recognized model used to explain information system adoption behaviour, and it is a useful tool for understanding consumer behaviour

for services, such as mobile banking services; it combines aspects of technology and service goods from the perspective of behavioural sciences. In this study, the technological perspectives of IT experts are considered, qualitative data will be gathered related to the key drivers of technological development to understand the kinds of factors influencing mobile IT.

3.3.2 Research method

The objective of the research is a critical investigation into the impact of mobile information technology on consumer behaviour in the German FM/S industry. If we focus on the consumer, the research might seem deductive at first glance because hypotheses may be developed (based on the underlying model) and tested to describe the relationship between the viewpoints of IT experts and behaviour of consumers. However, the main focus of this research is the influence of the mobile IT solution architecture and design, which implies the technical aspects.

Assuming that IT experts would provide essential and significant inputs regarding technical aspects, the researcher conducted expert interviews as a subtype of the semi-structured interview (Harrell & Bradley, 2009). The IT expert is someone having privileged access to relevant information and who can shape reality through his institutional context (Hitzler, Honer, & Maeder, 1994; Meuser & Nagel, 2009). During the in-depth expert interviews of 18 mobile IT experts categorized according to the key drivers of technological development (cf. chapter 2.11), the researcher gained insights into the thinking process of the IT experts, which enabled the classification of the statements made by mobile IT experts.

This study provides a reconstruction of subjective IT expert viewpoints and propounds a theory. Therefore, the semi-structured interview is appropriate to gather the expertise of the IT experts. Semi- structured interview is well suited for the exploration of the perceptions and opinions of respondents regarding complex and sometimes sensitive issues and enable probing for more information and clarification of answers. Furthermore, the semi-structured interview considered the varied professional, educational and personal histories of the sample group and precluded the use of

a standardized interview schedule (Louise Barriball & While, 1994). Data collection with semi-structured interviews is favoured over quantitative methods because the research questions call for an exploratory study. In a research area in which current literature and research is limited, a qualitative approach needs to be given preference (Bryman, 2012); this would support the baseline understanding of the research phenomenon and allow for further informed quantitative research (J. W. Creswell, 2012). First, fundamental questions have to be explored before being able to consider specific aspects. The representative sampling for each category of the research string (path) is described in Figure 3-2.

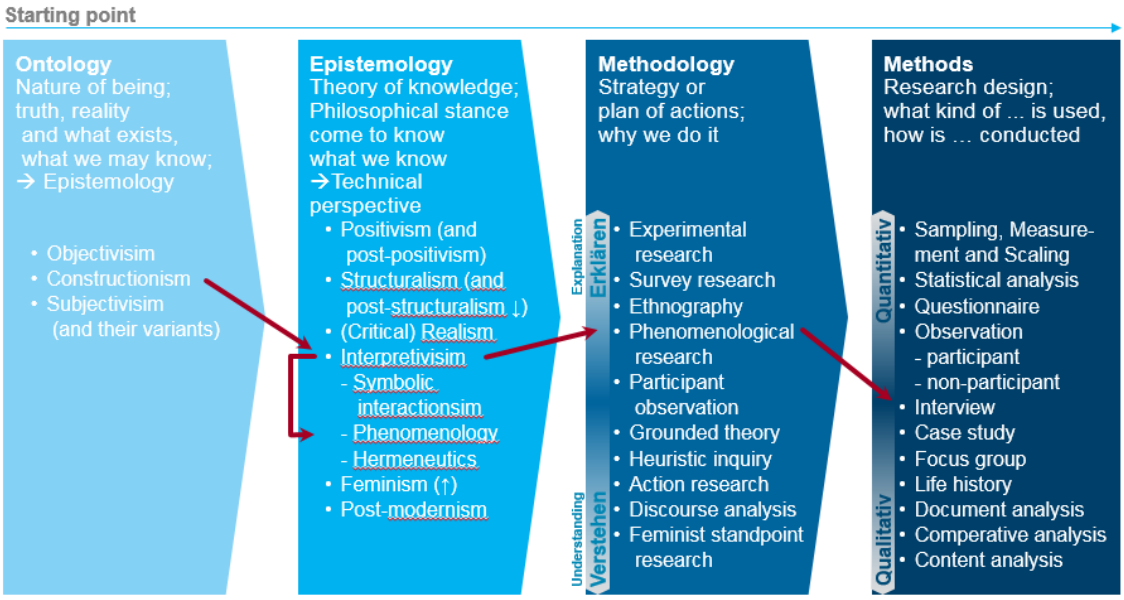

Figure 3-2: The research string (path) of the researcher

In this approach, the researcher seeks to establish the meaning of a phenomenon from the viewpoint of the interviewees (J. W. Creswell, 2012). Semi-structured interviews encourage the interviewee to explain and to discuss attitudes and facts (Campbell, Quincy, Osserman, & Pedersen, 2013). The method used for semi-structured interviews is based on Scheele and Groeben (1988) and has been specified subsequently by Groeben (1990). Brigitte Scheele and Norbert Groeben are psychologists who developed the approach for understanding subjective theories as a special model for studying everyday knowledge. They developed their approach in the 1980s and

1990s to study subjective theories in the fields like education and professional work. Interviewing has become the predominant method for data collection in qualitative research (Pierre & Jackson, 2014) where in-depth exploration into ideas and relationships is required (Schwandt, 2007).

For this study, the technical viewpoints have been analysed by conducting expert interviews with professional mobile IT architects and specialists in a worldwide-acting IT company (IBM Corporation) based on the analytical approach of content analysis. Content analysis is a method for summarizing any form of content by counting various aspects of the content. The subject expertise of the researcher enabled him to grasp the significant technical inputs provided by the interviewees who had complex knowledge about the topic under study. The semi-structured interview protocol was selected because the researcher was able to deduce interview questions from the research questions; the interview also left sufficient space for emerging themes. Various alternative methods were reviewed but rejected because their characteristics did not suit the current thesis.

Method	**Reject reason**
Survey	Lack in providing deep insights and flexibility (Singh, 2015). Risk of low response rate and unqualified content, because of missing motivation.
Focus group	Not appropriate because answers can be influenced by the conversation with others and possible difference in status; Data is less representative. However, could be applied after in-depth interviews (Ritchie, Lewis, Nicholls, & Ormston, 2013).
Observation	Not applicable because of financial and time constraints. Not appropriate, because of the benefit which the researcher gain from observing the IT architects of how they are designing applications.
Grounded theory	Researcher does not follow the aim to build a theory from the ground. This approach fails to recognize the embeddedness of the researcher.

Table 3-1: Methods considered and reason for rejection

In general, the goal of the interview was to express existing knowledge in answer form so that it was made open to interpretation. This includes assumptions, both explicit and

immediate. The conducted interviews have provided new research aspects (contributions), which had not been previously considered in literature review. Also, the researcher subsequently investigated the claims made in literature in these new areas. This process, that means the contribution of research findings, is part of the 'golden thread' of the main research.

Figure 3-3: The 'golden thread' based on Ramdhony (2014)

3.3.3 Research design

Any research design provides a framework for the collection and analysis of data using broad considerations of the options available. Questioning was considered as the most appropriate method because of the need to find parity with the researcher's epistemology and the nature of the research question. Lancaster (2005) and Bryman and Bell (2011) defined the key advantages of questioning as the following:

- It provided in-depth understanding in particularly complex issues.
- It provided flexibility in adaptation during fluid interviews.
- The simplicity and a semi-structured approach allowed IT experts to open up and provide rich data.
- It provides better validity because of immediate verification with respondents.
- It provides better speed and pace of data collection.

These factors make the approach ideal when implementation horizons are short, such as the current DBA.

Lancaster also highlighted some potential limitations with this approach; bias may become a very real issue particularly with the proximity of the researcher to the respondents. The researcher can be biased by world views, cultural experiences, and upbringing (Saunders, Lewis, & Thornhill, 2012). Respondents may feel inclined to help the researcher or be influenced if certain recording materials are introduced; data analysis can become a huge problem with the scale and potentially unstructured nature of the output; therefore, a sizeable amount of time needs be put aside to collate and analyse data. Finally, the lack of consistency will result as a consequence of the differences in the ebb and flow of the sessions (Gorshkova, Nekrestyanov, Novikov, & Pavlova, 1999). This again will necessitate diligence in final data analysis and summarizing.

At this stage, the research design (i.e., the relationship between the ontology, epistemology, methodology, method, and analysis of the current research) can be described as depicted in Figure 3-4. It begins with the ontological orientation followed by the epistemological and methodical considerations (Grix, 2010).

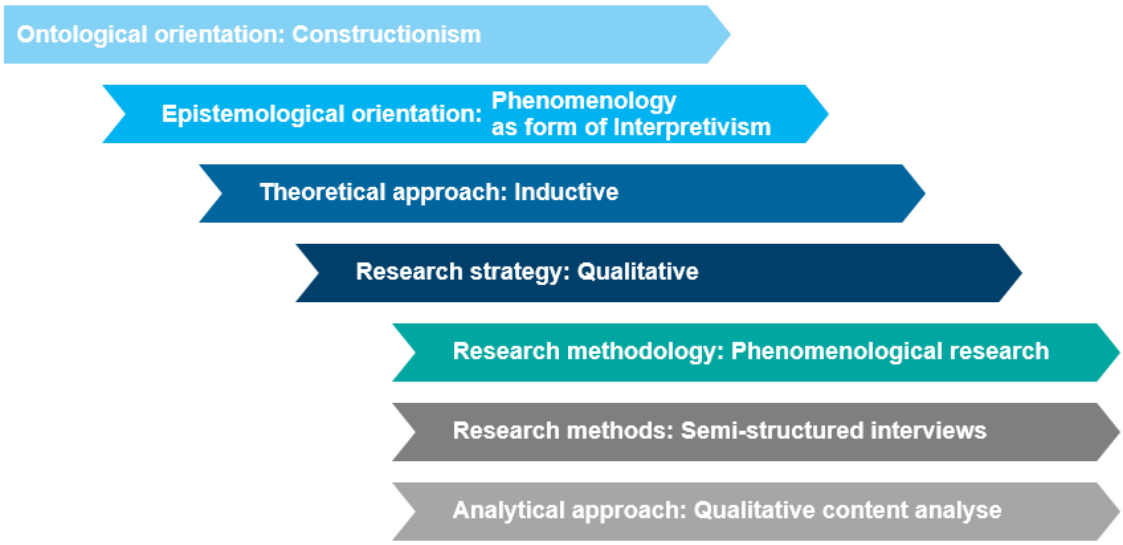

Figure 3-4: The research design of the current thesis

3.3.4 Pilot research

The research design was verified by a pilot research (Denzin & Lincoln, 2011; Tracy, 2010). The pilot study is a "small scale version/s, or trial run/s, done in preparation for the major study" (Polit, Beck, & Hungler, 2001). It is a preliminary study conducted to evaluate feasibility, time, cost, adverse events, and effect size (statistical variability) in an attempt to predict an appropriate sample size and improve upon the study design prior to performing the full-scale research project (Hulley, 2007). The aim of this pilot study was to test the data collection and data analysis processes (Denzin & Lincoln, 2011; Tracy, 2010). Conducting a pilot study does not guarantee success in the main study; however, it does increase the likelihood of success (P. Baxter & Jack, 2008). For the pilot, two IBM IT experts in the field of mobile IT development were randomly selected out of the six key drivers of technological development. The pilot affected several decisions related to conducting the main study, which will be discussed in the following sections.

The pilot study had shown that the number of interviews is not of relevance but that the size of the sample should be established inductively until the saturation point has been reached. Contrary to the pilot approach where a simple random sampling was applied, the sample design for the main study was adjusted to purposive sampling that focussed on the key drivers of technological development which consider each dimension.

The pilot helped the researcher to identify difficulties in applying the coding scheme, such as deciding which category to employ when considering a certain dimension for which no code was available. The pilot provided a direction for the main study but was open for new IT expert views and insights in the main research. However, the pilot was not able to provide definitive answers for any of the research questions because of the restricted number of participants and the limited sample group, which did not reflect the entire population.

3.4 Data collection process

For the pilot study, data was collected in June 2015. For the main study, data was collected from August 2016 until September 2016. In the main research, the IT expert interviews were conducted as late as possible to obtain knowledge and experience of the IT architects and specialists based on current trends in the architecture and design of mobile applications. Furthermore, the time span for the main research was kept as short as possible to ensure that no new findings (e.g., innovations, strategies, trends) come up within the overall interview process, which could impact the data analysis.

3.4.1 Sampling procedure

The interview participants were determined by selecting IT experts from the IBM Mobile Center of Competence. The competence centre is a community within the IBM Corporation that helps to communicate and socialize the status of mobile web projects, services, and best practices. The competence centre is critical to interlock the vision and strategy for mobile IT solutions across the IBM Company. Furthermore, the sample focused on the FM/S industry within the "Deutschland, Austria, Confoederatio Helvetica" (D-A-CH) region, which includes Germany, Austria, and Switzerland, because of the region-specific requirements regarding business regulations (cf. chapter 2.8.3) for the online trading market in Germany. The sample is represented by interviewees from the consulting, software, and services sector (line of business) called Global Business Services (GBS), which is responsible for application innovation. Furthermore, IT experts across the GBS brand from Software Technical Sales (STS) and Global Technology Services (GTS) were considered to obtain an outsider's view on the topic and to allow further discussions (M.B. Miles & Huberman, 1994; Yin, 2012).

It was important to ensure that the sample was representative and verified. Matthew B Miles, Huberman, and Saldaña (2013) described the most common pitfalls of representativeness as sampling non-representative informants and generalizing from non-representative activities. Hence, contrary to the pilot approach where a simple random sampling was applied, the sample design for the main study was adjusted

to purposive sampling that focussed on the key drivers of technological development which consider each dimension.

The key informant technique (Jankowicz, 2013) was employed to identify the participants. A key informant is a source of detailed information based on expert knowledge in a particular field. Key informants were selected based on standard protocols for qualitative research, for instance, key informants ought to hold positions that make them knowledgeable about the research issues, and they should be willing to communicate with the researcher (John & Reve, 1982). Key informants do not need to be statistically representative. Rather, they are selected based on the possible insights they might have (John & Reve, 1982). In connection with the current research, the informants were chosen based on their mobile IT knowledge with respect to their functional direction (i.e., their specialization). For example, for the key driver 'security', a mobile IT security architect was interviewed; whereas for the key driver 'visibility', a mobile IT specialist with experience in the development of graphic user interfaces was involved. Each key driver was represented by a minimum of two experts.

Within the competence centre community, mobile IT experts with different gender and age were selected based on their profiles and key skills documented in their curriculum vitae (CV). Only professional IT architects/specialists with mobile IT background and long-term experience (minimum five years of engagement) were considered to cover the technological development in the past. Therefore, the participants were aged from 28 years (which was five years more than the minimum age of entry at IBM based on a university degree) to 63 years (the earliest retirement age). Other CV attributes were not relevant because the researcher was primarily interested in the expertise and not in the person as an individual (Meuser & Nagel, 2002).

Table 3-2 provides an example of the personal information of two participants. The Appendix III, provides the complete overview of the interview participants and their personal data and development.

Personal information	**First participant**	**Second participant**
Age:	41	57
Gender:	Male	Male
Nationality:	German	German
Education/ Degree:	Apprenticeship for "Mathematisch Technischer Assistent", RWTH Aachen University, Germany	Dr. rer. nat. in Biophysics, Universität des Saarlandes, Germany; Diploma in Physics, RWTH Aachen University, Germany
Years of work experience:	13 years of experience in design and implementation of distributed systems in a commercial environment, especially for J2EE based platforms.	More than 20 years of experience in IT business
Profile:	In addition to application development, he has gained experience in the technical lead and coordination of Java development teams. He has very detailed knowledge of the IBM asset Valuta-Direct FX&MM. In several projects he was significantly involved in the essential phases of development (architecture, design, implementation, roll-out and support) with focus on technical coordination of the Java environment within the projects. He is currently focused on designing solutions for the mobile space based on the Apple iOS technical platform (i.e., iPhone and iPad with Objective-C).	During the last 12 years he worked as a people manager. Besides the people management skills he gained good knowledge in project management particularly with regard to application development, mobile solutions and the management of proposals. Furthermore, he is a qualified speaker, consultant and instructor.

Personal information	**First participant**	**Second participant**
Key Skills:	Java development: - Enterprise Java (JEE), - GUI JFC/Swing - Technical analysis - Valuta-Direct Online Trading Foreign Exchange & Money Market iPhone/iPad: - Objective-C - GUI development with Cocoa Touch - Core data persistence layer - UI workflow conception	- Project Management - Consulting - Proposal Management - People Management - Enterprise Solutions - Application Development - Mobile- and RFID-Solutions - Education
Job related activities:	Member of IBM Germany iPhone & iPad Communities, leader of a local iPhone community group, mentoring of employees for Apple iOS specific programming topics. Technical lead and guidance for iOS based showcase development activities for Valuta-Direct (Foreign Exchange and Brokerage solutions). In-house mentor of employees for Java-related topics; coordination of tasks for external colleagues who are involved in Valuta-Direct FX&MM-based projects. Responsible for evaluation and introduction of optimization techniques in the Valuta-Direct Online Trading reference system.	

Table 3-2: Personal information of participants

The appropriate sample design ensures that, on the one hand, each key driver is considered by an individual out of the population in which the study is being conducted; on the other hand, it also ensures that the target group of individuals has common characteristics (Best & Kahn, 1993; Tuckman, 1994). The pilot study had shown that the number of interviews is not of relevance but that the size of the purposive sample should be established inductively until the saturation point has been reached regarding the key drivers of technological development. For the main study, the sampling enables the researcher to gain representative knowledge and allows for accurate generalizations to be made for the entire population. Data saturation

was reached when the 18 interviews were conducted and no new themes were emerging from the interviews.

3.4.2 Interview design

The interview design was divided into three parts:

(a) A general introduction for the interview with opening questions (Saunders et al., 2012) and the introduction into the overall topic that need to be covered during the conversation;
(b) The non-sensitive, less important (welcome) questions regarding the field of the IT expert and her/his professional experience, followed by the questions about the key themes – the key driver of technological development; and
(c) Topic-related final questions and closing questions to conclude the interview.

Part (a) consisted of the following actions:

- The interviewee is thanked for participating.
- A brief outline of the research purpose (aims and objectives) is presented along with the nature and intention of the research output including what will happen to the collected data.
- The previously agreed right to confidentiality and anonymity is reiterated.
- Request to audio-record the interview is restated.
- A summary of the themes is covered, time availability is confirmed, and the informed consent sheet is checked for signature (cf. chapter 3.4.6).

After this, the interview started with non-sensitive, less important questions related to the topic to help the participant feel comfortable and also to gain first insights. Related to the key drivers of technological development, the respondents were asked to specify the technical factors that were currently influential or the technical factors that would significantly influence consumer behaviour in the future.

Subsequently, a number of semi-structured, open-ended interview questions were asked in order to obtain an in-depth understanding. The idea was to guide

the individuals through some previously identified themes developed from the literature, which had shown value in the mobile IT and consumer behaviour affinity debate. The questions revolved around the key drivers of technological development (key themes). The researcher began by asking an open-ended question, followed by theory-driven, decision-directed questions related to the key theme and ended up by asking a comparative (or probing) question. The various types of questions allowed the researcher to deal more explicitly with the presuppositions brought into the interview in relation to aspects of the interviewee. Supported by methodological aids, this makes the implicit knowledge of the interviewees more explicit. To recall the interview and check if its content had been correctly represented the Structure Laying Technique (SLT) was applied. SLT is a model for the structuring of interview contents (Scheele & Groeben, 1988).

The following decision-directed and comparative (probing) questions were asked, e.g. related to the key theme 'visibility':

- Does the complexity of the solution, including page length, number of graphics, number of links, amount of text, and use of animation influence the consumer?
- Does the limited screen real-estate influence the development of mobile applications?

The researcher did not attempt to draw conclusions in respect of projects, strategies, age, gender, or other professional or personal background aspects of the respondents. This study did not aim to analyse what is right or what is wrong. Instead, the interview provided insights about the technical viewpoints and ended with any open-ended (final and closing) question, for example:

- Does mobile IT 'drive' the consumer?
- Do you have any further questions?
- Is there anything you want to add?
- Is there anything that could be improved in the interview process?
- Would you like to receive a summary of the research findings?

The principle of openness (Flick, 2005) , which is delivered by this approach, is transformed into a dialogue because of the various degrees of explicit confrontations with the topic. See Appendix IV for the complete list of questions.

3.4.3 Interview process

The interviewees were invited to participate by an e-mail message. A cover letter (see Appendix V) informed them about the aim, the circumstances of the research, and how the collected data would be used.

The interview questions were drawn up in English with the intention of including non-German-speaking IT experts also. The interviews themselves were conducted in English also to prevent losing information (content) during the translation from German into English language. Every one-to-one interview took approximately between one and one-and-a-half hours.

The interviews were audio-recorded, anonymized, and transcribed by using the audio conference function via the (IBM) company's e-meeting services to secure an accurate account of the conversations and avoid losing data. Extensive field notes were made during and directly (but no longer than 12 hours) after the interview. The collection and anonymization of the data followed the "Code of Practice on Research Integrity" guidelines of the Edinburgh Napier University (Barkess, 2013). The associated Research Integrity (RI) application (dated 13 February 2015) has been approved (identifier ENBS/2014-15/032) at a meeting of the Faculty Research Integrity (ethics) Committee, which took place on 5 May 2015.

3.4.4 Secondary data

The experts provided insights into several sources of knowledge, such as documents, messages/news, blogs, wikis, and feeds; however, the researcher also used the secondary data for the data analysis (Aven, Renn, & Rosa, 2011). The researcher also included the pilot data in the main research. Therefore, contamination (for example, due to outdated data) was possible, but this could be considered part of the development process. In this context, the researcher returned to verify if in

the period between the pilot research and the main research, new relevant information regarding topic had been made available by the participants. As this was not the case, the data analysis focused on the given semi-structured interviews.

3.4.5 Trustworthiness criteria

Every research project consists of several phases; it begins with the selection of a topic of study and ends with the dissemination of research findings. Each step in this research process has the potential to influence the research output. It is important that all researchers attempt "to avoid as much error as possible during all phases of the research in order to increase the credibility of the results" (Brink, 1991). To attain credibility, the research process must be both valid and reliable which, as Brink (1991) has argued, is a major challenge when a project is based on a semi-structured interview.

The concepts of reliability, validity and generalizability have their origins in the quantitative tradition. AERA, APA, and NCME (1999) defined the reliability of a test as the consistency of measurements when the test is repeated. Validity refers to the appropriateness, meaningfulness, and usefulness of the specific inferences made from test scores (AERA et al., 1999). Validity in this research is obtained by developing its constructs from the literature review. To increase internal validity, it was necessary to verify whether the findings were internally coherent and if concepts were systematically related. To facilitate this process, the researcher continually returned to the findings from literature and mapped them to the themes emerging during the data analysis (Meyer, 2001). Generalizability is related to a specific form of validity called external validity, which addresses the ability to generalize an inference derived from a specific sample to a wider general population.

From a research strategy and sampling perspective, the researcher used established phenomenological methods, which seek a deep understanding of the meaning of a particular phenomenon (e.g., the IT expert's perspective) from the individual's own perspectives by collecting extensive narrative data (Patton, 1990). Therefore the researcher also considered dependability, credibility, transferability and confirmability as trustworthiness criteria for the qualitative investigation (Guba, 1981; Schwandt,

Lincoln, & Guba, 2007). According to Bitsch (2005), dependability refers to “the stability of findings over time” (p. 86). Dependability involves participants’ evaluation of the findings, interpretation and recommendations of the study such that all are supported by the data as received from informants of the study (Cohen, Manion, & Morrison, 2013; Tobin & Begley, 2004). In the context of this study the researcher ensure dependability by the application of the audit trail strategy (Bowen, 2009; Li, 2004) supplemented by a code-recode strategy based on Chilisa and Preece (2005). Credibility is defined as the confidence that can be placed in the truth of the research findings (Holloway & Wheeler, 2002; Macnee & McCabe, 2008). Credibility establishes whether or not the research findings represent plausible information drawn from the participants’ original data and is a correct interpretation of the participants’ original views (Graneheim & Lundman, 2004; Lincoln & Guba, 1985). In the context of this research the strategy of prolonged engagement in the field was used. The researcher stayed in the field for almost 14 month from the pilot to the main study with the purpose of giving this gestation time to see if there is phenomenon change as a result of engagement into the professional development. Transferability refers to the degree to which the results of qualitative research can be transferred to other contexts or settings with other respondents – it is the interpretive equivalent of generalizability (Bitsch, 2005; Tobin & Begley, 2004). According to Bitsch (2005), the “researcher facilitates the transferability judgment by a potential user through ‘thick description’ and purposeful sampling” (p. 85). Confirmability refers to the degree to which the results of the inquiry could be confirmed or corroborated by other researchers (J. Baxter & Eyles, 1997). Confirmability is “concerned with establishing that data and interpretations of the findings are not figments of the inquirer’s imagination, but are clearly derived from the data” (Tobin & Begley, 2004, p. 392). In the context of this research the confirmability was achieved also through the audit trial. Nevertheless, within the semi-structured IT expert interview, different aspects were considered in the context of trustworthiness.

The researcher intended to consider international IT experts to achieve an outsider's view on the region-specific topics. However, the researcher recognized that international participants were not interested in the success of a mobile IT development model for a specific region that was outside their domestic scope. Therefore, international participants were less motivated to respond. To ensure that this group does not go unrepresented or that participants do not influence the study by their unmotivated and inappropriate responses, the sample was adjusted to minimize non-respondents; this improved the credibility of the findings.

Another item that influenced the study was the language barrier, which was also considered (Henley, 1979; Word, 1980). The flexibility of the semi-structured interview method ensured that through the careful use of words, valuable and consistent data were obtained from the willing participants with limited understanding of the English language. The slow and clear articulation and/or paraphrasing of questions also secured the credibility of the final results. Therefore, for semi-structured interviews, truth value and consistency do not depend upon the repeated use of the same words in each question, but upon conveying an equivalent meaning using substitute words (Denzin, 1989).

Furthermore, the wordings used by the participants were also considered. Participants could say the same things but mean different things. To ensure that data revealed "what we think they reveal" (Treece & Treece Jr, 1986), all unclear or ambiguous words and phrases were probed. For the responses provided by the IT experts, the researcher resolved ambiguity by using probing questions (S. Hutchinson & Wilson, 1992) to clarify the responses. Probing, in particular, proved to be an invaluable tool for ensuring data consistency because it

- allows for the clarification of interesting and relevant issues raised by the respondents (S. Hutchinson & Wilson, 1992);

- provides opportunities to explore sensitive issues (Nay-Brock, 1983; Treece & Treece Jr, 1986);
- can elicit valuable and complete information (Austin, 1981; Bailey, 1987; Gorden, 1975);
- enables the interviewer to explore and clarify inconsistencies within respondents' accounts; and
- can help respondents recall information for questions involving memory (Smith, 1992).

Probing also maximizes the potential for interactive opportunities between the respondent and the interviewer, which helps to establish a sense of rapport and reduces the risk of providing socially desirable answers (Patton, 1990)

The researcher also took into account the fact that an interview can become complex when the respondent and the interviewer differ in ethnicity, gender, socio-economic status, education, or age (Bailey, 1987). However, the self-presentation of the interviewer, that is, the interviewer's etiquette and friendliness can largely overcome this potential for bias and go a long way towards putting the respondent at ease (Denzin, 1989).

For the current thesis, audio-taping was chosen because it provides detailed insights into the performance of both the respondent and the interviewer. Further, access to the nuances of the interactions between respondent and interviewer (e.g., intonations and pauses) help to ensure the accuracy and completeness of the information collected. However, audio-taping does not allow the review of gestures and the attention level of the participant.

Finally, the success of the semi-structured interview method clearly relies upon the skills of the interviewer. Moderating each interview to obtain accurate and complete data while maintaining sufficient standardization to secure the truth value and consistency of data was a major challenge to the researcher; this was ensured by training (Moser & Kalton, 1986), which also strengthened the interview skills.

3.4.6 Ethics

The premise of all the research work undertaken in this thesis adheres to the Edinburgh Napier University (2010) Code of Practice on Research Ethics and Governance in combination with the German Federal Data Protection Act (Bundesdatenschutzgesetz, Gesetz zum Schutz vor Mißbrauch personenbezogener Daten bei der Datenverarbeitung). All respondents were required to understand, comment, and subsequently sign the informed consent form (Bryman & Bell, 2011). This ensures respect for the rights of others who are directly or indirectly affected by the research; the consent of participants was obtained after they were fully informed about the project. At all times, participants' rights of privacy were guaranteed with safeguards concerning all aspects of confidentiality. Written consent was obtained (see Figure 3-5), and all participants were fully informed of the nature and the purpose of the research, how it will be conducted, the expected outcomes, and how the outcomes will be disseminated. This was explained prior to the session and restated at the start of each interview. During the signing process, all key aspects of the form were presented: the purpose, importance of transparency and confidentiality, the audio recording of sessions, and the right to remain anonymous (or not). If participants were open to their details being published in the report, then their express consent was achieved.

Consent for participation in a research interview

DBA Study Interview – Klaus Hahn (DBA delegate)
Edinburgh Napier University
July 2016

I agree to participate in a research project (critical investigation of the mobile IT expert's perspective) worked on by Klaus Hahn from the Edinburgh Napier University. The purpose of this document is to specify the terms of my participation in the project through being interviewed.

1. I have received sufficient information about this research project. The purpose of my participation as an interviewee in this project has been explained to me and is clear.

2. My participation as an interviewee in this project is voluntary. There is no explicit or implicit coercion whatsoever to participate.

3. Participation involves being interviewed by a researcher from the Edinburgh Napier University. The interview will last approximately 60 minutes. I allow the researcher to take written notes during the interview. I also shall allow the recording (by audio tape) of the interview. It is clear to me that in case I do not want the interview to be taped I am at any point of time fully entitled to withdraw from participation.

4. I have the right not to answer any of the questions. If I feel uncomfortable in any way during the interview session, I have the right to withdraw from the interview.

5. I have been given the explicit guarantees that, if I wish so, the researcher will not identify me by name or function in any reports using information obtained from this interview, and that my confidentiality as a participant in this study will remain secure. In all cases subsequent uses of records and data will be subject to standard data use policies at the Edinburgh Napier University (Data Protection Policy).

6. The interviewer guarantee that this research project has been reviewed and approved by the Edinburgh Napier University Ethics Committee. For research problems or any other question regarding the research project, the Edinburgh Napier University Ethics Committee may be contacted.

7. I have read and understood the points and statements of this form. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in this study.

8. I have received a copy of this consent form co-signed by the interviewer.

_____ _____
Participant's Signature Date

_____ _____
Researcher's Signature Date

For further information, please contact:
Klaus Hahn
E-Mail: 40138794@live.napier.ac.uk
Phone: +49(0)163 4401611

Figure 3-5: Hardcopy of the consent form

Data protection was always of paramount importance. This was again clarified with all the research participants; their wishes were respected and their right to withdraw at any point was accepted. Every interview was digitally recorded and transcribed verbatim to assure accuracy. Interviewers were also informed that the researcher understood that the individual's answers or comments in response to the questions were the opinions of the individual interviewee and not necessarily the official position of the institution. They were also informed that their specific views, especially in the in-depth interviews, will be highlighted and drawn upon. Finally, for security purposes and researcher's peace of mind, all data was stored with password protection and encryption in various locations (e.g., researcher's home, workplace, and any portable medium). All electronic and physical data files will be destroyed five years from the date of the submission of the thesis for examination.

3.5 Data analysis

This section discusses how the data collected from semi-structured interviews were processed, coded, and analysed for answering research questions of the main research and to meet the research aim and objective of the study. Qualitative data analysis and data interpretation is understood as the process for reviewing, synthesizing, and interpreting data in order to describe and explain the phenomena studied (Fossey, Harvey, McDermott, & Davidson, 2002). It is a process in which the researcher takes descriptive information and offers an explanation or interpretation.

Before beginning the data analysis, the researcher verified if the data was appropriate prepared. For this, the transcripts (see Appendix VI) were read a number of times to remove all preconceptions and misinterpretations and to ensure, as far as possible, that duplications and inappropriate statements were removed; answers with same word meanings were identified and standardized. The intention of this process was to remove researcher bias and determine data consistency with the aim of achieving the required data quality. As a result, well-organized and reduced data were given for further data analysis. During the data analysis, the researcher divided, condensed, sorted, and reconstituted the data. In other words, the complex topic was broken into smaller parts

to gain a better understanding and to get a feel for the data. Data interpretation took place within this process. Interpretation brings meaning and coherence to the themes and aims to develop linkages and a sensible story line (Alvesson & Kärreman, 2007). The researcher understood data analysis and data interpretation as an iterative task in which continuous understanding and learning about the data can help to discover new themes and relationships among them. Each cycle of data interpretation was guided by the following questions: What is important in the data? Why is it important? What can be learned from it? So what? (Wolcott, 1994).

The instrument to find relationships between the object of study – the view and expertise of IT professionals – and the research questions is called coding. As mentioned above, coding is the process of breaking down data into distinct units of meaning for analysis and thereafter systematically re-evaluating them for their inter-relationships; this enables the researcher to move the data to a higher level of abstraction (Denscombe, 1998; Goulding, 2002; Martin & Turner, 1986). In this study, the coding script was developed based on the key drivers of technological development (see Appendix VII).

Coding helps the researcher to condense extensive data sets of approximately 15 to 20 pages of data per interview into smaller analysable units by creating categories derived from the data. A codebook was developed as a means to document the development and evolution of the coding system (P. Baxter & Jack, 2008). This codebook was useful to ensure the consistency of the codes (DeCuir-Gunby, Marshall, & McCulloch, 2011). The edited data by which verbal data were converted into variables and categories of variables allowed the researcher to apply a Computer-Assisted Qualitative Data Analysis Software (CAQDAS) for the data analysis. The data were analysed based on key themes related to coding with the help of an appropriate software solution. Because of the commercial implications for the study, NVivo had been chosen to store and organize the interview transcripts (Hutchison, Johnston, & Breckon, 2010) after coding and analysing the data.

The data were analysed (and compared) by the identification of a core category as a key part of the process. The researcher examined words, phrases, sentences, and paragraphs of field notes, and then compared these with other indicators in the interview data, which showed similarities or differences (Glaser & Strauss, 1967; Strauss & Corbin, 1990) in the feedback of the IT experts. In addition, to providing guidance and structure to the coding based on Charmaz (2006), J. W. Creswell (2012), Emerson, Fretz, and Shaw (2011), and Saldaña (2013), a number of questions were identified which needed to be answered during the coding. These included, but were not limited to, the following: What process is at issue? How can it be defined? How does this process develop? How does the research participant act while involved in this process? When, why, and how does the process change? These questions greatly supported data comprehension. If no new codes were identified, the researcher moved on with axial coding.

Axial coding refers to the procedure for developing categories and relating those categories to their subcategories (Strauss & Corbin, 1990). The purpose of axial coding is to begin the process of reassembling data that were fractured during the initial coding (Pierre & Jackson, 2014). In addition to that, the researcher asked independent IT experts to review the suggested codes and provide feedback. This helped to ensure the reproducibility of inter-coder reliability, that is, different coders would code the same data in the same way (Saunders et al., 2012; Yin, 2012). Finally, the researcher abstracted themes from the codes. The codes were clustered into common themes so that similar units were grouped into 'higher'-order themes and separated from units with different meanings followed by subsequent iterations to group them; finally, they were grouped together to represent common, salient, and significant general dimensions.

The overall data analysing process can be described by the analytical framework given in Figure 3-6.

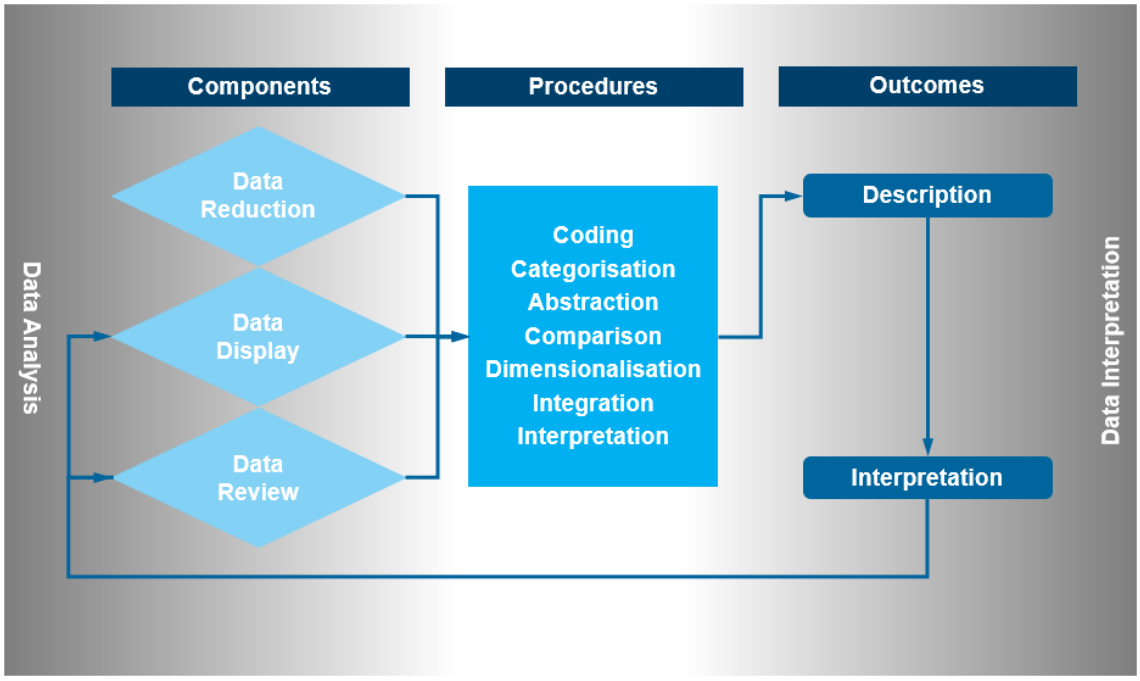

Figure 3-6: The qualitative analytical process

3.6 Summary

This chapter presented a detailed discussion of the methodology applied in this research. Based on the various research philosophies described in known literature, the philosophical standpoint of the work and the researcher himself was justified.

In this thesis, the researcher follows a qualitative phenomenological research approach, which allows the researcher to explore the relationship between mobile IT and consumer behaviour. From the various research methods, the researcher determined the most suitable method for this exploratory study as the semi-structured interview.

By applying content analysis, the analytical approach is defined to improve the content provided by IT experts in terms of predetermined categories in a systematic and replicable manner. The research string (path) described above demonstrates the methodological fit applied to this research, which is understood as consistency among elements of a research project (Edmondson & McManus, 2007).

Although a qualitative research approach is not common in this area, at least in terms of methodological rigour, this chapter has argued that qualitative research is fully appropriate for this research situation and can be applied as long as careful attention is given to methodological integrity. Based on the discussion of methodology, the next chapter details the richness of data drawn from the research design and, via a comprehensive analysis, delivers practical insights and concludes by offering a conceptual framework for the application in German FM/S industry.

4 FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the study findings based on the methodology and method described in Chapter 3. The current research design was primarily determined by the overall (main) research question “What shapes the development of mobile IT applications?” and by the gap in literature pertaining to the analysis of the technical context of mobile IT in the German financial market. The researcher followed a qualitative phenomenological research approach that describes the ‘lived’ experiences of a phenomenon from the interviewee's perspective (Van Manen, 1990). The research objective was to learn how the respondents ‘live’ the architecture and design of mobile IT and how they steer the technological development within the company. Qualitative data were gathered related to the key drivers to understand the different factors that influence mobile IT. Qualitative research is often considered doubtful because field research on the same phenomenon can provide different findings (Mårtensson, Fors, Wallin, Zander, & Nilsson, 2016). Therefore, the data must be presented in sufficient depth to present the linkage between data and theory. It also uses of verbatim quotes from the interviews to provide credibility to the study (Tracy, 2010); this also helps to clearly distinguish between the researcher’s own opinions and the participant’s ideas (Corley & Gioia, 2011). However, interview quotes will not be provided for all the themes that emerged. Only those opinions considered information rich and concise have been quoted.

Based on the assumption that IT experts will provide essential and significant inputs regarding the technical aspects, 18 semi-structured interviews were conducted. The interview participants were determined by selecting IT experts out of the IBM Mobile Center of Competence taking into consideration the region, the sector represented by the consulting, the software and service sector brand, the informant’s profile (age, years of experience) and key skills. As one key learning point from the pilot it was important for the main study that the sample was representative and verified. To obtain an outsider’s view on the topic, IT experts across brands were also considered.

The findings were reported based on the total number of informants and the number of times the topic was raised. To ensure anonymity, the interview partners are all referred to by the pronoun ‘he’, even when the interlocutor is a female. ‘His’ in this thesis is used as a gender-neutral pronoun interchangeable with ‘her’. Furthermore, the interview partners are labelled by the prefixes EN, SI, EF, FL, SE, and VI for IT experts with focus on engagement, simplicity, efficiency, flexibility, security, and visibility, respectively. These are followed by the numerical order of the participants. For example SI_05 refers to the interview participant number 5 with focus on the simplicity dimension. The chapter begins with a discussion of participant characteristics, which is followed by findings related to the key drivers of technological development from the perspective of the IT experts and the presentation of the adapted TAM.

4.2 Findings

4.2.1 Participant characteristics

The IT experts were very keen on participating in the interview process. The participants were proud to be part of the research and were therefore highly motivated to provide feedback. Of the 19 IT experts invited, 18 participated in the interview. The researcher intended to consider international IT experts to obtain an outsider’s-view on the region-specific topic. However, international participants were not interested in the success of the mobile IT development model for a region outside their personal scope. Therefore, the sampling was adjusted to minimize non-respondents and improve the validity of the findings.

Two participants noted that if they had received the questions beforehand, they could have been better prepared for the interview. However, the researcher wanted to receive spontaneous feedback without bias. Two other participants were uncomfortable with the interview being conducted in English because of their limited understanding of the foreign language. In these cases, the questions were articulated slowly and clearly and/or paraphrased. In one of the two cases, the interview was conducted in the German language and subsequently translated into English.

All the study participants were professional mobile IT architects and specialists with more than five years of experience in their fields. The selection criteria were purely objective and based on their profiles and key skills. Nevertheless, sometimes the participants found it very difficult to answer questions that were not within the scope of their classic job roles or professions. The researcher considered this by the classification into the key driver of technological development.

Table 4-1 provides the demographic information for the participants and their functional direction (specialization) related to a key driver of technological development (dimension). Appendix I, presents a complete overview of the interview participants and their personal data and development (i.e., profiles and key skills).

Participant No.	**Dimension**	**Participant Dimension Identification**	**Age**	**Gender**	**Nationality**
1	Visibility	VI_01	42	Male	German
2	Engagement	EN_02	60	Male	German
3	Security	SE_03	36	Male	German
4	Flexibility	FL_04	47	Male	German
5	Simplicity	SI_05	44	Male	German
6	Simplicity	SI_06	53	Male	German
7	Engagement	EN_07	47	Male	German
8	Security	SE_08	48	Male	German
9	Flexibility	FL_09	48	Male	German
10	Flexibility	FL_10	49	Female	German
11	Visibility	VI_11	49	Male	German
12	Visibility	VI_12	46	Male	German
13	Security	SE_13	47	Male	German

Participant No.	Dimension	Participant Dimension Identification	Age	Gender	Nationality
14	Flexibility	FL_14	54	Male	German
15	Flexibility	FL_15	29	Female	German
16	Efficiency	EF_16	48	Male	German
17	Efficiency	EF_17	47	Female	German
18	Engagement	EN_18	29	Male	German

Table 4-1: Overview of demographic information of participants and their functional direction

The average age of the IT expert population in this study is approximate 46 years (see Figure 4-1) and their experience was between a minimum of five years and a maximum 30 years (see Figure 4-2). Most of the participants were male (see Figure 4-2).

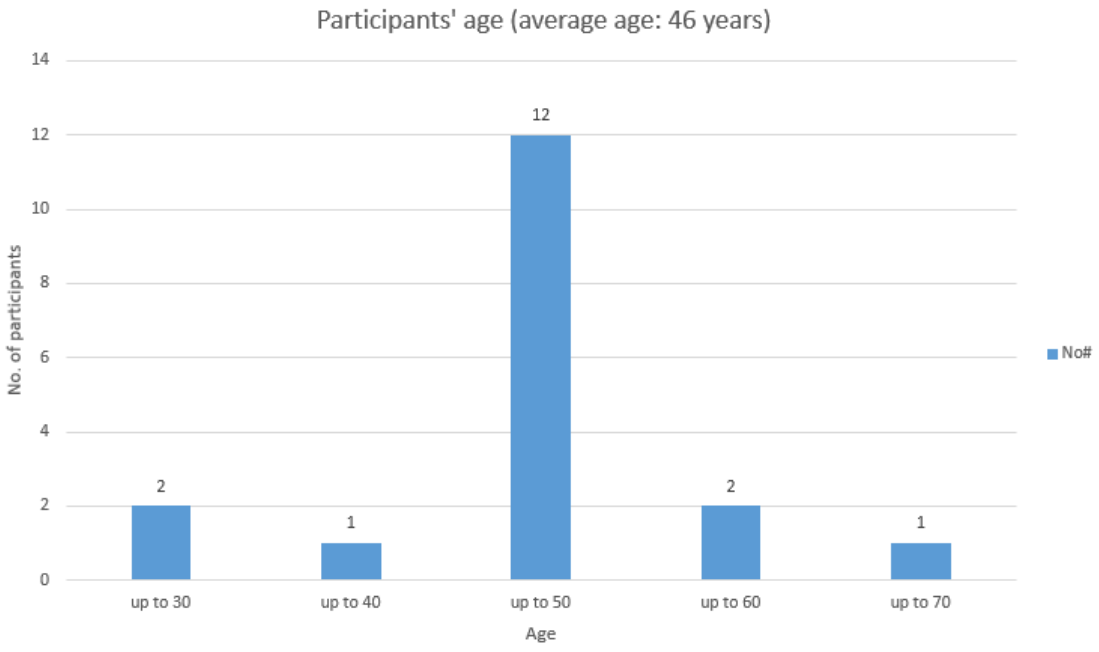

Figure 4-1: Participants' age

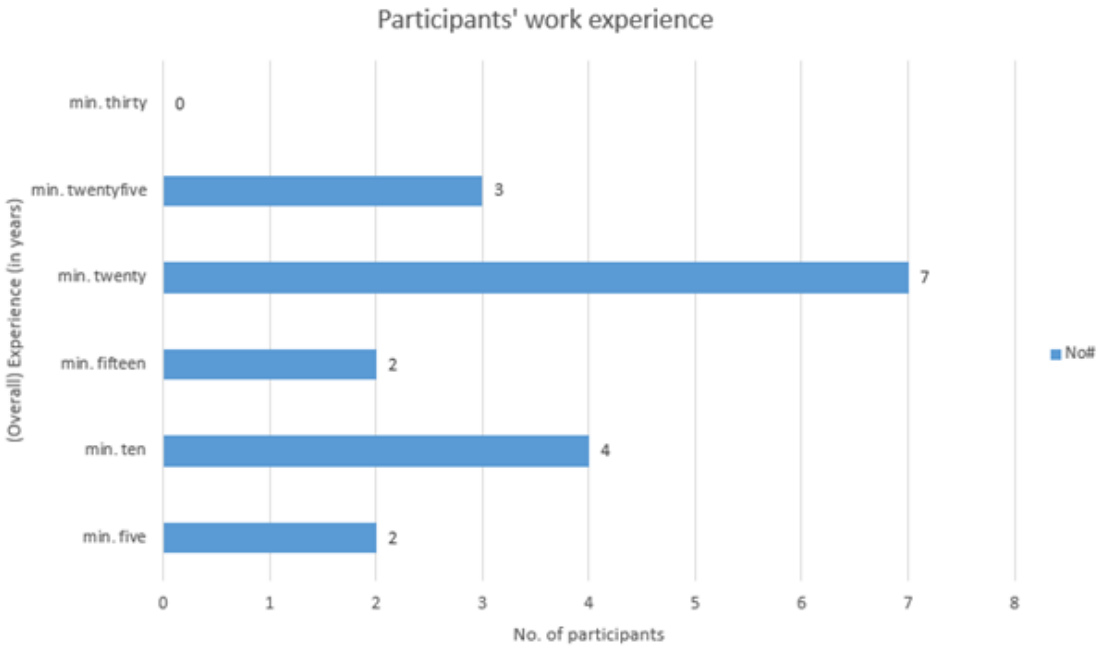

Figure 4-2: Participants' work experience

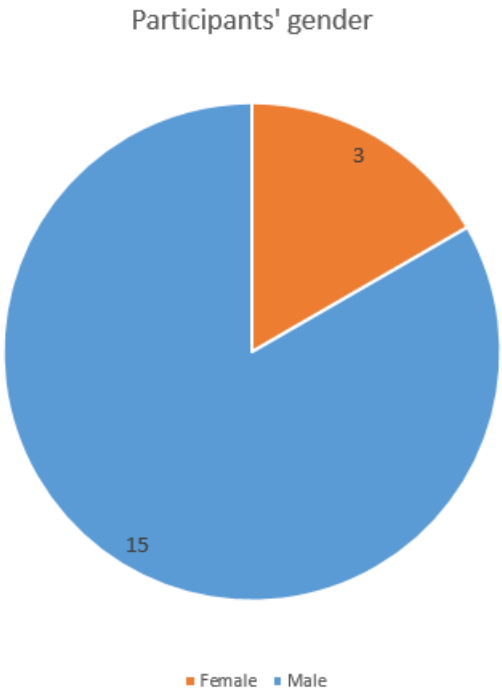

Figure 4-3: Participants' gender

The findings in respect to the gender can be compared with the worldwide survey "Female representation within technology industries" based on LinkedIn data (LinkedIn, 2015). The statistics (see Figure 4-4) present the female representation within technology industries as of June 2015; the results confirm that females are still underrepresented in this area. Companies that operate in computer software or information technology and services have a female representation among software engineers of 18.9 to 22.1 percent which is quite similar to the sample for this thesis.

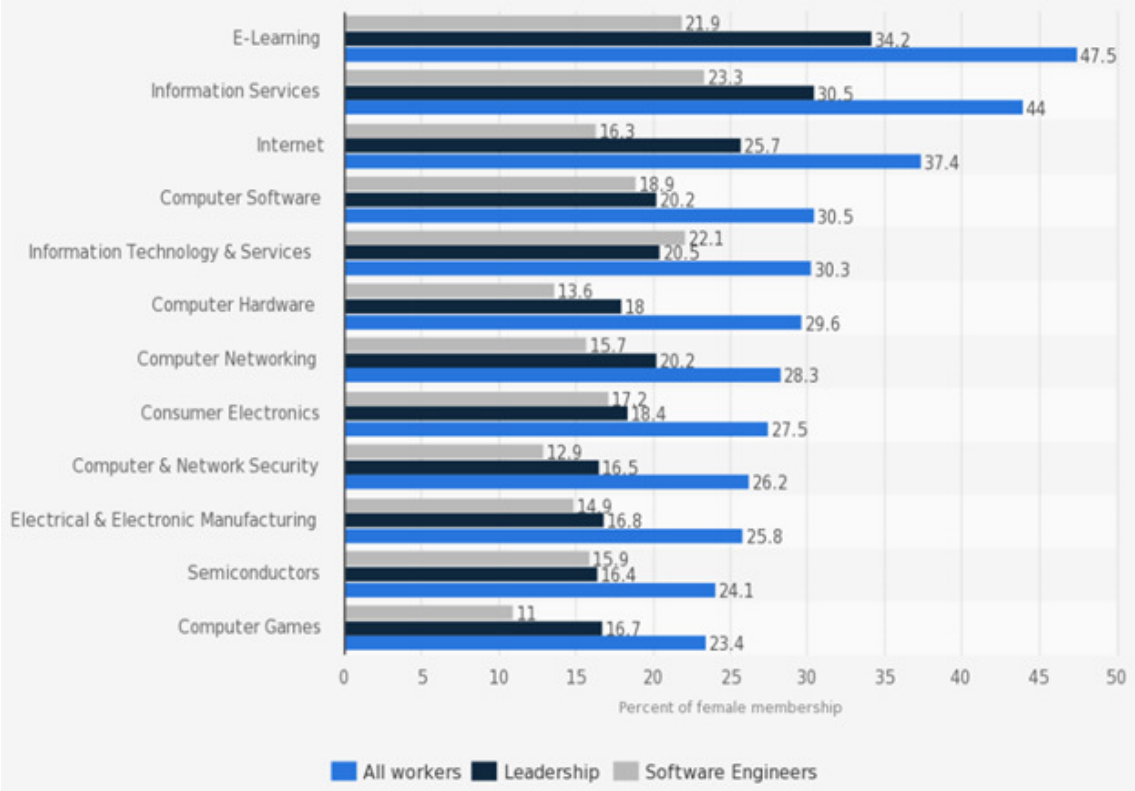

Figure 4-4: Female representation within technology industries as of June 2015 (LinkedIn, 2015)

4.2.2 Mobile application development attributes

The interviewees stated the different attributes that they deemed as important to the mobile application development in the German FM/S industry. Table 4-2 lists attributes according to the density coverage in the interviews from the most- to the least-mentioned theme.

Beginning/Ending	Code	No. of informants mentioning (n=18)	No. of mentions
	People (consumers/users)	18	249
	Application/s	18	167
	Development	18	84
	Strategy	18	71
	Business relevance	18	61
	Standards	18	45
	Device/s	13	36
	Time	14	30
	Information	12	29

Table 4-2: Emerging themes related to application development attributes

All informants stated that 'people' (consumers/users) who use mobile IT are the major attribute.

SE_03 stated the following:

> *Everyone has a mobile phone, everyone is using his or her mobile phone, I'd say daily or at least most people are and with the introduction of smart phones that increased dramatically towards not just using it for interacting with other people, but replacing or extending your personal life to some degree.*

He also specified how the use of financial services has dramatically changed. VI_11 specified that *"mostly people"* shape the development of mobile IT applications. Further, he stated that *"if people really need it, they jump at the opportunity"*.

Speaking about the influence of technology on human behaviour, EF_17 stated the following:

> *Technology influences human behaviour just like you might if you use your mobile device. Like young people, in the morning when they wake up and see a smartphone next to their beds. You know, checking your messages every time on the go is something new and it influences the behaviour of people.*

Informants who particularly applied the word 'consumer' (SE_08, FL_10, SE_13) clarified the demand for mobile IT using the phrases: *"Because the consumer wants to connect to the applications at any time and at any place"* and *"the expectation of a consumer is changing technology"* (SE_08). However, SE_13 explained that *"from the consumer perspective it is not important that mobile IT is there – technology is used only"*.

Informants who particularly applied the term 'user' (FL_10, SE_13, EF_16) enhanced the user perspective as follows. EF_16 stated the following:

> *It's different from the past applications; we are much more data driven and system driven. And the new way of building applications in the mobile space is user experience driven to make it most easy to the user to use.*

FL_10 summarized the importance of mobile IT as follows:

> *Why the consumer or end user thinks it is important because, as I mentioned before, everything is readily available—the information that you need—you can buy your tickets online on your way to the subway station, you can check in online with your mobile phone regardless where you are.*

After the consumer/user-perspective, the application attribute was highlighted by the all informants. For example, EN_18 looked at the past and described the (mobile) application/s as follows:

> *We started with a notebook and a few applications and then it started off to combine both areas with a telecommunication area…. I think this is a huge*

> *shift which we are currently in because I think it started five or six years ago where more applications have been developed, a lot of things were put into the market which didn't really get off.*

Regarding the situation today he stated the following:

> *If I think about the applications for me personally it is all regarding the aim which the app is going to fulfil and the way how to achieve it … I think especially mobile technology is mainly driven by the user. So the user defines how to use applications for example.*

SI_06 clarified the application aspect as follows:

> *Well, the mobile applications serve very specific requirements. And if someone has a new idea, he puts it into the market and the user accepts or rejects it. Based on the fulfilled requirement a new demand will be created. "Oh, I can do this with it. Then, I also want to do that with it".*

VI_12 shared this view to develop *"simple and very focused applications"* and enhanced that mobile solutions *"focused on a single problem or two problems, not the kind of applications which do everything"*.

The aspect of the mobile application development is described by VI_01 as *"different from the development of usual web applications"*. He added the following views:

> *I think in contrast to traditional development, it is most effective that you focus on a single user experience or a single task, which needs to be achieved within the app. And in the near future … the development will be more service oriented and maybe more fragmented, the same which happened in the app market that you have apps with smaller scope compared to traditional development.*

EN_02 mentioned that *"the development cycle for mobile solutions are very much shorter. So I could observe, (scrum) technology; (scrum) models are used very often*

to develop mobile solutions". SE_13 noted that *"IT departments will have a huge challenge regarding definition of standards for application development"*.

The relevance of business and strategy was pointed out by all 18 participants. Regarding strategy, thirteen informants (VI_01, EN_02, FL_04, SI_05, EN_07, SE_08, FL_09, VI_11, VI_12, FL_14, EF_16, EF_17, EN_18) shared the same view: *"All the applications, all the things the organization is doing under our eyes, they're from strategy"* (EN_07). Therefore *"strategy is most important"* (VI_12, EN_18) and *"strategy is driving the mobile app development"* (VI_11). EF_16 summarized his views on strategy:

> *The purpose and the vision is very important (to specify) – where does a company want to go? And this is related to the mobile transformation, so do I just replace existing things in the mobile device or do I really want to change things so there's the strategy part.*

Regarding business relevance VI_12 stated the following:

> *You need to have a clear business understanding and responsibilities at the customer side and make it available. So, have a clear business architecture and also, later, a technical architecture.*

From the clarification of the aspects (themes) above, the technically-driven attributes ('application' and 'development') and the organizationally-driven attributes ('strategy' and 'business relevance'), follow the particular relationship between 'IT Expertise' and 'Business Strategy', as described in Figure 4-5:

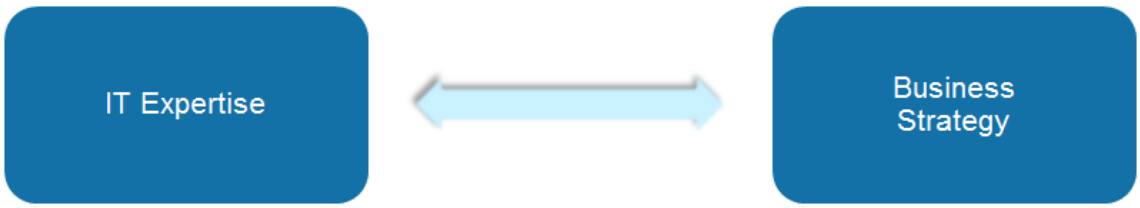

Figure 4-5: Relationship between IT expertise and business strategy

Furthermore the informants stressed the attributes ‘standards’, ‘device/s’, ‘time’, and ‘information’. In response to the attribute ‘standards’, SE_13 explained that *“without standards, development is not possible”*. Regarding ‘device/s’, the informant FL_04 noted: *“Well from an end-user point-of-view, I think it is quite important that the behaviour, the look and feel, the transaction speed, the handling of the application needs to be the same regardless of what device I am using”*. VI_11 specified that if *“the device can do more, then the people are using it”*. The aspect of ‘time’, especially, availability was pointed out in a comment by the informant EF_16: *“So, this is a key thing—every time you want it, everywhere you want it”*. With reference to aspect ‘information’, the consumer in the German FM/S industry expect content related-data in real time.

4.2.3 Engagement

The research area ‘engagement’ is concerned with the first research question: How do mobile information technologies influence the engagement of companies for developing mobile solutions?

The interviewees stated that an engagement in the mobile business increase revenue, reduces cost, and engages customers. However, this requires information about what the consumer would like to have and how the consumer acts on this demand. One finding from the interview is that IT companies and IT service providers must tackle the challenge under consideration of the cost of development. Therefore, VI_11 expressed the factors influencing engagement as follows:

> *One is business, because they want to drive business with the help of mobiles, of course. The other is technology, because they have to have answers for all these challenges in this mobile domain. And, of course, the user.*

SI_06 explained this further in the following words:

> *I think, in general, the stakeholders (in the mobile app development) are the ones who want to bring the information to the customer.*

Therefore, this results in the finding that the business is the key driver of the engagement. This statement was emphasized by SI_05:

> *I would expect the business departments to be the driver. If it is business-to-employee, it is about applications for themselves or for their team members; I think the involvement of the end users has a big impact on the design. If it is about business-to-consumer, well, it is still the business departments, but it is also kind of guesswork – what they assume the user may like and there may be surprises doing the real user experience research – what the users really like.*

All key informants stated that cost is a secondary factor, which was explained by EF_17:

> *I think first there is the idea and then there's a business case based on cost, and sometimes cost is also a killer—meaning that the idea was originally good but it is too expensive to implement it.*

However, EN_07 stated his views on rising costs:

> *[The] cost is going to rise because of the new need to maintain stuff, and you need to think about how to really maintain all the different applications there and all the different platforms and stuff. And from there, I think that the company then says, "Okay, this is a new channel. Okay let's think about cost in a broader way. And think about on what you really want to achieve with those applications". From there, yes, costs are relevant and the drivers too, but the business functionality comes more to the forefront.*

Table 4-3 lists the themes emerging from the interviews according to the key driver engagement from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Engagement	Mobile application/s	18	239
	User/s experience	18	145
	Cost of development	18	121
	Business relation	16	73
	Stakeholder	13	65
	Consumer behaviour	9	52

Table 4-3: Emerging themes in the engagement dimension

4.2.4 Simplicity

In the research area of 'simplicity', the second research question was explored: Has consumer behaviour significantly changed by using the latest user interface trends?

The interviewees stated that a successful application needs to be based on easy/simple operations via various input channels. Consumers will not tolerate unintuitive applications. The application should provide quick and easy access to features with the aim of saving time and money. This includes various input channels and personalized architecture and design for the user interface.

About the requirement of a device/user interface, VI_11 said, *"[The] device should know what I need at that moment and react on that"*. However, he also mentioned that today the capabilities of the devices are limited in regard to hardware power.

One of the informants (VI_11) stated *"They don't want to be bothered with technical issues"*. However, it is not only the device (hardware), but the software technology also that adds power to the online trading process.

EF_16 commented as follows:

> *It is not then explicitly about the device but the combination of having a mobile device and the capability of a mobile device to understand the environments, their surroundings, and extend your voice and then combined with the right (software) technology to understand the intent of a user and help him to be efficient.*

SI_06 explained regarding the topic:

> *You don't want to interact with an application, which is too clumsy or too complex to work with. You want it simple because you don't want to fiddle around with something for minutes before you get what you want.*

Therefore, in addition to the known data-entry methods (keyboard/keypad), new and innovative user interface technologies are expected, for example, based on the user's voice. Speech will play a major role for future mobile solutions within the FM/S industry. EF_16 commented on this as follows:

> *I think it is really that this user interface will bring much more change—to be able to talk to these devices, yes, that the voice plays a big role.*

FL_04 summarized the simplification of user input and stated: *"Make it as easy as possible"*. VI_11 shared the same view and added: *"Only show me the data I need to know. Don't show me everything. I don't need a huge, extended navigation pattern in the mobile space"*.

Table 4-4 lists the themes emerging from the interviews according to the key driver simplicity from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Simplicity	Device/User interface changed	18	217
	Easy/Simple operation	18	166
	Keyboard/Keypad	10	57
	Innovation	7	30
	Technology	7	27

Table 4-4: Emerging themes in the simplicity dimension

4.2.5 Efficiency

The research field 'efficiency' explores answers to the third research question: Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?

The interviewees stated that a mobile application must fulfil consumer needs and demands. This includes the feature/functional aspect and the service/technology aspect in the form of a powerful and scalable communication (if required). Therefore, in the case of time-critical applications for the FM/S industry, a connection of high quality (with high bandwidth) without latency is expected. However, the importance decreases with time. EF_16 underlined this view in the following words:

> *So, when you compare, let's say, the GPRS or EDGE bandwidth to a 3G, then this is a major driver until 4G. I have no idea yet, if we really need more. Of course, they develop faster and faster and you even have more bandwidth with the mobile solution than on a home based solution. I think at a certain level of bandwidth, you are done, yes – and the user will not see any difference, especially in solutions.*

In this context, EN_07 expressed his concern regarding latency:

> *So, I mean, latency is there. And you need to deal with latency. And it depends on the use cases on what that really means. The point for me is that each user must be able to use the application and to have a good user experience. If latency impacts that user experience then you need to do something about that.*

This means that efficiency is not affected by bandwidth or latency if the application does not require it.

If we highlight the feature/functionality aspect, then pushing of context-sensitive and personalized information is of relevance by providing FM/S products or services. Nine informants (VI_01, EN_02, SE_03, SI_06, SE_08, FL_09, FL_10, VI_11, EF_16) shared these same views. EF_16 explained this in the following words:

> *Yes. Absolutely. And why is this, because it helps the usage and the conversation; the user has the device, which is much more efficient because the user has not always to think about things and pull things. He gets triggered by the system with more intelligence behind that says, okay, this is now relevant to users and this is now the point where I give him this information.*

SI_06 also agreed with the need for personalized information:

> *Yes. That's an interesting point because pushing means that I get notified—that I get notified immediately. And also this depends on the application. I would say there are lots of applications where I don't care if I get the information immediately or just when I look it up. But there may be events that are so important that I want to know them immediately. The tendency with what I'm seeing is that you get overkilled with notifications and 95% are not important. So, it's more and more time-consuming to filter (personalized/context-sensitive) what I want to see. So, it's important that applications don't overuse such features.*

One informant (SE_08) negated this view, *"So in general I would say, no. This is not dramatically helping the acceptance"*.

VI_01 pointed out that the discussion of function/technological availability based on the user experience, *"I think you will easily notice this from an end-user experience when you're working in different environments"*. He summarized, *"It depends on each user and each user market"* and SI_06 supplemented this view by stating: *"It is something that the user expects"*. VI_11 put it in a nutshell, *"What he wants to have is if I need a service in that moment where I need it, it must be there".*

The above discussion shows that if the product or service is applied then the application is efficient enough. Table 4-5 lists the themes emerging from the interviews according to the key driver efficiency from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Efficiency	Bandwidth / Latency	12	90
	Pushing information	12	74
	User expectation	13	61
	Communication	10	59
	Acceptance / Usage	5	49
	Powerful and scalable	3	46

Table 4-5: Emerging themes in the efficiency dimension

4.2.6 Flexibility

In the research area of 'flexibility', research question four was explored: Does flexibility play a major role in the development of mobile applications?

The informants were of the view that access to computing and communications is necessary not only from one's 'home base', but also when one is travelling. Furthermore, a mobile solution should function with an array of mobile device types to ensure freedom of choice. It should be available anywhere, anytime, and on any device.

This increases the effort (i.e., the cost and time) for the architecture and design of the mobile application. However, this would decrease the lifecycle of mobile IT.

EF_16 made the following comments:

> *The user is getting used to the faster change cycles on the one hand. And on the other hand he expects this that there's much more value coming step-by-step and faster delivery cycles out of it to address these needs.*

To be successful under these constraints, it is important to be the 'first' in the competition. FL_10 suggested strategic timing to obtain a competitive edge:

> *I think the time to market is absolutely relevant because that will give you a competitive advantage; as a company, if you can be the first one with a new functionality of the new information—a new way to interact.*

EN_07 shared these views and added the following words:

> *Time-to-market is key. And as a default, I would go with cross-device development to be able to have a short time to market on all relevant platforms or at least the 80-plus percent iOS, Android.*

However, EN_07 differed from these viewpoints:

> *Time to market is irrelevant if you're only on the edge of innovation. So, you really need to think and define the new services which are offered to the end consumer.*

As mentioned by EN_07 above, the time constraint requires an appropriate architecture to ensure that the mobile application is running on any device. SI_05 explained that the architecture depends on platforms which have to be supported today – *"three large platforms which are Android, iPhone, and to some extent, maybe Microsoft Windows or the Windows phone"*. However, the market is quite fragmented (according to EN_07) and constantly and rapidly changing. EF_17 spoke on the aspect of a portable

architecture that *"it depends on the use case. If it's not an information-based application, it's okay to have a hybrid app. If there is something that uses [the] native functions of your device, it is definitely better to have a native application"*.

Furthermore, it depends on user expectations. EF_16 expressed his concerns in these words:

> *From the user expectations, we have to consider that there are people who love let's say a Windows platform or the Android platform and others who love the iOS platform. And one thing – in a B2C market, you don't have a choice. You have to serve all of the customers otherwise you'll leave them behind.*

Summarising this, VI_11 said, *"[The] user doesn't care if you [the organizations] are flexible or not. All the user cares about is do I get what I need in that moment"*.

EF_16 also expressed his views on functionality:

> *If you have a lot of functionality in there that needs native components, then yes. I would say if the key thing and the key benefit is that the users make money with you, then it's worthwhile to build native applications. From a usability perspective, it is better because [it is] always faster. But the difference between the native application and an HTML5 application is probably not always so different for an end-user, if you could just accept some information. So it is depending on what the app is doing.*

Taking into account the 'time-to-market' aspects, SI_05 describes the approach as follows:

> *So I think time-to-market is key, and I wouldn't constrain myself to just one ecosystem, neither iOS nor Android. So I would start with cross-device development and only then, knowing that there is a market, maybe invest in two native apps, iOS as well as Android and then Windows phone and so one.*

EF_16 and SI_05 were concerned about the flexibility of the technical approach: *"A multi-tiered architecture is necessary"* (EF_16) *and "with cross platform layer in between"* (SI_05).

Table 4-6 lists the themes emerging from the interviews according to the key driver flexibility from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Flexibility	Development/Application lifecycle	12	225
	Portable architecture	11	100
	Native programming	12	92
	User demand	10	87

Table 4-6: Emerging themes in the flexibility dimension

4.2.7 Security

The research area 'security' is concerned with the research question number five: What role does device management, data privacy and security play in the development of mobile solutions?

The interviewees considered the aspect of security from a general, consumer point of view. This concerned the integrity, confidentiality, authentication, and non-recognition of transactions. Two informants (SI_05, VI_11) stressed the point that *"in B2C you don't have mobile device management, to be honest. You have application management, not device management. I mean, no private person would let you control my device"* (VI_11). FL_09 shared this view saying, *"So, basically you are securing your device"*.

It follows that the security aspect is transferred to the application layer; therefore it influences the architecture and design of the mobile solution. This results in the reduction of complexity, which comprises both, customers' expectations regarding handling and functionality and their expectation to ensure security.

FL_04 explained these views succinctly: *"I will take care that no confidential data will be available outside of the device and outside of my company area"*.

Regarding the aspect of authentication and authorization, VI_11 stated: *"To manage your device or your different devices – and your identification – it is sufficient to work with a password and user ID to minimize complexity"*.

FL_15 described the security requirements from the organizational point of view as follows:

> *If we are talking to clients in the banking space then that's a big topic, the security thing and that everything's secured and that they have to cooperate [with the] store and everything like that. But, in the future, I can imagine that everything is going to be a little less, maybe not in the banking spaces because they are tightly regulated and everything. But I can imagine that the security concerns are getting yes a little bit yes less, and that these, just for example the fingerprint thing, become natural —they enhance the stuff so that it's really something that yes organizations would use. I can imagine that.*

VI_11 shared this view and added regarding the importance of security: *"This is a European thing. I mean, the Americans are much more relaxed about that"*.

Table 4-7 lists the themes emerging from the interviews according to the key driver security from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Security	Device management	12	248
	Data management	14	187
	Consumer expectation	13	146
	User identity	13	118

Table 4-7: Emerging themes in the security dimension

4.2.8 Visibility

Research field visibility explores answers to research question six: How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?

The informants reported that in the mobile world, the focus is on a single problem (cf. chapter 4.2.2) with information and services the user wants at whatever point he wants it while keeping the interface simple and clean but being very responsive and quick.

One informant (VI_11) stated the following:

> *Every app must be self-explanatory. And not only that, it must be very simple and fast. And you can only achieve that if you take out complexity.*

FL_09 shares this view and mentioned:

> *You have to try to simplify the user interface to do the tasks in a few steps, more or less. The user is able to navigate easily and quickly with a few steps to the most important information.*

Based on this knowledge, SI_05 opined that *"mobile devices have the opportunity for much richer interactions"*.

EN_02 raised the concern that *"the layout is completely different from the layout [of] a classical computer application"*. While FL_09 argued in the context of various devices and platforms to see *"if it is possible to make it look alike across the platform in a similar way"*. EN_02 said, *"I think the visibility is important, yes. If the look and feel is not accepted by the users, then they will not use mobile applications"*.

Table 4-8 lists the themes emerging from the interviews according to the key driver visibility from the most- to the least-mentioned theme.

	Code	No. of informants mentioning (n=18)	No. of mentions
Visibility	Complexity of the application	13	105
	Screen design	16	90

Table 4-8: Emerging themes in the visibility dimension

4.2.9 Summary of the findings

This chapter focused on the presentation of the findings supported by verbatim quotes from the informants (Tracy, 2010). The coding of the interview data helped to identify emerging themes related to the key drivers of technological development. In the first step, about 90 codes were extracted from the interviews. In a second step the codes were clustered into about 35 first order themes by common statements with the aim of finding classification and order. Finally six higher themes were developed to describe the topics in relation to the associated research question. Overall, within this process similarities, differences, cross references, and dependencies were identified. These important topics will be further analysed in the next chapter to verify whether certain themes will emerge as external variables in the conceptual framework, which have an influence on the technological development. Moreover, findings from academic literature will be included to allow a discussion on the findings from multiple views.

4.3 Analysis and discussion of findings

The aim of this research project is to develop a conceptual framework in which the key drivers of technological development are determined and the relation between the technological development and the consumer's expectation regarding a mobile application are explored. For this purpose, a conceptual framework is developed using an iterative process from academic literature and field data. The findings have been incorporated in a previous section (cf. chapter 4.2); this chapter caters to the interpretation of the qualitative data analysis.

Yin (2013) pointed out that data analysis consists of three stages, namely examining, categorizing and tabulating. Krueger and Casey (2014) built on this concept and suggested that the purpose should drive the analysis and that all analysis should begin by going back to the initial intention of the study and never lose sight of the purpose. In addition, and to avoid any bias, they pointed out that the analysis should be systematic, sequential, verifiable, and continuous. Therefore, whilst the in-depth expert interviews might have had a free flowing and open nature, the analysis should be much more structured and logical. Krueger Richard and Anne (1994) suggested a journey – the analysis continuum – from raw data to descriptive statements and ultimately to interpretation.

All the interviews were analysed using the same procedures to deliver accessible thematic data for interpretation. Each commenced with an emersion into the data and then a systematic allocation of the data into relevant 'higher' order themes were evolved from the priori codes/themes by taken the literature into account. The aim of the qualitative analysis was to detect patterns, coherent themes, meaningful categories, and emerging ideas that assist in comprehending the identified phenomenon. The challenge was to identify valuable connections and to offer reflective analysis.

To describe the content given by the respondents, the content analysis approach was used based on the frequency of key phrases and words encountered. The analysis

follows the six main steps of content analysis specified by Adams, Khan, Raeside, and White (2007). First, the unit of analysis was identified: the German FM/S industry represented by mobile IT experts of the IBM GBS brand. Second, the categories were specified: the key drivers of the technological development were chosen based on the rationale that the underlying influence factors will shape these key drivers. The categories were verified by literature review. Third, the coding was applied by using the codebook. In the fourth step, the data was broken down into distinct units of meaning and moved to a higher level of abstraction. The fifth step involved the illustration of the analysis results. In the sixth (last) step, a conclusion was drawn on the complexity of the phenomenon. Figure 4-6 presents an overview of the prepared responds:

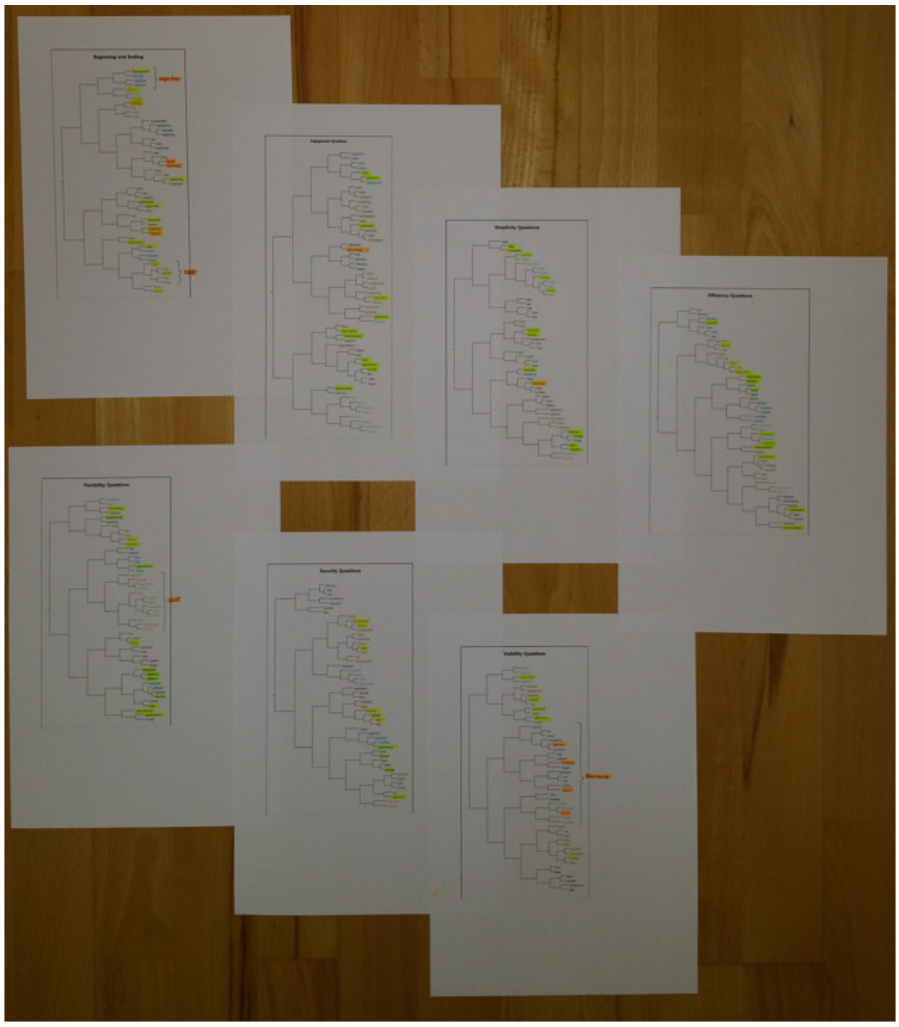

Figure 4-6: Cluster analysis to determine classification/order and to identify cross references/dependencies

The data was reduced, grouped into representing themes, and clustered by common statements with the aim of finding classifications and order (yellow highlighted in Figure 4-6). Cross references and dependencies were identified (orange highlighted in Figure 4-6) within the analysis process. After the first cycle of a theming coding the strategy of axial coding was applied to identify and name relevant concepts and categories. The data were grouped together to represent common, salient, and significant general dimensions. The data analysis, in particular the cluster analysis of each dimension is described in Appendix VIII in greater detail.

4.3.1 Engagement

As mobiles continue to become the primary engagement channel, people want, seek, and expect more direct and meaningful interactions in useful and intuitive ways. VI_11 expressed the factors influencing engagement as follows: *"They want to drive business with the help of mobile"*. To this end, mobile IT enables companies to create, deliver, and manage real-time, spontaneous communications by using the preferred mobile channels of their customers. SI_06 explained this as follows: *"In general, the stakeholders are the ones who want to bring the information to the customer"*. Today's mobile technologies offer consumers new levels of convenience and flexibility to interact with financial institutes whenever and wherever they want. To help enable this flexibility, the engagement and therefore an investment are inevitable. However, in this process the costs can be considered as an influence factor, as EF_17 explained: *"I think first there is the idea and then there's a business case based on cost, and sometimes cost is also a killer".*

Based on the research question "How do mobile information technologies influence the engagement of companies for developing mobile solutions?" and on the key themes that emerged from the data analysis (see quotes and word cloud below), the conceptual framework can be drawn as shown in Figure 4-7.

Figure 4-7: Key driver engagement: Business related applications increase revenue, reduce costs and engage customers

4.3.2 Simplicity

Therefore, the best applications do only one (required) thing, but they do it very well. It is important that the application solves a certain problem in regard to simplicity. SI_06 explained: *"You don't want to interact with an application, which is too clumsy or too complex to work with"*. The application comprises various platforms with high market share and must be well designed, both in terms of visuals and the user experience (UX). The interviewees stated that consumers will not tolerate unintuitive applications. VI_11 elaborated: "*They don't want to be bothered with technical issues".* The application should provide quick and easy access to the features required with the application of various input channels (keyboard/keypad, voice, or other gestures). VI_11 also said: *"[The] device should know what I need at the moment and react on that".*

Based on the research question "Has consumer behaviour significantly changed by using the latest user interface trends?" and on the key themes that emerged from the data analysis (see quotes and word cloud below), the conceptual framework can be drawn as shown in Figure 4-8.

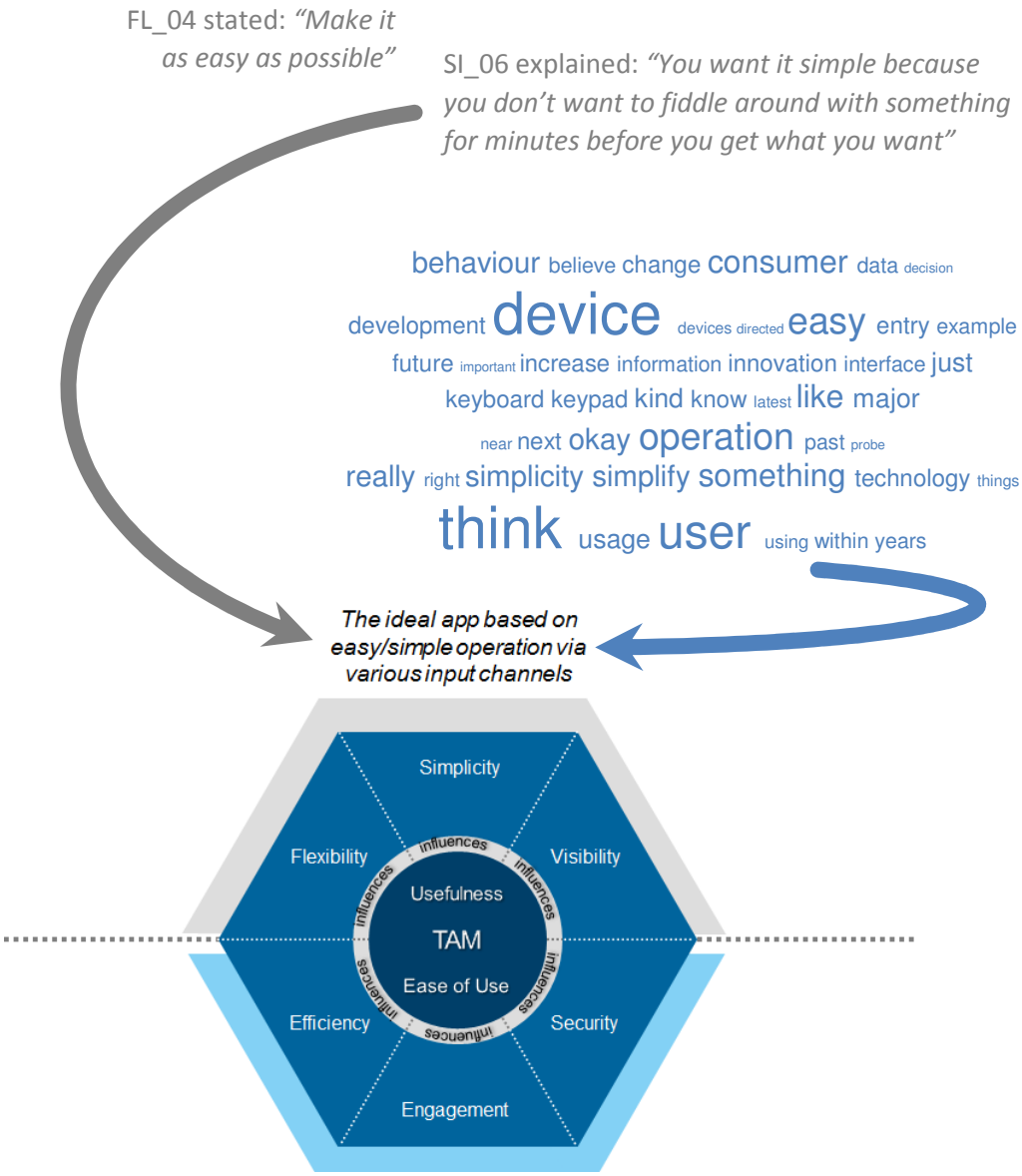

Figure 4-8: Key driver simplicity: The ideal application based on easy/simple operation via various input channels

4.3.3 Efficiency

If the ratio of resources expended in relation to the accuracy and completeness with which users achieve goals is balanced, then the solution is sufficient. VI_01 pointed out, *"It depends on each user and user market".* The mobile application should give quick access to personalized content and features that the customer will use most frequently; it must be supported by real-time analytics and cognitive tools (such as advisors) to save time. EF_16 explained: *"He gets triggered by the system with more intelligence behind that, okay, this is now relevant to users and this now the point where I give him this information".* In this context, the IT architecture and design for mobile solutions have to prevent exceptions – that means, it should not crash, freeze, or display an error message. Therefore SL_06 suggested: "*So, it's important that applications don't overuse such features".*

Based on the research question "Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?" and on the key themes that emerged from the data analysis (see quotes and word cloud below) the conceptual framework can be drawn as shown in Figure 4-9.

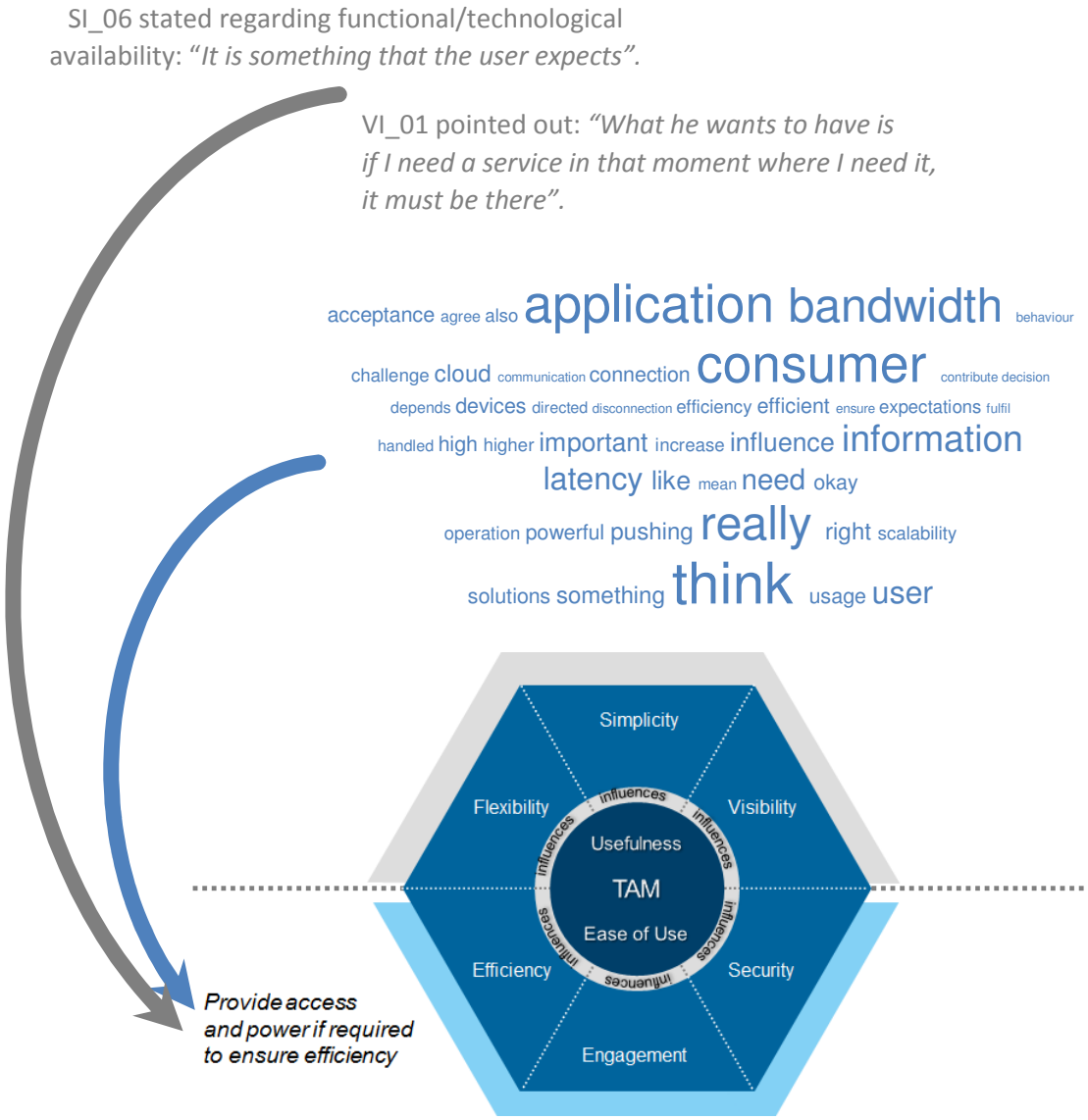

Figure 4-9: Key driver efficiency: Provide access and power if required to ensure efficiency

4.3.4 Flexibility

Mobile users today expect high-fidelity access to the same information they have on their desktop, presented in a mobile-friendly format. This is difficult because of the fragmented set of devices and platforms and the cost of developing for multiple mobile platforms. In this context EF_16 stated: *"You have to serve all of the customers otherwise you will leave them behind"*. The ability to be flexible is based on a portable architecture, which comprises a large number of device types including different device configurations and the aspect of 'time-to-market' in connection with the shortened lifecycle of a mobile application.FL_10 suggested: *"I think the time to market [aspect] is absolutely relevant because that will give you a competitive advantage; as a company, if you can be the first one with a new functionality of the new information – a new way to interact".*

Based on the research question "Does flexibility play a major role in the development of mobile applications?" and on the key themes that emerged from the data analysis (see quotes and word cloud below) the conceptual framework can be drawn as shown in Figure 4-10.

SI_05 stated: "*So I think time-to-market is key, and I wouldn't constrain myself to just one ecosystem, neither iOS nor Android".*

EN_07 suggested: "*I would go with cross-device development to be able to have a short time to market on all relevant platforms or at least the 80-plus percent iOS, Android".*

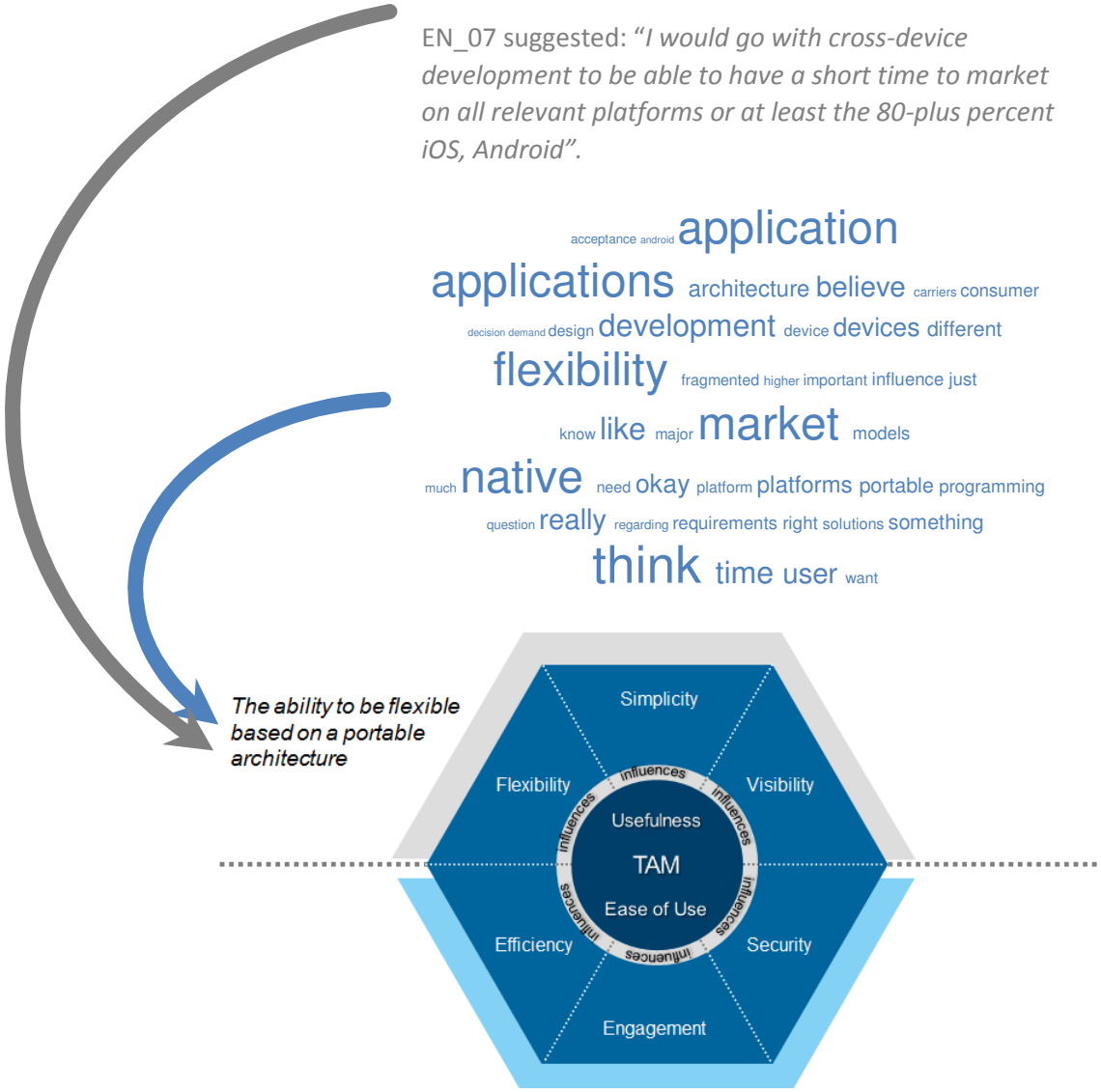

Figure 4-10: Key driver flexibility: The ability to be flexible based on a portable architecture

4.3.5 Security

Security and the perception of security play a major role for consumers who deal with banking products/services. FL_04 claimed: *"I will take care that no confidential data will be available outside of the device and outside of my company area"*. Especially in the area of the FM/S industry, consumers expect that their transactions will remain secure. FL_15 described: *"If we are talking to clients in the banking space then that's a big topic, the security thing and that everything is secured and that they have to cooperate [with the] store and everything like that".* In general, consumers are aware about security issues even though they might not know how exactly they work. Therefore, a lack of confidence in security can be recognized and it is important for IT companies and IT service providers to ensure the security of mobile IT. VI_11 stated: *"To manage your device or different devices – and your identification – it is sufficient to work with a password and user ID to minimize complexity".* Besides the security of device and infrastructure, data security is of particularly importance within the area of FM. This comprises data protection from advanced and common threats.

Based on the research question "What role does device management, data privacy and security play in the development of mobile solutions?" and on the key themes that emerged from the data analysis (see quotes and word cloud below) the conceptual framework can be drawn as shown in Figure 4-11.

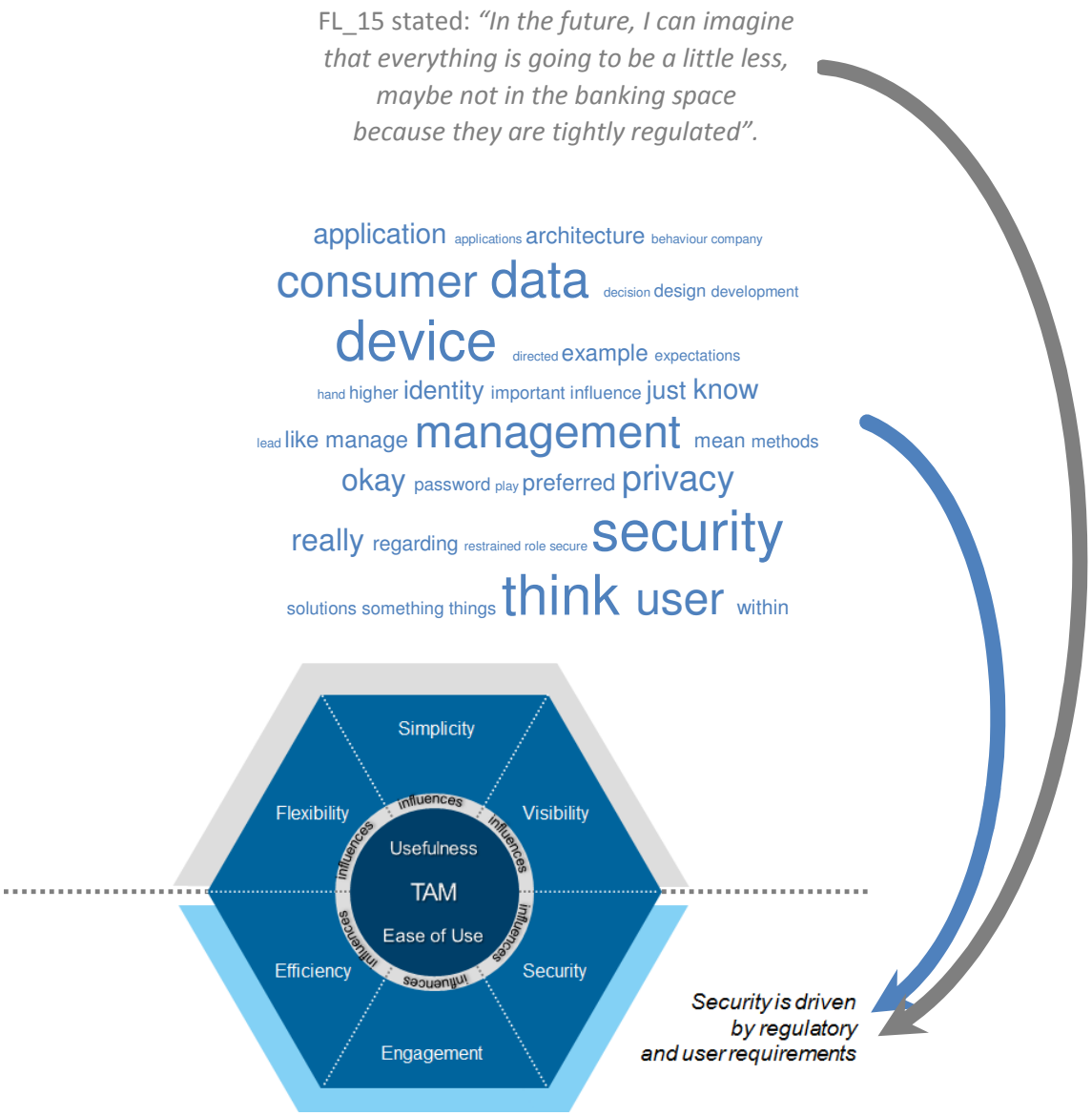

Figure 4-11: Key driver security: Security is driven by regulatory and user requirements

4.3.6 Visibility

Good mobile designs involve much more than just aesthetic considerations about layout, colour, or font. The design should organize the user interface purposefully and in meaningful and useful ways based on clear, consistent models that are apparent and recognizable to users; the design should place related things together and separate unrelated things; it should also differentiate dissimilar things and make similar things resemble one another. The design should make visible all required options and materials for a given task (e.g., menus and navigation) without distracting the user with extraneous or redundant information. VI_11 claimed: *"Every app must be self-explanatory. And not only that, it must be very simple and fast. And you can only achieve that if you take out complexity"*. Good designs do not overwhelm users with alternatives or confuse them with unnecessary information. Finally, the user expects technology to work for them to resolve problems quickly and easily in the context in which they use the technology.

Based on the research question "How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?" and on the key themes that emerged from the data analysis (see quotes and word cloud below) the conceptual framework can be drawn as shown in Figure 4-12.

FL_09 stated: *"You have to try to simplify the user interface to do the tasks in a few steps, more or less. The user is able to navigate easily and quickly with a few steps to the most important information".*

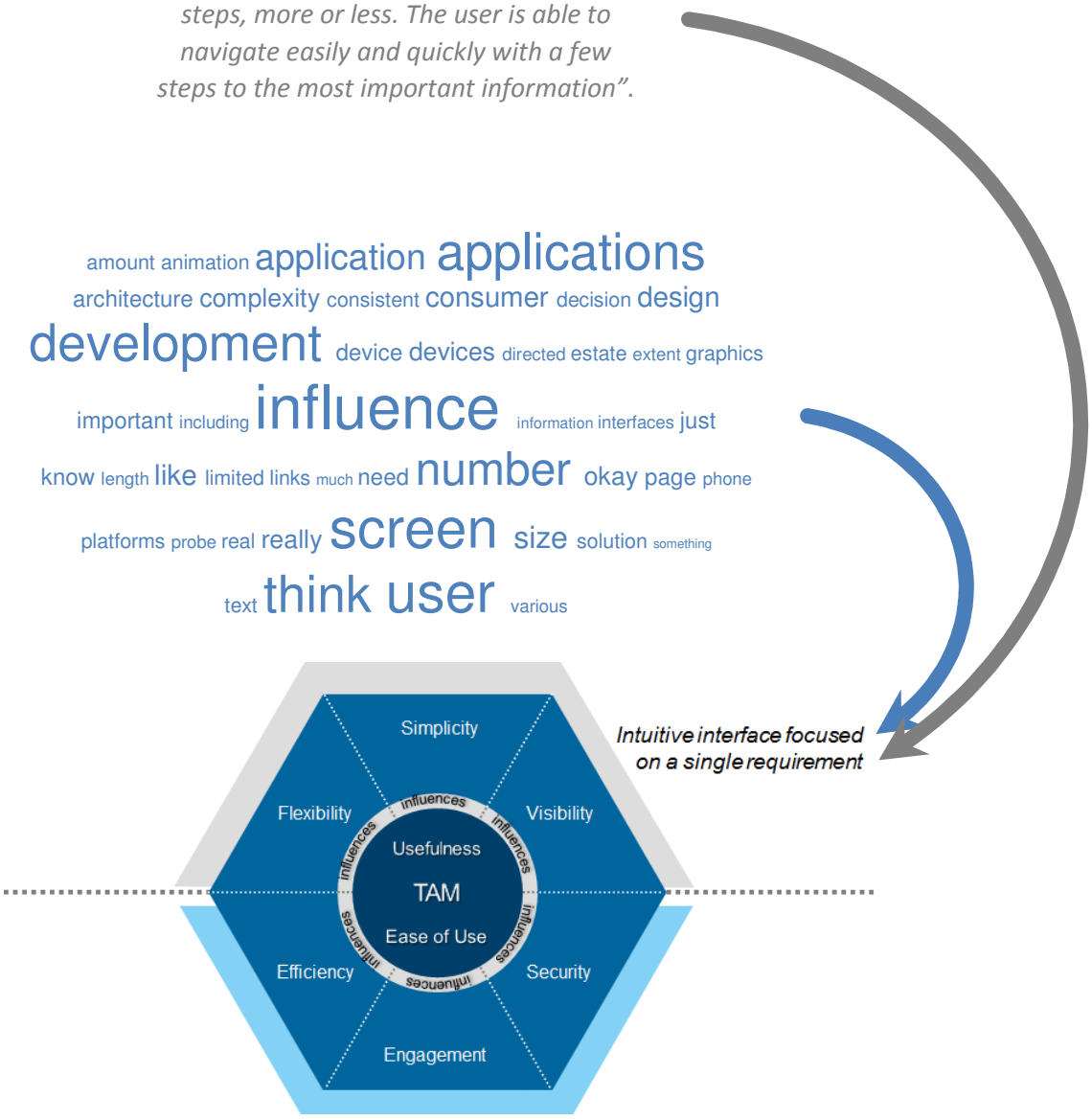

Figure 4-12: Key driver visibility: Intuitive interface focused on a single requirement

4.4 Discussion (continued) and conclusion of findings

With respect to the key themes that were developed on the basis of the data analysis, the conceptual framework evolved along the key drivers of technological development can be describe as illustrated in Figure 4-13.

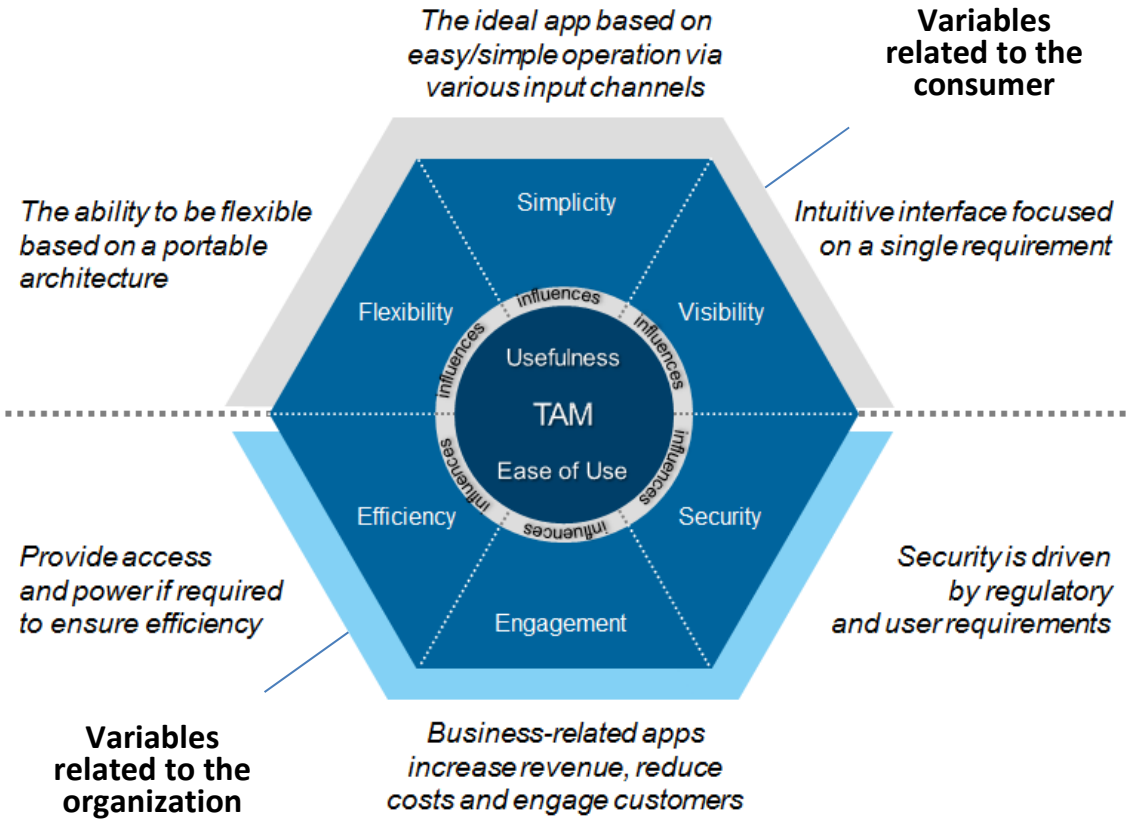

Figure 4-13: Conceptual framework in consideration of the influencing factors

The framework contains the influencing factors (i.e., variables) with respect to literature review, with the aim of providing answers to the research questions. In comparison to previous research (Zmijewska et al., 2004) a set of business-related criteria is considered which differentiated between consumer- and organization-specific variables. To further gain academic and practical understanding, it is deemed essential to discuss the benefits of the conceptual framework (Tsang, 2013, 2014).

The benefits have been identified based on the findings from the field data. The first benefit is that the framework can form a foundation for a retrospective analysis of the key drivers of technological development, to study the influence factors.

Furthermore, the framework forward-looking provides the basis to explain the relationship between the technological development and the TAM in the form of an enhancement as shown in Figure 4-14.

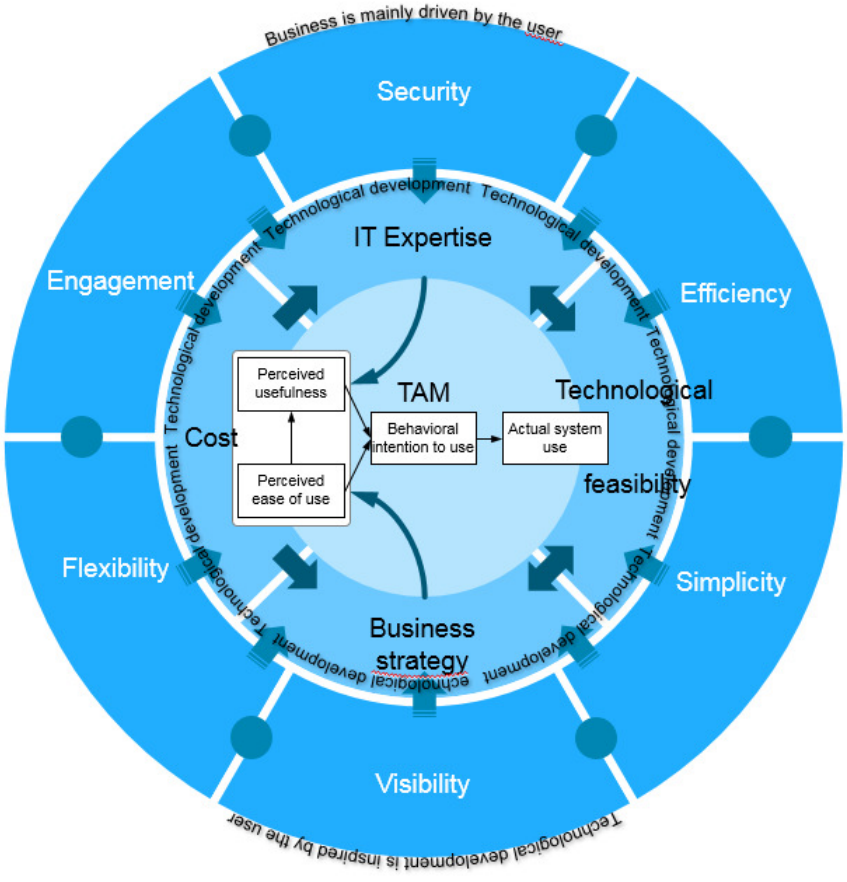

Figure 4-14: Relationship between technological development and the TAM

Technological development in the area of mobile IT dramatically changes the development of mobile solutions. On basis of the key drivers of technological development the IT expert interviews explored the technical viewpoints and found remarkably consistent patterns emerging; these influence the development of mobile solutions. The views expressed by the informants and the resulting data analysis are presented in the Figure 4-13 . Moreover, the field data allowed the specification

of a guideline that provided directions for the application of the mobile 'moment'. Data showed that:

A mobile application for the German FM/S industry needs to provide immediate and relevant mobile 'moments' in the context of the entire customer ecosystem.

Customers operate in a multi-channel world, and they want their mobile application to respond immediately, appropriately, and seamlessly. The applications work in the larger engagement ecosystem to provide customers with the content they demand when they want it. This result of the analysis confirmed the statement of Rhee et al. (2006) that mobile IT is a gateway for people to sense their digital contexts and that the boundaries between the office and home are fast dissolving (Puro, 2002). Therefore:

Applications that provide FM/S products or services are a key way to increase customer engagement, experience, and loyalty.

The mobile application acts as the 'mission control' of the customer's mobile moment, reaching out to the back end for data and functionality while keeping a clean and friendly interface for customers and providing them with relevant, contextual content from the FM/S industry at the swipe of screen. This result of the analysis confirmed the statement of Ho and Kwon (2003) that mobile services are more personalized, developed, and simple. The application leverages the larger mobile experience on the device, including mobile web, mobile e-mail, and messaging. The untapped opportunity in mobiles for the IT company and the IT service provider is to obtain an extremely detailed understanding of their customers (and the way they behave in various contexts), anticipate customers' expectations, and work across the enterprise ecosystem to develop unique insights that power better marketing across all channels, not just mobiles. Therefore:

IT companies and IT service providers must leverage data to understand the impact of mobile moments and how they can be improved.

A great mobile application experience is designed and created by knowing the customer, including where they are and what they need in that moment. Mobile phone users can access and use mobile services anywhere and anytime (Cui & Roto, 2008). In order to do this, vast amounts of data are collected, analysed, and made available. Additional data collected feeds back into the next experience to improve the next mobile 'moment'. This result of the analysis confirmed the statement of Schenk et al. (1998) that through experience, users develop a set of skills and relevant knowledge that leads to effective performance with a particular technological environment.

In summary the findings and the analysis are connect to the aim and objectives of this study. Such as previous researcher argued, mobile services and/or applications are particularly relevant (Linck et al., 2006). Within the data analysis the researcher determined the attributes why mobile IT is a game-changer across the FM/S industry. Related to the objectives of this study, IT expert interviews were conducted so that differences and similarities to the current literature could be identified. Furthermore, on basis of the data analysis and in consideration of the literature a conceptual framework was evolved and an enhancement to the TAM was developed. The following chapter summarizes the main findings of the study and provides academic implications as well as recommendations for practitioners.

5 CONCLUSION

5.1 Introduction

This chapter presents the conclusions and recommendations of the study. It begins with phrasing the gap and an introduction into the framework to close the gap. The chapter 5.2 continues by stating how the original aim of the study has been addressed and provides the evidence that the current research project is logical and coherent. In the chapter 5.3 the results of the research were summarized. The original primary research questions were clearly answered. Chapter 5.4 provides managerial implications for the findings. Recommendations will provide guidance for both academics and practitioners. Finally, chapter 5.5 and 5.6 discuss the potential limitations and recommendations for future research, followed by an overall conclusion chapter 5.7.

Consumer behaviour is the study of the processes involved when individuals or groups select, purchase, use, or dispose of products, services, ideas or experiences to satisfy needs and devices. The field of consumer behaviour is interdisciplinary; it is composed of researchers from many different fields who share an interest in how people interact with the marketplace. There are many perspectives on consumer behaviour; however, research orientations can roughly be divided into two approaches: the positivist and the interpretivist perspectives. The positivist perspective, which currently dominates the field, emphasizes the objectivity of sciences and views the consumers as rational decision makers. In contrast, the interpretivist perspective stresses the subjective meaning of the consumer's individual experiences; it is based on the idea that any behaviour is subjective and allows multiple rather than a single explanation.

Previous studies have investigated consumer behaviours in general. The focus of this study was the consumer behaviour of banking customers in the German FM/S industry. Most customers in Germany are satisfied with the convenience of traditional banking services but the expectations are constantly rising as new technologies and consumer behaviours develop. The technological advances

have challenged the providers of financial services. Financial institutions will be forced to deliver information and banking services via various electronic channels because of a decline in the importance of traditional branch networks (cf. Appendix I).

Current literature has shown that the consumers in the area of financial markets and services contribute to information technology, especially mobile IT, based on models of how users accept or adopt a technology described by existing theories (cf. chapter 2.7). However, literature does not highlight the key drivers of technological development from a business-related, especially technical point of view. Previous researchers argued that the influence on the consumer behaviour is categorized by the known major factor groups and their sub-factors (cf. chapter 2.11.2), which do not consider technological progress, especially in the area of mobile IT. The researcher drew on the views and expertise of IT architects and specialists to gain an in-depth understanding of the factors influencing the shape of the architecture and the design of a mobile IT application. These have an impact on the consumer behaviour in the German FM/S industry. This research investigated the impact of mobile IT on consumer behaviour in the German financial market and provided a conceptual framework as basis for the non-complex TAM enhancement. Figure 5-1 describes the framework with the four new variables of the TAM: business strategy, cost, IT expertise, and technological feasibility. Furthermore, the framework consider the key drivers of the technological development and how these influencing factors are linked to each other and to the dimensions. In addition, the particular relationship between business (strategy) and IT (expertise) which was developed within the data analysis (cf. chapter 4.2.2, Figure 4-5) is highlighted in form of the red coloured arrows. On one hand, the impact of business strategy on IT expertise and its limitation can be described as follows: Business ‘drives’ IT but strategy is limited by technology. On the other hand, the impact of IT expertise on business strategy and its limitation can be described as follows: IT ‘enables’ business but requires a business use case.

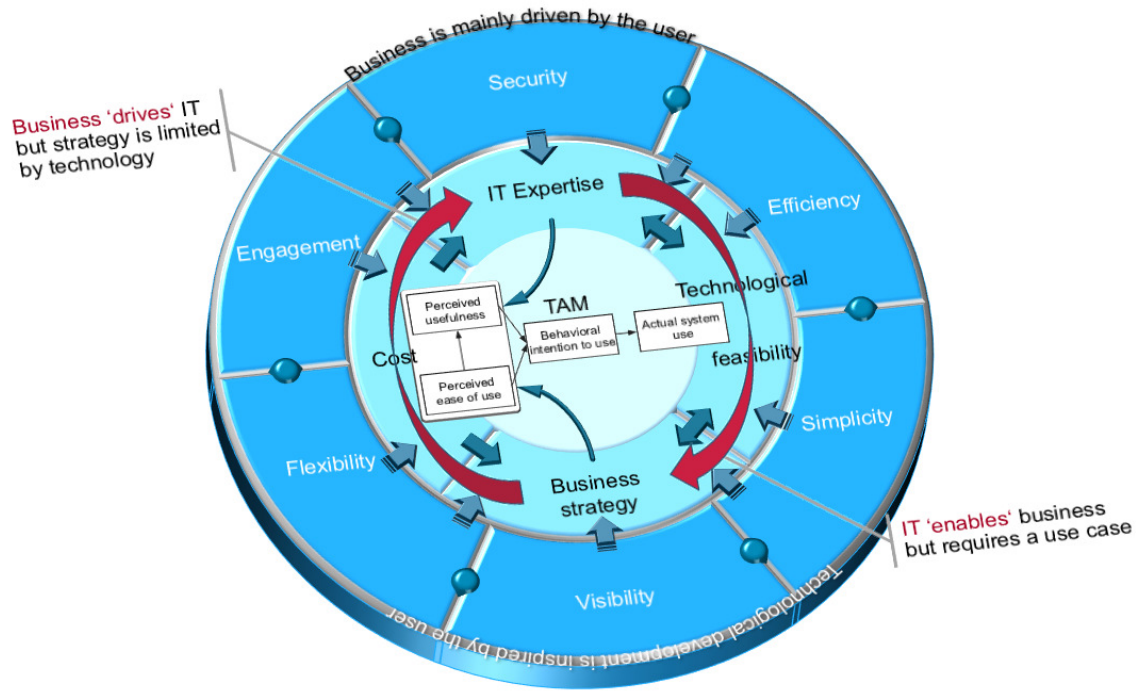

Figure 5-1: Conceptual framework as basis for the non-complex TAM enhancement

5.2 Main findings of the research

The aim of the research was to investigate the perspective of IT experts about the impact on the mobile application development on the German FM/S industry. The research drew on the views and expertise of IT professionals in order to gain an in-depth understanding of the architecture and design of mobile applications and their impact on consumer behaviour. Consumer opinions and behaviours were identified from the perspectives of IT experts in the context of the perceived usefulness and ease of use of mobile IT.

In order to achieve the aim, four research objectives were identified:

- *Literature review*. The present study closed the gap in literature pertaining to the lack of studies that explored, analysed, and evaluated the technical viewpoint with regard to consumer behaviour. Existing literature does not highlight the key drivers of technological development from a specific business-related and technical viewpoint. A critical contextual literature review of academic and industry-based literature was done to identify central themes

and theoretical issues that confirmed the impact of mobile IT for the German FM/S industry, in the context of the architecture and design of mobile applications for online trading. The extensive literature review comprised 243 peer-reviewed journal articles or conference papers, 111 books or book sections, 37 industry reports (online/web media), and 11 other sources (thesis/generic/figure). The literature review was an integral element of the research study, and it provided historical background and current context for the study. Relevant theories and concepts that underlay the research, terminology, and definitions used in the literature were addressed.

- *Methodology (and method)*. Semi-structured interviews helped the researcher to gain insights into the thinking process of the IT experts and explore why mobile IT is a game-changer across the German FM/S industry. Because of the novelty of this research, a qualitative phenomenological research approach, based on semi-structured expert interviews with professional mobile IT architects and specialists in a worldwide-acting IT company (IBM Corporation), was considered as a suitable approach; this also conformed to the researcher's philosophical interpretation. The approach enabled the researcher to describe the 'lived' experiences of the phenomenon from the interviewee's perspective (Van Manen, 1990) and to answer the research questions by exploring the research gap.
- *Findings and analysis.* A conceptual framework was evolved based on the literature review and field data findings, and an enhancement to an existing information system theory was developed to describe the relationship between the mobile information technology and consumer behaviour. Within the analysis, similarities and differences were identified, which allowed presenting multiple views on the phenomenon and providing a modification of the TAM.
- *Recommendations.* Based on the key findings an overview was composed related to the key drivers of technological development. This overview details the main aspects for the development of mobile applications.

Based on the 'golden thread' (Ramdhony, 2014), the structure of the research is recapitulated by describing the correlation amongst the literature review, methodology, method, findings, and analysis by means of task and purpose (see Table 5-1):

Chapter	**Task**	**Purpose**
Literature review	Evaluation of academic and industry contributions Development of literature review framework and a structure used throughout the research	The creation of a literature review framework, which allowed the framing of the research field, set boundaries to it, and served as a structure for the presentation of further research claims Identification of the research gap, and (based on that) formed the research questions
Methodology	Description of phenomenology and proof for applying this philosophical understanding to this research	Opening up possibilities for creating formative relations between being and acting, between who we are and how we act, and between thoughtfulness and tact (Van Manen, 2007, p. 13)
Method	Exploration of the phenomenon through semi-structured interviews	Identifying a research method that allows direct interaction with participants to explore the research field in which little previous research had been done
Findings and analysis	Presentation of findings based on verbatim quotes and coding Analysis including reference to other academic research; generation of themes; review of the conceptual framework based on field data	Identify similarities or differences Finding a universal meaning for an experience

Table 5-1: Research structure and demonstration of coherence and logic

The structure above is seen as an indicator of a coherent research project in which the components of the research are consecutively assembled. Furthermore, it is argued that the research is not only coherent, but also of good quality. To achieve this, research quality criteria were used and their reflections in this research are presented as follows:

- Credibility: the researcher stayed in the field for almost 14 month from the pilot to the main study with the purpose of giving this gestation time to see if there is phenomenon change as a result. Data analysis include horizontalisation (understand participant experience) and cluster of meaning of the data (unification of interpretation into themes).
- Transferability: the population of interest is specified. Rich and extensive set of details concerning methodology and context included in the research report. Interviewee purposefully selected to allow information richness.
- Dependability: the researcher coded the same data twice by giving at least one or two weeks' gestation period between each coding. The results from the two coding were compared to see if the results are the same or different. An interview protocol was developed and applied interview transcripts are stored in a database (NVivo) to keep an audit trail with time stamp. Themes are defined and grounded in extant literature.
- Confirmability: achieved also through the audit trial
- Integrity: decision-directed and probe questions are defined. A chain of evidence using quotes from informants is provided to readers.

There is an ongoing debate about whether phenomenology is a science or a branch of philosophy and religion, which are called 'soft sciences' (Harris, 2007). Furthermore, another criterion for research evaluation is the question of generalizability of the findings. Critics of phenomenology think that it is not possible to describe unique experiences and simultaneously make generalizations about them (Farber, 1966). The proposed interpretation of the research phenomenon is built on current academic literature and on the interview data from 18 IT experts, who were part of the IBM Mobile Center of Competence. However, the primary goal is to allow various phenomena

to be described by those who have experienced them, which will allow a deep understanding of the research issue. The researcher understands these criteria as a focus on thoroughness, and the findings can be explained and established by any kind of research.

5.3 Main results

By conducting the study, the objectives described were achieved. First, the selected sample group represented and reflected the target population of IT experts. Second, the interviewees provided rich and insightful data for a successful analysis. Furthermore, it was shown that the results were aligned with the purpose of the study; therefore, no additional sources (except literature) was needed. Finally, it was found that the interview data allowed the identification of influence factors and codes related to the key themes (Campbell et al., 2013; Saldaña, 2013).

The researcher spent substantial time in data collection and analysis (as expected) because the researcher had to become familiar with the data and the analysis software simultaneously. The researcher recognized that qualitative analysis and data interpretation involves more than coding. Fossey et al. (2002, p. 729) argued that the understanding of qualitative data entails “conceptual level processes of exploring the meanings, patterns, or connections among data”. Strong emphasis was laid on understanding the theoretical and practical implications of coding. Basit (2003, p. 145) argued that “coding and analysis are not synonymous, though coding is a crucial aspect of analysis”. Literature indicates that consistency and completeness in coding is a critical aspect in the process of data analysis (Campbell et al., 2013). In the pilot coding process, the researcher got a feel for the data and performed data reduction and interpretation. The pilot helped the researcher to identify difficulties in applying the coding scheme, such as deciding which category to employ when considering a certain dimension for which no code was available. The pilot provided a direction for the main study but was open for new IT expert views and insights in the main research. However, the pilot was not able to provide answers for any questions because of the restricted number of participants and the sample group, which did not reflect the entire population.

In the main study, the researcher created a research diary to detail the ongoing theoretical developments and analytical decisions made (J. W. Creswell & Miller, 2000). The research diary comprised summaries of reading activities, meeting records, and early analytical procedures. In addition, memos were written and adapted as insights for the data changed. The critical reflection of data in the form of a diary helped the researcher to focus on the essential part: the coding. With the help of coding, the researcher noticed remarkable concurrences in the interview results so that themes could be developed to evolve a conceptual framework and develop an enhancement to the TAM.

The responses to the research questions have been summarized by quoting the findings and their interpretations based on the developed themes. The research questions were derived from the main research question “What shapes the development of mobile IT applications?” This recognizes the importance of exploring the key drivers of technological development: engagement, simplicity, efficiency, flexibility, security, and visibility.

- Related to the research field ‘engagement’, the following research question was asked

  – **RQ1:** How do mobile information technologies influence the engagement of companies for developing mobile solutions?

  The engagement in the mobile business is mandatory to increase revenue, reduce costs, and engage customers. IT companies and IT service providers must tackle the challenge of the cost of development because mobiles continue to be the primary engagement channel — people want, seek, and expect useful, intuitive, and meaningful interactions with financial institutes whenever and wherever required.

- Related to the research field ‘simplicity’, the following research question was asked

  – **RQ2**: Has consumer behaviour significantly changed by using the latest user interface trends?

  A successful application needs to have easy/simple operations for various input channels. It is important that the application solves a certain problem in regard to simplicity. Therefore, the application should provide quick and easy access to the features required with the application of various input channels (keyboard/keypad, voice, or other gestures).

- Related to the research field ‘efficiency’, the following research question was asked

  – **RQ3**: Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?

  A mobile application must fulfil consumer needs and demands to be effective; this includes features/functional aspects and service/technology aspects in the form of powerful and scalable communications (if required). Furthermore, the mobile application should provide access to personalized content and features that the customer will use frequently; these are to be supported by real-time analytical and cognitive tools (advisors) for efficiency.

- Related to the research field ‘flexibility’, the following research question was asked

  – **RQ4**: Does flexibility play a major role in the development of mobile applications?

  Mobile applications should run anywhere, anytime, and on any device. Mobile users today expect high-fidelity access to the same information that they have on their desktops to be presented in a mobile-friendly format.

The ability to be flexible is based on a portable architecture, which needs to cater to a large number of device types and configurations. Flexibility also needs to consider the 'time-to-market' aspect in connection with the shortened lifecycle of a mobile application.

- Related to the research field 'security', the following research question was asked

  – **RQ5**: What role does device management, data privacy, and security play in the development of mobile solutions?

  The perception of security plays a major role for consumers who deal with banking products/services. This comprises the security of the device, infrastructure, and the data, especially in view of the increasing regulatory demands made by the German FM. The consideration of security results in the reduction of complexity, which includes customer expectations regarding handling, functionality, and security.

- Related to the research field 'visibility', the following research question was asked

  – **RQ6**: How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?

  The focus is on providing a solution to a single problem with information and services the user wants at whatever point he wants it, while keeping the interface simple and clean but being very responsive. Therefore, the design for a mobile application should include all required options and materials for a given task visible (e.g., menus and navigation) without distracting the user with extraneous or redundant information. Good designs do not overwhelm users with alternatives or confuse them with unnecessary information.

Additionally, the following general aspects were observed within the semi-structured interviews of the IT experts. All informants stated that 'people' who apply mobile IT are the most important attribute. People (i.e., consumers or users) including the organizational staff (e.g., IT architects and specialists) are at the centre of the mobile application development. Consumer/user experiences, professional designs, and architectural skills are now being seen as key drivers for business success.

> *It [human history] has distinct movements or periods in which a variety of talented people influenced by a shared set of principles defined by the needs and attitudes of the time invent something new, ultimately creating what will become the defining style of the period, an artefact of the collective consciousness of our species (Fling, 2009, p. 300).*

In the context of this research, it states that the way of how people will apply mobile financial services will continually change to a fragmented but service-oriented environment, which shapes the development of mobile IT applications for the German FM/S industry.

Sometimes, the principle that users expect technology to work for them and solve problems quickly and easily is reversed by new inventions in technology in response to which user needs arise much later. In this case, insights do not move from users to the company but from the company to the users. It is about merging new technological possibilities with visions for future practice without asking users what they want but by making radical proposals about it. This approach requires a solid understanding of technology and users' businesses combined with the capabilities and the skill sets to discover hidden, unmet needs, that is, the perspectives of IT experts.

5.4 Implications of the study

The usability of mobile IT has been studied extensively and several guidelines are currently available. Although mobile devices have developed considerably, user interface restrictions still remain and cause usability problems that can be overcome by avoiding certain kinds of elements and contents in the solution. The goal of a good mobile application that could work optimally on any device and network is an extremely ambitious idea because the kinds of devices and technical infrastructures are constantly growing. Furthermore, the solutions need to adapt to changes in technical infrastructures, such as the available network on the move. Personalization and context-awareness have been proposed as solutions to usability problems, but they may bring in new problems. Perhaps an even bigger problem than the ease of use has been the technical reliability of technology and the difficulties in their application.

The challenges for user acceptance of mobile solutions arise from the increasingly complex technical and business environments in which the users access the application using mobile devices that have several user interface restrictions. At the same time, pressure for faster development cycles complicates the management of application development and delivery from design to marketing and does not allow extensive usability studies. The solution may lead to severe usability and technical problems in addition to a lack of content. In this challenging design environment, there is a need to extend the focus of current usability-oriented design guidelines based on existing information system theory to better cover the design decisions that affect user acceptance.

5.4.1 Academic implications

Davis (1989) presented the Technology Acceptance Model (TAM) to explain the determinants of user acceptance for a wide range of end-user computing technologies. The model is based on the Theory of Reasoned Action (TRA) by Ajzen and Fishbein (1980). The TAM has been tested and extended by many researchers, including Davis himself. It was designed to study information systems at work to predict whether the user will actually use a certain system for their jobs. Later, it was often used to study the user acceptance of Internet services. The model provides a tool to study the impact of external variables on internal beliefs, attitudes, and intentions.

Venkatesh and Davis (2000) enhanced the model to TAM2, which provides new input variables categorized into social influence processes and cognitive instrumental processes. TAM2 reflects the impact of subjective norms affected by experience, voluntariness, image, job relevance, output quality, and result demonstrability on the user acceptance. The validity of these new input variables was proven by four longitudinal studies.

Mathieson, Peacock, and Chin (2001) further extended the TAM by analysing the influence of perceived user resources. They claimed that there may be many situations in which an individual wants to use an information system but is prevented because of the lack of time, money, expertise, and so on. Mathieson et al. classified resource-related attributes into four categories: user attributes, support from others, system attributes, and general control-related attributes that concern an individual's overall beliefs about his/her control over system use. In their extended model, external variables affect perceived resources that further affect perceived ease of use and behavioural intention to use.

The TAM was originally developed for studying technology at work. Subsequently, it has often been used to study user acceptance of Internet services (Barnes & Huff, 2003; L.-d. Chen, Gillenson, & Sherrell, 2004; David Gefen, 2000; David Gefen & Devine, 2001; David Gefen, Karahanna, & Straub, 2003). David Gefen et al. (2003) have studied the TAM in connection with e-commerce. They have extended the TAM for this

application area and propose that 'trust' should be included in the research model to predict the purchase intentions of online customers. Furthermore, Venkatesh et al. (2003) have proposed a unified view for the user acceptance model. They have combined the original TAM with seven other user acceptance research approaches, including the Innovation Diffusion Theory (cf. chapter 2.7.6). The Unified Theory of Acceptance and Use of Technology (UTAUT) includes four key determinants of intention and usage: performance expectancy, effort expectancy, social influence, and facilitating conditions. Performance expectancy replaces perceived utility in the original TAM and effort expectancy replaces perceived ease of use. Social influence and facilitating conditions have been adopted from the other research approaches.

The TAM (including its variations) is well documented and has been widely used as a framework for surveys where existing products are assessed. Davis and Venkatesh (2004) proved that stable and behaviourally predictive measures of perceived usefulness of information systems can be made by using mock-ups. Therefore, the TAM constitutes a solid framework to identify issues that may affect user acceptance of technical solutions. The model can be enhanced from its original purpose of studying the user acceptance of existing products to studying planned product concepts, such as mock-ups (Davis & Venkatesh, 2004). This indicates that the TAM could also be used in connection with technology development projects, such as mobile IT projects to assess the usefulness of proposed solutions. Applied in this way, it allows the researcher to enhance the model by adding the element of technological development based on the unlimited insight of the IBM IT experts regarding the key drivers. The data from the IT architects and specialists provide other academics with an unprecedented levels of insights from technical point of view – the IT expert's perspective. The factors influencing mobile IT development were carved out and related to the TAM in form of new external variables (see Figure 5-2). Based on the consumer's behaviour (actual system use) in the German FM/S industry the researcher emerged consumer- and organization-specific (external) variables which have an influence on the technological development within the organization. This influence is illustrated by the two red coloured lines. The variables related to the consumer are: flexibility,

simplicity, and visibility; the variables related to the organization are: efficiency, engagement, and security. The green rectangle of technological development represents the framework with the four new (internal) variables of the TAM: business strategy, cost, IT expertise, and technological feasibility. In this context the particular relationship between business strategy and IT expertise is highlighted by the bold, blue line in the middle.

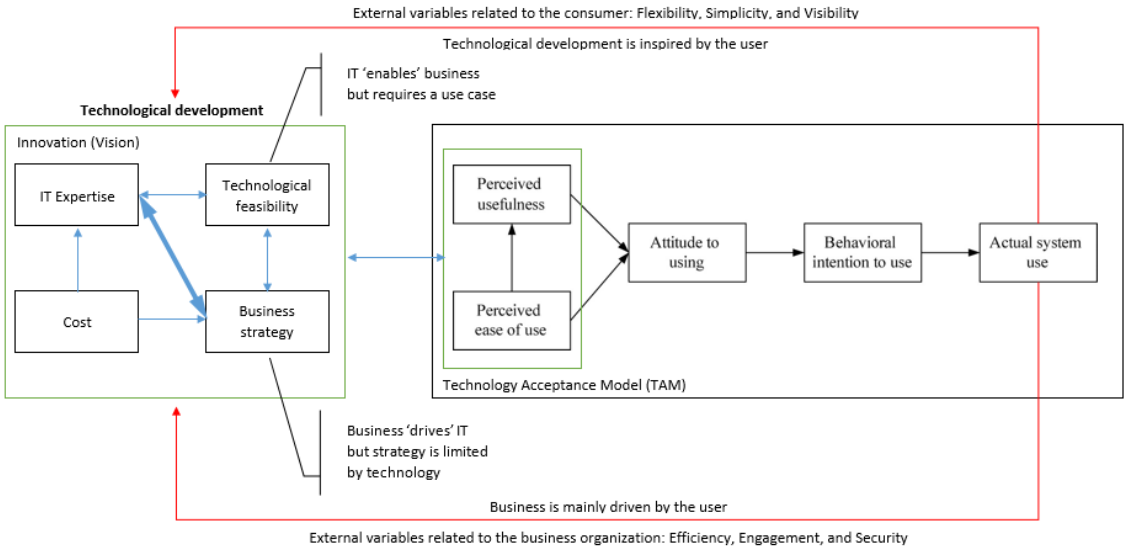

Figure 5-2: Factors influencing mobile IT development related to TAM

It also allowed the researcher to evolve a conceptual framework that presented a contribution to knowledge which can be used in the future by other researchers in the area of mobile IT development because it is a representation of a complex and highly dynamic phenomenon (see Figure 4-13). Furthermore, the methodological approach underlying this research demonstrates the use of qualitative data collection and analysis.

This section has outlined the contributions of the research to literature. The next section will advance the arguments and discuss the implications for practitioners.

5.4.2 Practitioner implications

Coming from a practitioner background, the guiding motivation for this study was to provide a link between two diverse spectrums (academic and practitioner) and by doing so to enable practitioners to apply new theories more readily. The issue arose from the practical application needs (Kelemen & Bansal, 2002). The research was therefore conceived to provide rich and contemporary observations and also a researcher's framework to guide practitioners.

The main question is: "What shapes the development of mobile IT applications?" The actors in this process are the chief executive officers (who make decisions on strategy), the chief marketing officers (who are responsible for marketing activities within an organization), the chief technical officers (who are focused on technological issues within an organization), and the consumers (who are customers of the bank). Based on the actors' requirements and demands, the mobile enterprise strategy was determined; the marketing was developed; and technology was applied to provide appropriate mobile applications for the German financial market. The relationship is illustrated in the Figure 5-3.

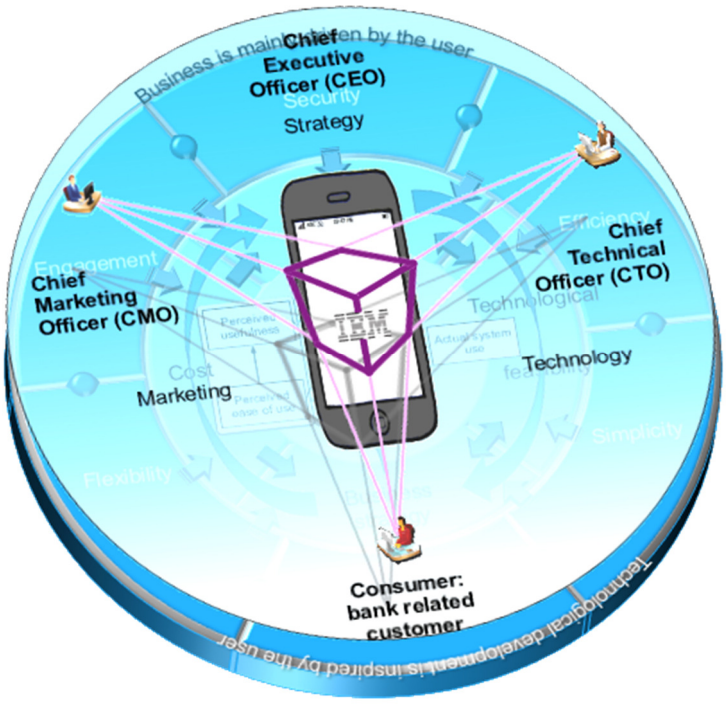

Figure 5-3: Actors in the development process of mobile IT applications

The figure represents an extension to Figure 5-1 where the link between the practitioner (CxO) view and the conceptual model is illustrated. The management view is a separate layer on top of the conceptual model which affects the same. That means the dimensions (key driver of technological development) are influences by strategy (CEO), marketing (CMO) and technology (CTO) of the organization (company).

Related to the key drivers of technological development, the recommendations for C-suite executives are summarized as follows:

- Engagement (derived from RQ1): Mobile IT enables companies to create, deliver, and manage real-time, in-the-moment communications using their customers' preferred mobile channels. Today's mobile technologies offer consumers new levels of convenience and flexibility to interact with financial institutes whenever and wherever they want. To help enable this convenience and flexibility, an engagement and therefore an investment is inevitably.
- Simplicity (derived from RQ2): It is important that the application solves a certain problem in regard to simplicity. The application comprises various platforms with high market shares, and they must be well designed both in terms of visuals and user experience (UX).
- Efficiency (derived from RQ3): The mobile application should provide quick access to personalized content and features that the customer will use frequently. It needs to be supported by applying various input channels, real-time analytics, and cognitive tools (advisors) with the aim of saving time.
- Flexibility (derived from RQ4): The mobile application needs to have flexibility based on a portable architecture, which functions across a large number of device types including the device configurations. It also needs to consider aspects of ‘time-to-market’ in connection with the shortened lifecycle of a mobile application.

- Security (derived from RQ5): The mobile application needs to ensure the security of the mobile IT. This includes the security of the device and infrastructure, protection of data from advanced threats, and compliance with the increasing regulatory demands of the German FM.
- Visibility (derived from RQ6): The mobile application needs to be able to organize the user interface in a purposeful, meaningful, and useful way based on clear and consistent models that are apparent and recognizable to users. It should put related things together and separate unrelated things, differentiating dissimilar things and making similar things resemble one another.

The inevitable engagement of IT companies and IT service providers to increase revenue, reduce costs, and engage customers and the requirement to provide quick and easy access to complex systems and features with the application of various input channels are factors influencing the mobile world. Other factors include the personalization and context-awareness of the services on demand (in real time); efficiency and flexibility (anywhere, anytime, and on any device) based on a portable architecture; security awareness regarding user data protection and compliance due to the increasing regulatory demands of the German FM; and consumer expectations for intuitive mobile application designs. All these factors raise technological development as a user acceptance factor based on the relationship of IT expertise and business strategy. Therefore, the C-suite executives have to consider the following aspects for the successful development of future mobile IT projects:

- Focus on the application content: take a product marketing approach to defining application features and capabilities (both applications that are data-driven and those created by gathering requirements from users). The organization must take a backseat and customers need to be given what they want.

- Measure the right stuff: measure the application's performance and how it enables your loyal customers to become more deeply engaged. Do not rely solely on transaction metrics; instead, go deeper and analyse location, behaviour, application interaction, and the underlying business impact to comprehend the value of a good mobile application and the ecosystem in which it functions.
- Create an application and a mobile ecosystem that provides exactly what the customer wants: complicating application functionality with additional trimmings that do not give customers their mobile moment(s) is just a waste of development time and money. Understanding and using the right data and measurement system will help determine what customers want and the best way to deliver it to them.
- Make the application mobile a collaborative endeavour: listen to the voice of the customer and work collaboratively across the marketing, e-commerce, and engineering teams to create and refine the road map and feature set.
- Make every change and every effort about the customer experience: the mobile application can serve as a key focal point for creating the best possible experience by working flawlessly and with other online and mobile elements to serve customers what they want, when they want.

5.5 Research study limitations

This study, like any other study, has its limitations and the research findings will be influenced by the definitions and methods used within the interview strategy. The limitations have been summarized below; however, they are not significant enough to affect the overall premise and level of insight achieved.

The research took place in connection with a specific company and a specific region and industry. The German FM/S industry was represented by German mobile IT experts of the IBM consulting, software, and service sector (GBS), including the supporting brands (STS and GTS). Therefore, great caution needs to be exercised in transferring these results (amongst other things, the conceptual framework and the enhancement to TAM) to other organizations, sectors and/or regions.

In total 18 interviews were conducted across the key drivers of technological development; this number could have been increased. However, the pilot had shown that the number of interviews was not crucial; instead, the size of the purposive sample needs to depend on the saturation pertaining to the key drivers of technological development. Interviews were carried out until data saturation had been reached and no new information was being generated. The interview design required the researcher to schedule extensive IT expert interviews (most extending to over one-and-a-half hours). The duration of the interview implied the possibility that people did not want to participate. However, although this method was time-consuming and therefore expensive from the viewpoint of the IT Company, it was essential so that all insights could be included.

The interviews were conducted by using the audio conference function of the (IBM) company's e-meeting services to secure an accurate account of the conversations and avoid losing data. The advantage of interviewing people who could otherwise not be easily approached was accompanied by the disadvantages of reduced access to social cues because of asynchronous telephonic communication. The interviewer did not see the interviewee; therefore, non-verbal cues (e.g., body language) could not be used as a source for extra information. However, social cues, such as voice, timbre, and intonation, were still available. Furthermore, the information provided by the interviewee could have been restricted for personal reasons, corporation guidelines, and knowledge protection. The IT experts occasionally assumed different roles (expert role or employee role), blocked the interview, and talked about the current work field instead of the topic. The interviewer had to ensure that the interview did not turn out to be a lecture on knowledge instead of a genuine question-answer session.

An open and faithful relationship was the condition for successfully conducting the interview. The challenge was to ensure the procedure was suitable for the interviewee and deal with irritations that arose when asked decision-directed or comparative (probing) questions. The researcher allowed for nuanced clarifications and the spontaneous ability to explore areas that were not originally presented

in the literature review. Data contamination could have occurred in the full-scale research project because the data from the pilot study were included in the main study. The pilot participants were not interviewed for a second time to prevent ambiguous views of one person.

However, the interview result could contain predictions and assumptions. Therefore, it would be difficult to evaluate and weight the answers and assign them to the key drivers for change. Furthermore, one potential problem was to ensure objectivity in data interpretation because the researcher was familiar with the topic. The researcher was conscious to keep to a bare minimum the influence of his practitioner experience of more than 20 years in the field of mobile solutions; yet, there might have been some influence of this on the data interpretation. Potential concerns regarding researcher bias (Saunders et al., 2012) were considered and action was taken to prevent any influence. Transcripts were re-read a number of times to remove all preconceptions and misinterpretations and to ensure, as far as possible, that all biases were removed. However, the subjective nature of the semi-structured interview could have affected researcher subjectivity although efforts were made to alleviate this.

5.6 Recommendations for future research

Most of the academic work adopts a pure positivist perspective (Davis, 1985, 1989; Hasslinger et al., 2007; Kim et al., 2007; Kotler & Armstrong, 2007; Lu et al., 2005; Massey et al., 2005; Stávková et al., 2008; Van der Heijden, 2004; Yang, 2005) while only a very few have adopted the interpretivist perspective (Cova & Elliott, 2008), which was also adopted by the researcher. By using the phenomenological research approach, this study looks below the surface of the views expressed by the IT experts to determine how this is in accordance with the consumers' viewpoints.

The knowledge from this study could be taken up once more by another researcher from consumers' viewpoints based on the functional approach. Related to the conceptual framework, hypotheses could be formulated and tested with the help of a concrete software solution. Based on the findings from the expert interviews, software for mobile devices could be developed, which contains the key elements for powerful and intuitive mobile solutions. It should be a solution for the online trading of financial products, such as foreign exchange (FX) and money markets (MM), for a major German bank (where the relationship between the client and the institute has dramatically changed). By applying this software solution, the user can conduct a questionnaire interview and the behaviour of the consumer could be assessed and classified to analyse the consumers' viewpoints in the German FM.

This quantitative research approach represents a kind of survey. The participants should have attained 18 years (the age for legal competency). In future studies, a fairly even male-female representation can be ensured along with a mix of scholars, students, workers/employees, and retired persons. Different levels of education could also be considered. The participants chosen could have short, medium, and wide experience in applying mobile devices to address the various customer segments of a bank. Such a survey could be carried out implicit by providing a software service for the bank, then it is estimated that approximately 75 percent will respond. Based on the findings, the analysis could be done by applying the IBM statistic software program SPSS.

Furthermore, the framework may be tailored for another industry with similar business attribute (e.g. insurance industry). This would make the enhancement to TAM more flexible and robust.

5.7 Overall conclusion

The study results confirmed the aim and objectives of the research, grounded in the literature. Based on the results, the researcher would rate the chosen methodology and method as appropriate to explore the technical viewpoints and to gather insights. The study confirmed that the qualitative phenomenological research approach was suitable to achieve IT expertise based on the knowledge and 'lived' experience of the IT experts. The study did validate data collection and data analysis (Denzin & Lincoln, 2011). Using semi-structured interviews, the key elements (variables) were determined based on the key drivers of technological development; a conceptual framework was evolved to develop an enhancement to the TAM by including the views of mobile IT experts.

The contribution to practice of this paper is to bring together the technical viewpoint and the viewpoints of the consumer and to provide a set of recommendations to better understand the relationship between the architecture and design of applications and the consumer behaviour. The researcher drew on the views and expertise of IT architects and specialists to gain an in-depth understanding of the factors influencing the shape of the architecture and the design of a mobile IT application. These have an impact on the consumer behaviour in the German FM/S industry.

Therefore, this study provides an answer to the main research question:

"What shapes the development of mobile IT applications?"

In responds to the main research questions, the researcher conclude that the mobile IT development is shaped by the business requirements, based on business strategy and uses cases. The business is supported by the IT expertise and affected by technological feasibility and cost. Overall, the research outcomes lend to the interpretation that IT inspires and enables (empowers) businesses. However, it is driven by user requirements specified by the business strategy as illustrated in Figure 5-4. Again, in contrast to the previous figures (especially Figure 5-1 and Figure 5-3) the focus in the current figure

is on the influence of business strategy and IT expertise on the TAM, which is characterized by the two thin, dark blue coloured arrows in the centre of the circle.

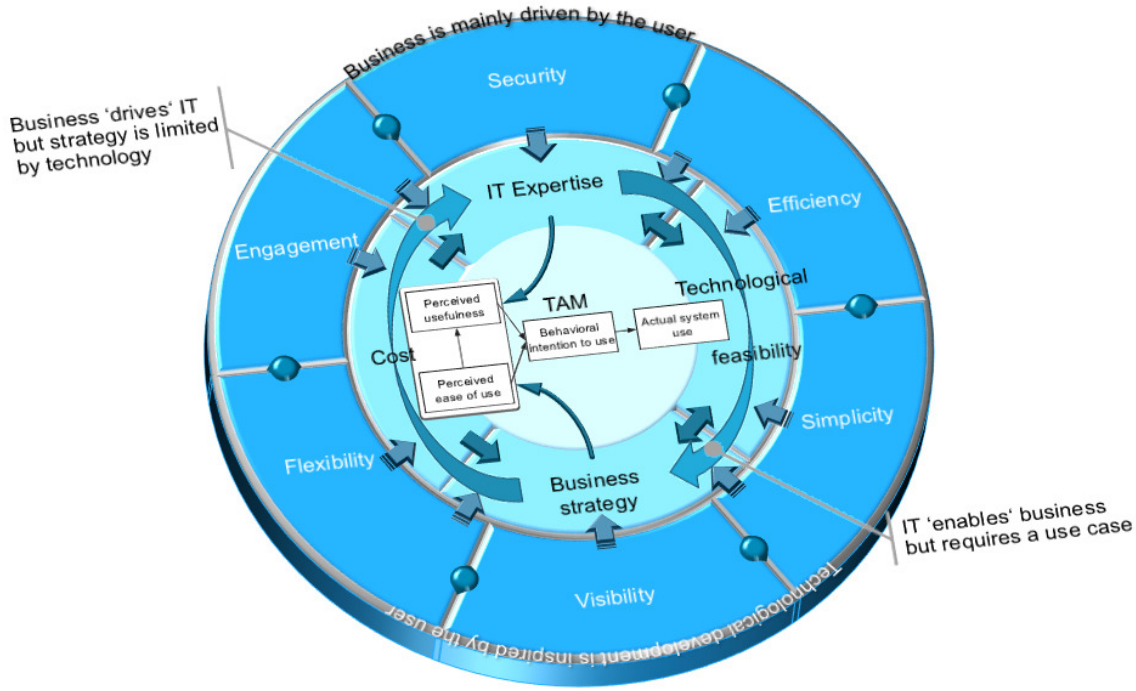

Figure 5-4: Enhancement to the TAM

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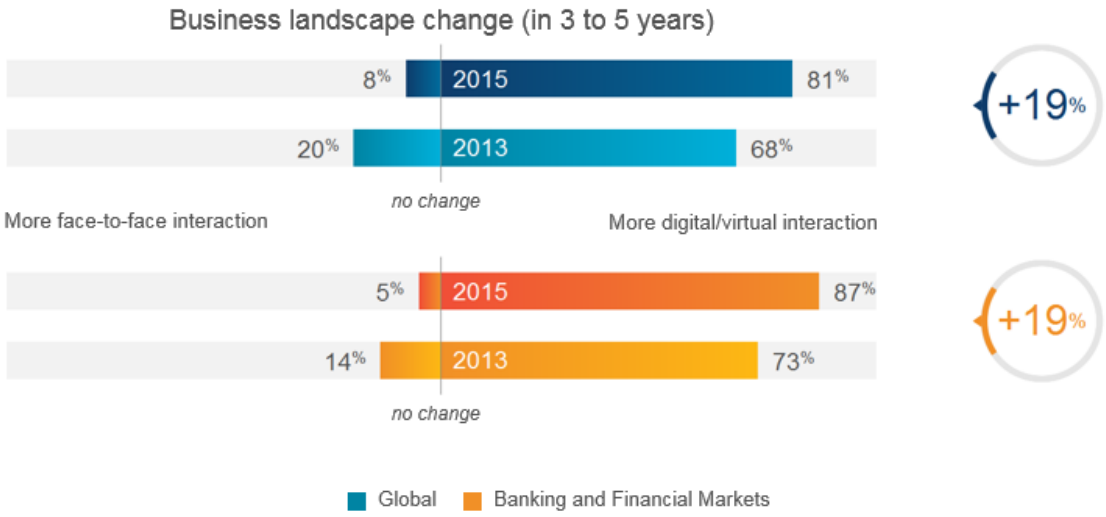
Appendix

Appendix I. Consumer segments, channels and service access

Based on the argument that for enterprises, IT plays a major role in general (cf. chapter 2.2), this section discusses the shift made by the consumer to apply IT, especially mobile IT. To illustrate the shift, the figure below (IBM, 2015) shows how CxOs have concluded that customer interactions have been moving increasingly from face-to-face interactions (i.e., offline interactions) to digital/virtual interactions (i.e., online interaction).



Furthermore, the section highlights the consumer segments and channels, that is, the way they will communicate. Consumers can be categorized into four consumer segments (Keen, Wetzels, Ruyter, & Feinberg, 2004): generalists (who make their channel choices part of their overall shopping experience), formatters (who care greatly about which channel they use and only buy at physical stores), price sensitives (who are doubtful of channels and purchase from the cheapest channels), and experiencers (who prefer to use a channel that they had successfully used before).

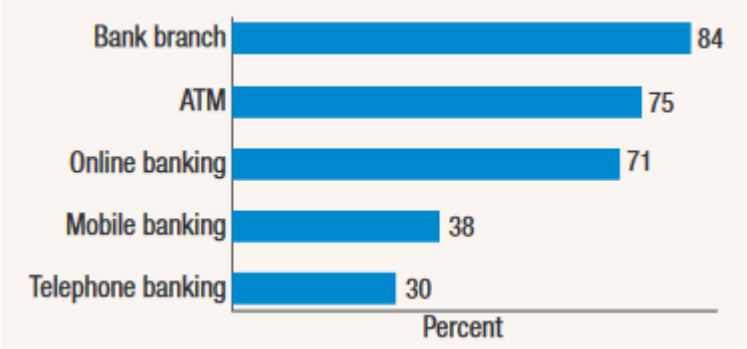
In a more recent study on Dutch consumers covering a broad cross section of products, Konus, Verhoef, and Neslin (2008) proposed three multichannel segments: (a) multichannel enthusiasts, who have positive attitudes towards all channels, high levels of innovativeness, and a view of shopping as a pleasurable experience, (b) store-focused consumers, who are oriented towards brick-and-mortar stores and have the highest levels of channel and brand loyalty, and (c) uninvolved shoppers, who have little interest in any of the channels and a low degree of shopping involvement.

Gupta, Su, and Walter (2004) discovered in a survey that 52 percent respondents migrated from offline to online channels across four product categories including books, airline tickets, stereo systems, and wine. Furthermore, this channel migration behaviour had been predicted by channel risk perceptions, price search intentions, evaluation effort, and waiting time, but it was unrelated to customer demographics. However, this trend is also noted in the areas of banking and FM as illustrated in the figure on the previous page.

Most customers in Germany are satisfied with the convenience of traditional banking services (Ernst & Young, 2014) but customer expectations are constantly rising as new technologies and consumer behaviours develop. The technological advances have challenged the providers of financial services (Accenture, 2015; Ernst & Young, 2014). Financial institutions will be forced to deliver information and banking services via various electronic channels because traditional branch transactions have declined in importance. Customer behaviour is changing to include the web, mobile, and social media for purchasing financial services (Accenture, 2015).

In the latest Federal Reserve reports on consumer use of mobile financial services (Federal Reserve System, 2016), the respondents were given a set of screening questions pertaining to their access to a bank account, the Internet, and a mobile phone or a smartphone. They were further asked about the various ways in which they accessed their financial accounts.

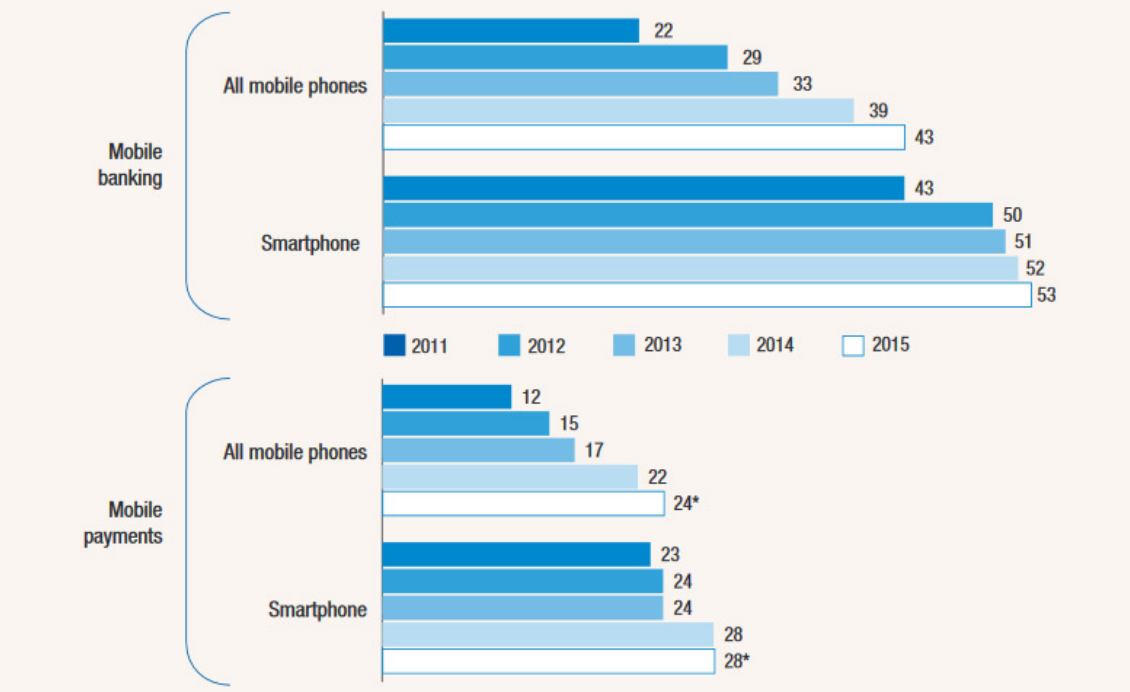
As shown in the figure below (Federal Reserve System, 2016), the most common way of interacting with a financial institution remains branch visits in person – 84 percent of consumers who had bank accounts reported that they had visited a branch and spoken with a teller in the past 12 months. The second most common means of access in the past 12 months was using an ATM (75 percent); this was followed by online banking (71 percent). Approximately one-third of all consumers with bank accounts used telephone banking, whereas 38 percent used mobile banking.



Mobile banking services (which enable consumers to obtain financial account information and conduct transactions with their financial institutions) and mobile payments services (which enable consumers to make payments, transfer money, or pay for goods and services) have become increasingly popular. Over the past few years, the number of institutions offering these services has increased, and the types of services offered by various financial institutions continue to grow.

With an increase in the dissemination of technology and a broadening of the available options, there has been an increase in the number of consumers who adopted mobile financial services as shown in the figure on the next page (Federal Reserve System, 2016). In the 2011 survey of Federal Reserve Board, for instance, 22 percent of all mobile phone users with bank accounts and 43 percent of smartphone users with bank accounts reported that they had used mobile banking in the previous 12 months.

These percentages have increased in each year of the survey. In the 2015 survey, the prevalence of mobile banking continued to increase, reaching 43 percent of mobile phone users with bank accounts and 53 percent of smartphone users with bank accounts.



Use of mobile payments has also increased over time. In 2011, 12 percent of all mobile phone users and 23 percent of smartphone users reported using mobile payments. By 2014, mobile payments increased to 22 percent for all mobile phone users and to 28 percent for smartphone users. The steady increase in the adoption rate among all mobile phone users as opposed to the more gradual rise in the adoption rate among smartphone users suggests that smartphone adoption substantially contributed to the increase in use of mobile payments. The measure of mobile payments in the 2015 survey is not directly comparable to those from previous years because of changes in the definition of mobile payments in the most recent survey. Despite these change, the new estimates appear similar to those from previous years, with 24 percent of mobile phone users and 28 percent of smartphone users reporting that they used mobile payments in 2015 (Federal Reserve System, 2016).

A continuing impediment to the adoption of either mobile banking or mobile payments appears to be the limited demand. Many consumers said their needs were already being met without mobile banking or mobile payments; they were comfortable with non-mobile options and did not see any clear benefits from this service. In addition, approximately one in five (21 percent) of those with mobile phones and bank accounts indicated that they are unaware of whether their bank or credit union offered mobile banking, which could indicate a lack of interest in these services among a portion of the population (Federal Reserve System, 2016).

However, the percentage of respondents who were unaware of whether mobile banking facilities were provided by their banks decreased from 28 percent in 2013 to 22 percent in 2014. The percentage of respondents who said that their bank does not offer these services has shown less of a change—6 percent in 2013, 4 percent in 2014, and 5 percent in 2015. The decline in the share of "Don't know" responses may suggest an increase in consumer awareness for mobile banking services over the last few years. This might also indicate that financial institutions are increasing their marketing of existing mobile services and that more of them may be offering these services.

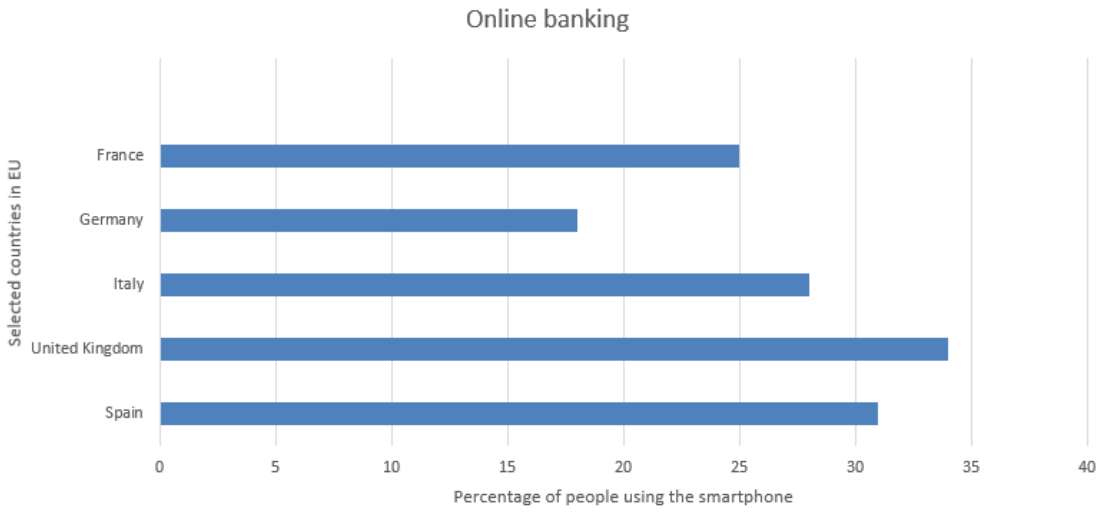
Lipowski (2013) used a standardized questionnaire that focused on the frequency of use of different distribution channels and on how people used mobile banking. The respondents declared that they mostly use online banking, ATMs, and payment cards. The frequency of use in all these cases is 2-3 times a week. A large percentage of respondents did not use the virtual branch at all (92 percent) or the cash deposit machine (67 percent). Respondents using mobile banking reported a higher frequency of use of payment cards (mostly daily) and mobile banking (mostly 2-3 times a week). The high frequency of use also applies to the Internet channel and ATMs. The Mann-Whitney test confirmed a significantly higher frequency of use of online banking, ATMs, payment cards, cash deposit machines, and virtual branches by people who using mobile banking. These findings might suggest that more active users of financial services often uses a variety of distribution channels for financial services, including mobile banking.

Among those who used mobile banking, the highest percentage use was for functions, such as checking accounts, transferring money from accounts for bills, and paying for purchases made as shown in the table below (Lipowski, 2013). Only a few types of mobile banking transactions were used by more than half of the users. The most frequently used facility was to check accounts using mobile devices.

Type of transaction	Percentage of people using this type	Dominant Frequency	75th percentile of frequency
Transferring money from accounts for bills	62,5	Once a quarter or less	Once a week
Checking accounts	90	Two, three times a week	Two, three times a week
Repayment of credit card	20	Once a month	Once a month
Cash loan	5	Once a quarter or less	Once a quarter or less
Opening deposit account	27,5	Once a quarter or less	Once a month
Toping-up a mobile phone	42,5	Once a month	Two, three times a month
Paying for purchases in store	45	Once a quarter or less*	Two, three times a week
Withdrawal from an ATM without a card	20	Once a quarter or less	Two, three times a month
Money transfer to another phone	35	Once a quarter or less	Once a month

In some cases, low frequency of mobile banking usage resulted from the specificity of the product. Not all the mobile banking functions listed in the table were available at each bank. Also, some of the options listed in the table had been recently launched. For instance, a relatively new product available at some mobile banking systems was the ability to make ATM withdrawals by using a mobile phone.

This paper focuses on investigating the mobile channel based on the fact that the very nature of selling and buying financial services has changed. Customers are now less willing to visit traditional branches and have less brand loyalty. They are more receptive to new electronic channels and are more sophisticated in demanding better service quality, including 24-hour availability of services (Coelho & Easingwood, 2003). Compared with other (European) countries, the distribution and use of online banking in Germany is comparatively moderate and reserved as shown in the figure on the next page (Ofcom, 2014).


Online banking
Selected countries in EU
France
Germany
Italy
United Kingdom
Spain
0
5
10
15
20
25
30
35
40
Percentage of people using the smartphone

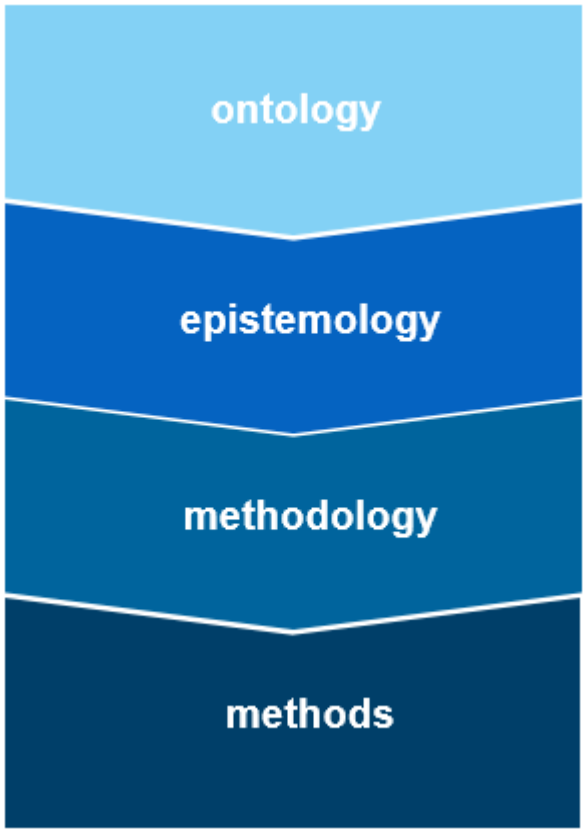
Appendix II. Research paradigm

A theoretical paradigm has been described as "the basic belief system or world view that guides the investigation" (Guba & Lincoln, 1994, p. 106), and it identifies the basis for orienting one's research (Bogdan & Biklen, 1982). It established the starting point of the research journey and becomes the premise for designing and conducting this research. A paradigm as seen by Malhotra and Birks (2003, p. 136) is "a set of assumptions consisting of agreed upon knowledge, criteria of judgment, problem fields and ways to consider them". It is the fundamental belief system that guides the research process (Guba, 1990; Sarantakos, 2012) and is born out of a framework characterized by the responses to three fundamental questions: ontological (i.e., researcher's viewpoint), epistemological (i.e., attainment of knowledge), and methodological (i.e., research design and interpretation) (J. Creswell, Plano Clark, Gutmann, & Hanson; Denzin & Lincoln, 2011; Saunders et al., 2012). Guba (1990) lays down definitions for these three aspects:

1. *Ontology*. This relates to common parameters and assumptions associated with the best way to investigate the nature of the real world. It answers questions such as "What is the nature of the knowable? What is the nature of reality?"
2. *Epistemology*. This relates to common assumptions that are created to understand the real nature of the society. It answers questions such as "What is the nature of the relationship between the knower (the inquirer) and the known (or knowable)?"
3. *Methodology.* This relates to a combination of different techniques that are used by researchers to investigate different situations such as "How should the inquirer go about finding out knowledge?"

Selecting the applicable research framework and the use of a research methodology is derived from the research paradigm itself (Collis & Hussey, 2013; J. W. Creswell & Clark, 2007). The process of arriving at a self-certified research philosophy was a logical process but was fundamental in influencing the research methods regardless of whether the qualitative/quantitative or mixed techniques were used. In a first approach

this research paradigm path is an informative linear process as shown in the following figure. That leads the researcher to define the methods used to achieve the aims.



Ontology, epistemology, axiology

At the outset, it is essential to locate the research philosophy and understand the paradigm. The key elements are ontological (i.e., the researcher's views of the nature of reality or being) (Saunders et al., 2012), epistemological (i.e., the researcher's views of what constitutes acceptable knowledge) (Audi, 2010), and axiological (i.e., the researcher's views of the role of values in research) (J. W. Creswell, 2012). Paradigms have been defined as 'world-view' positions (Sandelowski, 2000, p. 247) and determine the mode of enquiry (i.e., the methodology). Ontology is the starting point in clarification (Grix, 2010) and can be located somewhere between the two axes of objectivism and constructionism/subjectivism.

- Objectivism (or realism) is an ontology that ascertains that the physical and natural world and human behaviour can be studied independently of consciousness and experience — that they have truth and meaning residing in them as objects (Crotty, 1998, p. 5).
- Constructionism/subjectivism point to the view that all knowledge, and therefore all meaningful reality is contingent upon human practices because they are constructed in the process of interactions between human beings and their world and are developed and transmitted within an essentially social context (Crotty, 1998, p. 42).

The theoretical perspectives of positivism (related to objectivism) and interpretivism (related to constructionism/subjectivism) have been taken into account based on the above definitions. Positivists (also referred to as functionalists, conventionalists, traditionalists, scientific) and interpretivists (also referred as constructivists) are the two ends of the spectrum in the research paradigm (M.B. Miles & Huberman, 1994). Other philosophical standpoints (e.g., feminism, post modernism) are also known but for this thesis, the researcher will draw on the standpoint taken from the academic and practitioner worlds.

There have been endless debates about the comparative superiority of the two major opposing social science paradigms – positivism or interpretivism – for research (Schram, 2012) and management (Robson, 2002). It is vital to understand how people perceive the world and what they believe is knowable. The following table summarizes the main differences between the positivist and the interpretivist paradigms.

Positivist Paradigm	**Interpretivist Paradigm**
Uses large sample size	Uses small sample size
Researcher does not get involved into the problem domain	Researcher gets involved
The location is artificial	The location is natural
Data is specific and more precise	Data is subjective
Concerned with testing hypothesis	Concerned with developing theories
Generalizes from sample to population	Generalizes from one setting to another

Understanding the positivist perspective

Positivism is a term borne out of the work of Auguste Comte (1798-1857) and is formed around the power of science and of rational thought in order to gain a better understanding. The premise is stated to gain knowledge to ultimately control the world. In a positivist worldview, science is seen as a way to obtain the truth and to understand the world well so that we might predict and control it (Moutinho & Hutcheson, 2011). The empirical generalizations are seen to be (mainly) independent of time and space and are neutral and value-free (Steinmetz, 1998). For positivists, the observation that two variables are strongly correlated is often understood to signify a causal relationship (Prowse, 2007). Subjectivity and the self are removed Kress (2011), and only the tangible (i.e., the observable and quantifiable) are acknowledged. Positivism values laws and aims to develop steps to advance the body of knowledge; typically, researchers adopt the role of the characteristic value-free natural scientist (Bechara & Van de Ven, 2011). Quantitative methods are usually employed in mathematics and statistical modelling. Most quantitative methods employ reductionist strategies in which rigorous attempts are made to simplify processes to their physiological, physical, or chemical events Bullock and Stallybrass (1999).

In addition, positivists believe in working with only the observable social reality that finally leads them to the gathering of facts and the assimilation of hypotheses. Ultimately, they create theories and present it to academia for further testing, and unquestionably positivists focus on facts rather than on impressions. In their obsession with detail, positivists focus on observing, measuring, and duplicating tests, and they seek constant relationships between entities or events until a cause and effect is positively determined. Positivism generally relies on quantitative data collection and analysis (Tenenbaum, Gershgoren, & Schinke, 2011) and strives for pure objectivism.

The movement towards interpretivism

The lack of a more emotive 'why' dimension to the positivist paradigm is a major concern. Moilanen (2001) underlined the need to understand the core concept of what is measured. Chung and Alagaratnam (2001) stated that the functionalist paradigm had been very prevalent in marketing research. Hirschman (1986) noted that in the three decades leading up to 1986, only one research study published in the Journal of Marketing was non-positivist. More recent times have seen the movement towards constructivism. Scholl (2011) stresses the idea that constructivist/interpretivist philosophy really enriches research.

From the interpretivist stance, it is very difficult to accept the positivist paradigm. Social life has an uncanny way of dealing the unpredictable, particularly in the virtual world. When the ultimate aim of the positivist researcher is control, this appears somewhat hopeful and unachievable. The world has never been so complex, ever changing (Kroeze, 2012), and fluid, and the power of common people has never been so visible (Kerr, Mortimer, Dickinson, & Waller, 2012). A positivist approach may allow us to capture a moment in time but this is not enough because predictions cannot be made confidently. Practitioners would not welcome the lack of actionable vision. These perceived limiting factors have seen a movement toward stretching the scope of positivism and an attempt to re-calibrate it for a modern social perspective (Brinkmann, 2012).

Understanding the constructivist/interpretivist perspective

Denzin and Lincoln (2011) argued that a constructivist research design is infinitely better because it allows the collection and analysis of information gathered from multiple perspectives; therefore, it can assess the emotional factors more astutely. The constructivist approach is characterized by interactions between the participants and the researcher (Mingers, 2001), and it tends to use research methods such as interviews and observations. Krauss (2005) described the constructivist position as that in which "the knower and the known are co-created during the inquiry". It is about

setting out on a journey and letting the themes emerge subjectively; it is also about being open to interpretation.

Yih-Tong Sun and Scott (2003) also supported the view that in a rapidly changing business environment, an optimum balance of quantitative and qualitative measures are required to obtain a better understanding and gain insights into developing real progress. Finally, in an interpretive paradigm, case studies capture the dynamics of the studied phenomenon and provide a multidimensional view of the situation in specific contexts (Järvensivu & Törnroos, 2010). To that end, constructivists would suggest that a more realistic/interpretive stance brings more meaning, action, and interest. The recommendations of Goldkuhl (2012) are much more applicable to today's complex society.

The table below reinforces the fact that constructivism as opposed to positivism is the preferred paradigm for addressing the research questions and defining the format for the current research. The researcher focus on the mobile IT experts' knowledge intently and how this meaning is constructed in the world of mobile IT. It is the curiosity of the researcher to explore the factors influencing technology development.

Basic Belief	**POSITIVISM (reductive)**	**CONSTRUCTIVISM/ INTERPRETIVISM (interpretive)**
Ontology asks what is the nature of reality	There is a single reality – which is knowable – a somewhat naive realism	There are multiple realities. Relativism: local and specific constructed realities
Epistemology concerns the acquisition of knowledge and the relationship between the researcher and the respondent	Dispassionate/dualist/ objectivist – a detached observer of truth: findings true, research is independent of subjects	Transactional/subjectivist – interviewer and respondents are linked and knowledge is divested from the interaction
Methodology: research process by which knowledge is obtained	Experimental/manipulative – observation, quantitative, statistical. Verification of hypothesis	Participative – values are inherent in the context of the study – qualitative and interpretive
Axiology: the researcher states roles and values that validate the research	Truth, prediction – value-free objective and universal	Researcher values affect the study. Understanding and describing are key

Deductive and Inductive

Fundamentally, there are two perspectives on the approach to be taken to understand research data: deductive and inductive. The deductive approach is based on testing certain developed hypothesis and is obtained by working from the general to the specific (Bryman & Bell, 2011; Saunders et al., 2012). The inductive approach develops a framework for the underlying structure of experiences or processes that are evident in the raw data. As opposed to the deductive approach, the inductive approach is a journey from the specific to the general, such as an observation made by the researcher that eventually leads to a broad generalization and a theory (Collis & Hussey, 2013; Saunders et al., 2012; Thomas, 2006).

The approach selected can depend on criteria, such as philosophical standpoint, availability of materials, time availability, and audience under scrutiny (Cresswell, 2003). This research uses the inductive approach, which has allowed for real in-depth exploration and analysis and flexibility to fully understand the situation (Bryman & Bell, 2011). The researcher explored the practitioner perspectives and aimed to adapt the TAM to incorporate the practitioner perspective. The inductive approach tends to create clusters of data where patterns begin to emerge and from which data themes can be generated (Jenkins, 2011). Newman (2003) suggested that the inductive approach can be affected by the opinions of the researcher (i.e., subjectivity); however, when the researcher has intimate experience of the subject area (e.g., a long-serving practitioner), then this effect may actually be positive depending on the nature of the phenomenon being studied (Diefenbach, 2009). Based on the nature of the subject of inquiry and the qualitative methodology, the inductive approach appeared most suitable for this study to elicit the subjective data and uncover and identify the necessary themes to deliver insights for practitioners (Parker et al., 2011).

Appendix III. Interview participants

The table below (part 1 to part 4) provides an overview of the in-depth interview participants and their personal data and development, which comprised of participants' functional direction (specialization) related to a key driver of technological development (dimension) as well as age, gender, nationality, education/degree, and years of experience based on their vitae (CV).

Part 1/4:

Personal information	**First participant**	**Second participant**	**Third participant**
Dimension:	**Visibility**	**Engagement**	**Security**
PD_ID:	**VI_01**	**EN_02**	**SE_03**
Age:	42	60	36
Gender:	Male	Male	Male
Nationality:	German	German	German
Education/ Degree:	Rheinisch Westfälische Technische Hochschule (RWTH) Aachen, Germany; Apprenticeship for "Mathematisch Technischer Assistent"	- Dr. rer. nat. in Biophysics, Universität des Saarlandes, Germany; Thesis Title: Elektrophysiologische Untersuchungen zur Identifizierung der Ionenkanäle von Tonusfasern des Frosches, 1987 - Diplom-Physiker in Physics, RWTH Aachen, Germany; Thesis Title: Untersuchung von Erregungs- und Verstärkungsmechanismen mit kooperativen Modellen, 1982	Dipl.-Inform. (equivalent to Master of Science of CS) in Embedded Systems, Operations Research RWTH Aachen, Germany; Thesis Title: Development of a Product Datamodel for the Telecommunications Industries, 2008
Years of work experience:	13 years of experience in design and implementation of distributed systems in a commercial environment, especially for J2EE based platforms.	More than 20 years of experience in IT business	10 years of professional development; 8 years as IT Architect

Part 2/4:

Personal information	Fourth participant	Fifth participant	Sixth participant
Dimension:	**Flexibility**	**Simplicity**	**Simplicity**
PD_ID:	**FL_04**	**SI_05**	**SI_06**
Age:	47	44	53
Gender:	Male	Male	Male
Nationality:	German	German	German
Education/ Degree:	Masters Degree in Information Science, University Dortmund, Germany; Thesis Title: Comminication in Internet based Libraries, 1996	- University diploma with honors in Computer Science, University of applied sciences, Hamburg, Germany; Thesis Title: A system for archiving computer output on laserdisk (COLD), 1996 - Distinguished Chief/Lead IT Architect in issued by The Open Group, United States of America; Thesis Title: Certification, 2010 - IBM certified Executive IT Architect in Application & Integration Architectures, IBM, Germany; Thesis Title: First certifcation (renewed every 3 years), 2007 - Distinguished Engineer in Chief Technology Officer (CTO),	Diplom Ingenieur in Elektrotechnik/Technische Informatik, RWTH Aachen, Germany
Years of work experience:	Andreas has over 15 years of experience in different IBM Management- and Sales-Positions and over 20 years of experience in IT.	More than 20 years of experience in IT architecture	More than 20 years of experience as IT specialist/architect

Personal information	Seventh participant	Eighth participant	Ninth participant
Dimension:	**Engagement**	**Security**	**Flexibility**
PD_ID:	**EN_07**	**SE_08**	**FL_09**
Age:	47	48	48
Gender:	Male	Male	Male
Nationality:	German	German	German
Education/ Degree:	Diploma in Computer Science, University of Bremen, Germany; Thesis Title: eLearning for SAP in the eGovernment, 2004	Diploma in Mathematics, Technical University of Darmstadt (University of Sussex, UK), Germany; Thesis Title: Statistical analysis of HGPRT tests, 1994	- Diplom Betriebswirt (BA) in Business and Information Processing, Berufsakademie Stuttgart, Germany - ITIL foundation Certification in ITIL, Service Management, EXIN, Germany - Project Management Professional (PMP) - Project Management Institute (PMI), Germany
Years of work experience:	Twelve years of work experience	More than 20 years of experience as IT specialist/architect	More than 25 years of experience as IT specialist/architect

Part 3/4:

Personal information	Tenth participant	Eleventh participant	Twelfth participant
Dimension:	Flexibility	Visibility	Visibility
PD_ID:	FL_10	VI_11	VI_12
Age:	49	49	46
Gender:	Female	Male	Male
Nationality:	German	German	German
Education/ Degree:	University Degree (Master) in Mathematics / Computer Science / Business Administration (combined studies), Karlsruhe, Germany; Thesis Title: Hazard Functions, 1992	Dipl.-Ing. in graduate engineer, TU Braunschweig, Germany; Thesis Title: Material Parameter Optimization with Nonlinear-Quadratic-Programing, 1994	Diploma in media and computer science, Fachhochschule Furtwangen University of Applied Sciences, Germany; Thesis Title: Examination of interaction topologies at interactive art- and travel-guides, 1995
Years of work experience:	Having IT experience since 1987	IT Experience since 1992	IT Specialist since 1997

Personal information	Thirteenth participant	Fourteenth participant	Fifteenth participant
Dimension:	Security	Flexibility	Flexibility
PD_ID:	SE_13	FL_14	FL_15
Age:	47	54	29
Gender:	Male	Male	Female
Nationality:	German	German	German
Education/ Degree:	Commercial education	Unknown	Bachelor of Arts (B.A.) in Business Administration, FOM - University of Applied Sciences for Economics and Management, Germany; Thesis Title: Consumer-orientated Sales-Promotions - An effective instrument in Sales?, 2013
Years of work experience:	More than 20 years of experience	More than 25 years of experience	Five years of work experience

Part 4/4:

Personal information	Sixteenth participant	Seventeenth participant	Eighteenth participant
Dimension:	**Efficiency**	**Efficiency**	**Engagement**
PD_ID:	**EF_16**	**EF_17**	**EN_18**
Age:	48	47	29
Gender:	Male	Female	Male
Nationality:	German	German	German
Education/ Degree:	Diplom in Informatik, Technical University Darmstadt, Germany	Diplom Designer (FH), University for applied science, Hannover	- Visiting Student in Psychology, Thompson Rivers University, Kamloops, Canada - Bachelor of Science in Media Informatics, Cologne University of Applied Science, Cologne, Germany; Thesis Title: Evaluation der Wahrnehmung von Handlungsabläufen mit Hilfe stereoskopischer Darstellung erweiterter Virtual Reality durch ein Head-Mounted Display, 2010 - Master of Science in Media Informatics, Cologne University of Applied Science, Cologne, Germany; Thesis Title: Kognitionspsychologische Aspekte visueller Reizwahrnehmung und
Years of work experience:	11 years in Project and Programme management, 13 years in Standard software implementations, 5 years in process and technology improvement in the area of Finance & Administration and 10	More than 15 years of experience	More than five years of work experience

The job-related activities of the participants were not mentioned but also considered for the classification.

Appendix IV. Semi-structured interview questions

A semi-structured interview opens with the following:

- The interviewee is thanked for participation.
- A brief outline of the research purpose, and the nature and the intention of the research output is explained including what will happen to the collected data.
- (Previously agreed upon) right to confidentiality and anonymity is reiterated.
- Request to video/audio-record the interview is restated.
- A summary of the themes covered is provided; the available time is confirmed; the informed consent sheet is checked for signature.

Introduction to the key drivers of technological development.

A few "welcome questions" regarding the field of expertise and professional experience are given below:

- Based on your experience, which scientifically proven models significantly influence the development of mobile IT?
- Related to the key drivers of technological development, which technical influencing factors are relevant today or will significantly influence consumer behaviour in the future?
- What are the main achievements in the development of mobile IT applications?
- What makes the consumer consider mobile IT as important, and what aspects do you think are relevant from the consumer's perspective?
- How do you determine what the consumers want/require, and how do you know that you have responded and delivered to their expectations?
- What the fundamental criteria for innovate mobile IT solutions?
- Based on your experiences, do you know mobile IT projects in which flexibility and security inspire or drive the development of mobile IT?

Given below are the questions pertaining to the different topics.

Topic 'Engagement':

RQ1: How do mobile information technologies influence the engagement of companies for developing mobile solutions?

1. Who are the stakeholders in the development of mobile applications, and do you believe that a stronger demand by the stakeholders has a direct involvement in the architecture and design?
2. Decision-directed: Do the higher expectations of the user experience lead to demanding consumer behaviour?
3. Probe: Do you agree with the statement that the engagement is primarily driven by the cost of development (e. g., for multiple mobile platforms)?

Topic 'Simplicity':

RQ2: Has consumer behaviour significantly changed by using the latest user interface trends?

1. What kind of innovation will simplify the mobile device operation in the near future (within the next two years)?
2. Decision-directed: Does an easy operation of a mobile device increase the usage of mobile information technology?
3. Probe: Do you believe that the non-keypad data entry is the major development in the past to simplify the consumer behaviour.

Topic 'Efficiency':

RQ3: Does the use of new technologies in mobile communication and the application of integrated mobile solutions improve the efficiency of mobile devices?

1. How will the challenge of disconnection and high-latency operations be handled to fulfil consumer expectations?
2. Decision-directed: Does higher bandwidth and scalability increase the acceptance of efficient and powerful mobile applications?
3. Probe: Do you agree that pushing of information will influence consumer behaviour?

Topic 'Flexibility':

RQ4: Does flexibility play a major role in the development of mobile applications?

1. Do you believe that the urgent time-to-market demand and the fragmented set of devices, platforms and carriers influence the architecture and design of mobile applications?
2. Decision-directed: Does increased flexibility in the application of mobile solutions lead to higher consumer acceptance?
3. Probe: Do you believe that native programming models can archive the requirements regarding portable mobile applications?

Topic 'Security':

RQ5: What role does device management, data privacy, and security play in the development of mobile solutions?

1. In what ways do device management, data privacy, and security influence the architecture and design of mobile applications?
2. Decision-directed: Do higher expectations regarding security lead to restrained consumer behaviours?
3. What are the preferred methods to manage devices and consumer identities?

Topic 'Visibility':

RQ6: How does the development of consistent user interfaces for various devices and platforms influence the architecture and design of mobile applications?

1. Decision-directed: Does the complexity of the solution, including page length, number of graphics, number of links, amount of text, and use of animation influence the consumer?
2. Probe: Does the limited screen real-estate influence the development of mobile applications?

Final questions:

- What shapes the development of mobile IT applications: strategy, standards, and technology?
- How and to what extend can technology influence consumer's behaviours?
- Does mobile IT 'drive' the consumer?

Closing questions:

Do you have any further questions?

Is there anything you want to add?

Is there anything that could be improved in the interview process?

Would you like to receive a summary of the research findings?

Appendix V. Common version of the cover letter

***IBM Confidential: Doctor@IBM-Programm: Experten-Interview zur Untersuchung inwieweit IT Design und Architektur einen Einfluss auf das Anwenderverhalten hat**

Klaus Hahn to: U B 20.06.2015 11:30

Hallo U,

ich bin Doktorand an der Napier University in Edinburgh und forsche im Rahmen des Doctor@IBM-Programms zum Thema „Einfluss mobiler Informationstechnologie auf das Konsumverhalten im deutschen Finanzmarkt".

Dabei untersuche ich den Einfluss von IT Design und Architektur mobiler Applikationen (Apps) auf das Anwenderverhalten. Die Untersuchung erfolgt am Beispiel des deutschen Finanzmarkts, wo Transaktionen zügig, zuverlässig unkompliziert und sicher von statten gehen sollten.

Meine Arbeit umfasst unter anderem ein Experten-Interview, zu dem ich dich sehr herzlich einladen möchte. Das Interview dient dazu, die Schlüsselelemente in der Entwicklung von Mobile-Lösungen auf Basis deiner persönlichen Erfahrung zu identifizieren. Das Interview dauert i. d. R. nicht länger als 60 Minuten. Eine Vorbereitung auf das Interview deinerseits ist nicht notwendig. Den genauen Termin können wir gerne über Lotus Notes abstimmen. Einen Vorschlag meinerseits sollte dir bereits vorliegen.

Das Promotionsvorhaben wird von Gregor Pillen (Geschäftsführer IBM Deutschland GmbH, General Manager GBS DACH) unterstützt. Eine Claim Id zur Verbuchung von Kosten kann bei Bedarf bereitgestellt werden.

Das Interview erfolgt in Form einer aufgezeichneten Audio-Konferenz. Dein Feedback wird in anonymisierter Form verwendet und ausschließlich zum Zweck der Promotionsarbeit verarbeitet (IBM Confidential).

Ich würde mich freuen, wenn du mich bei meiner Arbeit unterstützen und dir die Zeit nehmen könntest. Weitere Informationen zu meiner Forschungsarbeit (One Pager) findest du im Anhang. Für Rückfragen stehe ich dir gerne telefonisch oder per Email zur Verfügung.

OnePager.pdf

PS: Mit Abschluss meiner Arbeit stelle ich dir gerne die Ergebnisse zur Verfügung.

Mit freundlichen Grüßen / Kind regards

Klaus Hahn

Managing Consultant / Advisory Architect
Manager e-Trading (H420) / Qualified IBM Interviewer
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Sitz der Gesellschaft: Ehningen / Registergericht: Amtsgericht Stuttgart, HRB 726121

Appendix VI. Extract of one transcript files

IBM GERMANY

Moderator: Klaus Hahn
June 25, 2015
11:00 am CT

Klaus Hahn: Hi, <Interviewee 1>

Interviewee 1: Yes. Hi, Klaus.

Klaus Hahn: Fine, fine that you can attend at this interview.

Interviewee 1: Okay.

Klaus Hahn: First of all, I would like to thank you that you can participate. I will give you a short introduction...

Interviewee 1: Okay.

Klaus Hahn: ...into the item. The title of the project is "Critical Investigation into the Impact of Mobile Information Technology on Consumer Behavior within the German Financial Market." And that means the aim of the research is that it is a critical investigation into the impact of mobile information technology and the contribution to practices to bring the technical point of view and the consumer point of view together...

Interviewee 1: Okay.

Klaus Hahn: ...to provide a set of recommendations to enable a clearer line of sight between the architecture and design of mobile IT and the consumer behavior.

Interviewee 1: Okay.

Klaus Hahn: Regarding this item, I will ask you some question. And first of all I will begin with the information that all the information here are confidential and the information you provide to me are anonymity - are under the respect of anonymity. And so it will not used without the IBM.

Interviewee 1: Okay.

Klaus Hahn: Okay. First of all I have worked out within my presentation such called key drivers of change. And these are six items. And all my questions are related to the six items. First of all it is engagement. Second is simplicity. Third, efficiency. And the last three one are flexibility, security, and visibility. These are the key drivers of change. And related to these key drivers of change, the design and the architecture of mobile solutions are related too.

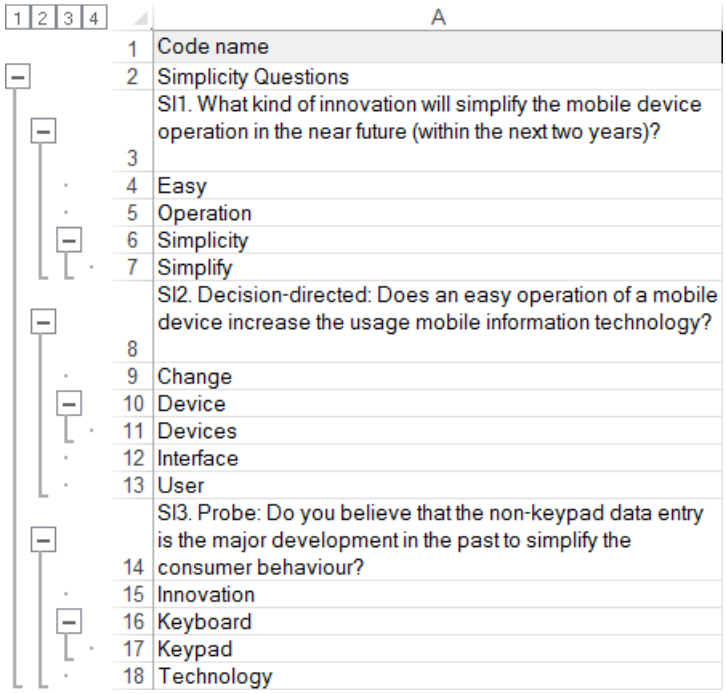
Interviewee 1: Okay. Understood.

Klaus Hahn: First welcome question. Based on your experience, which scientifically proven models are (unintelligible) - have influence on the development of mobile IT? What do you think?

Interviewee 1: Do you have additional information, a hint too regarding this question? I didn't get the context right now.

Appendix VII. Extract of the codebook

Codes by the example of the dimension 'Simplicity' (derived from the second research question RQ2):



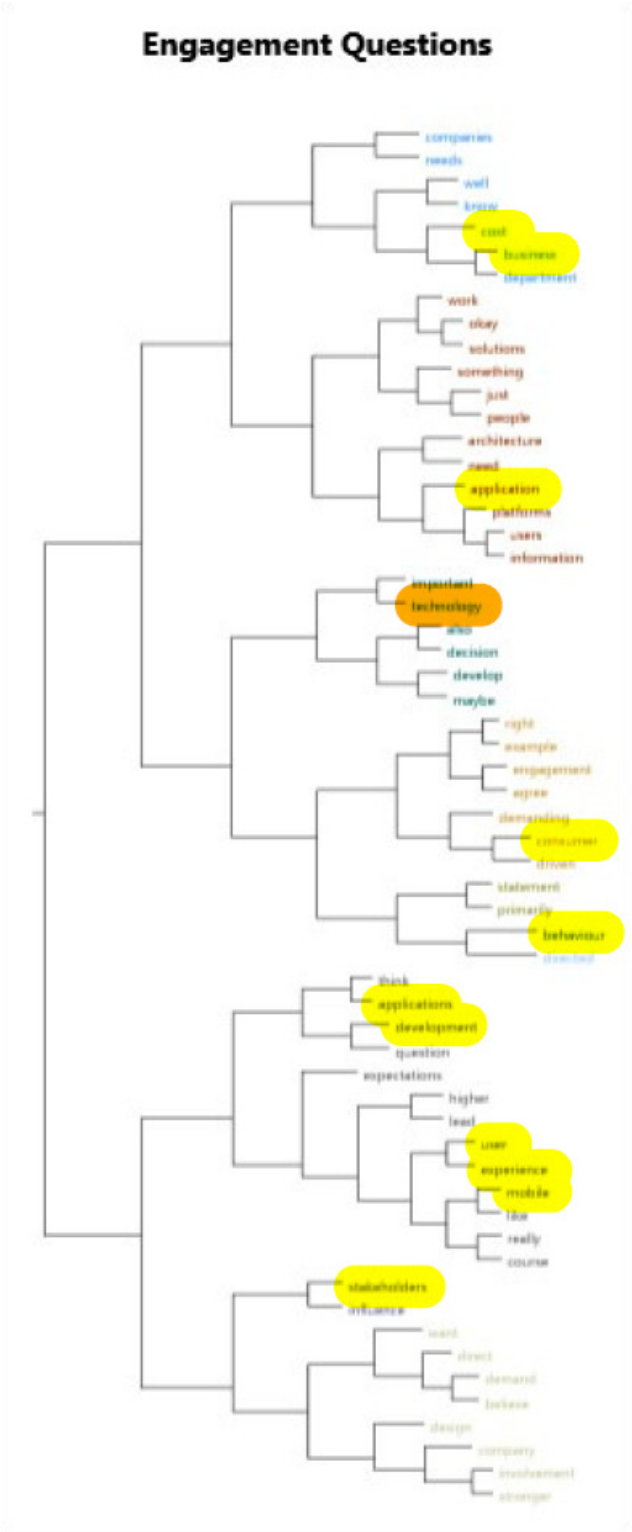
	A
1	Code name
2	Simplicity Questions
3	SI1. What kind of innovation will simplify the mobile device operation in the near future (within the next two years)?
4	Easy
5	Operation
6	Simplicity
7	Simplify
8	SI2. Decision-directed: Does an easy operation of a mobile device increase the usage mobile information technology?
9	Change
10	Device
11	Devices
12	Interface
13	User
14	SI3. Probe: Do you believe that the non-keypad data entry is the major development in the past to simplify the consumer behaviour?
15	Innovation
16	Keyboard
17	Keypad
18	Technology

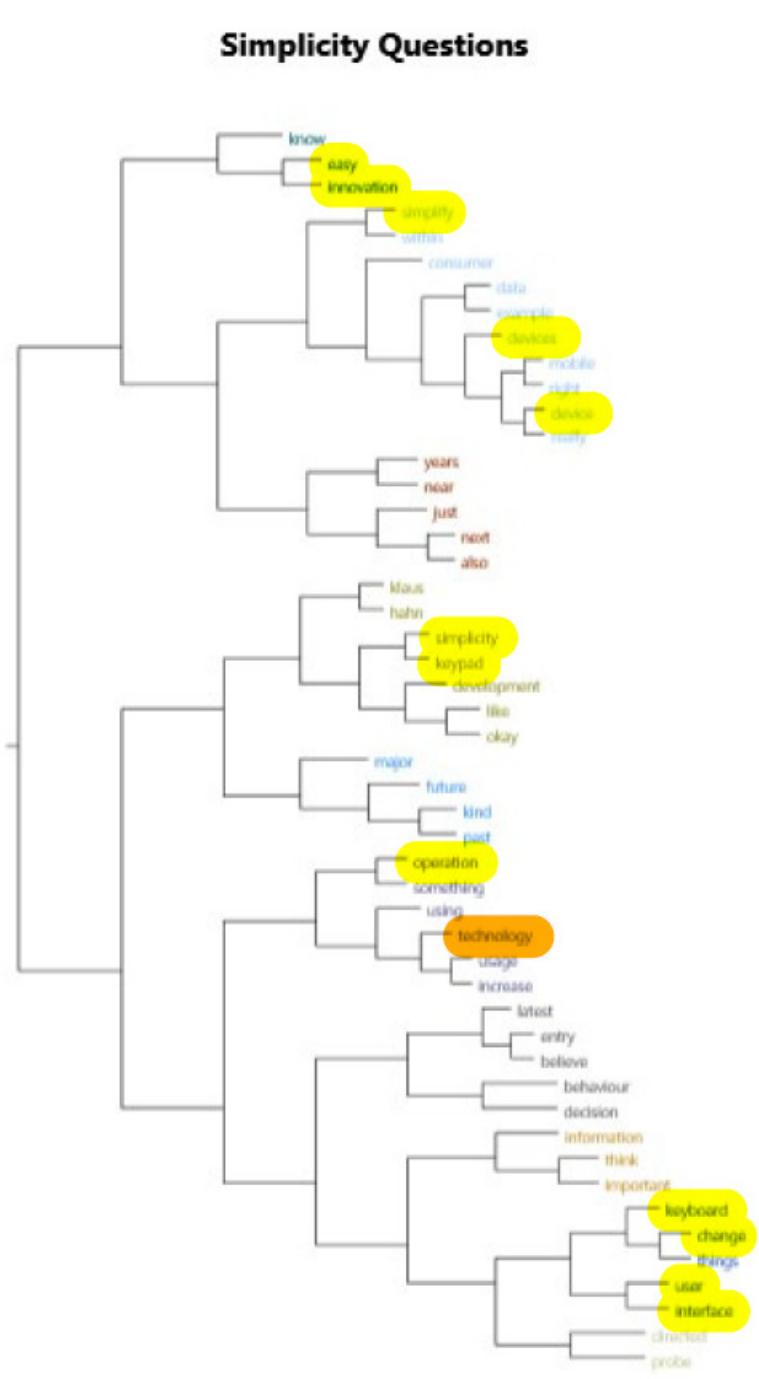
Relation of codes to (higher) key themes:

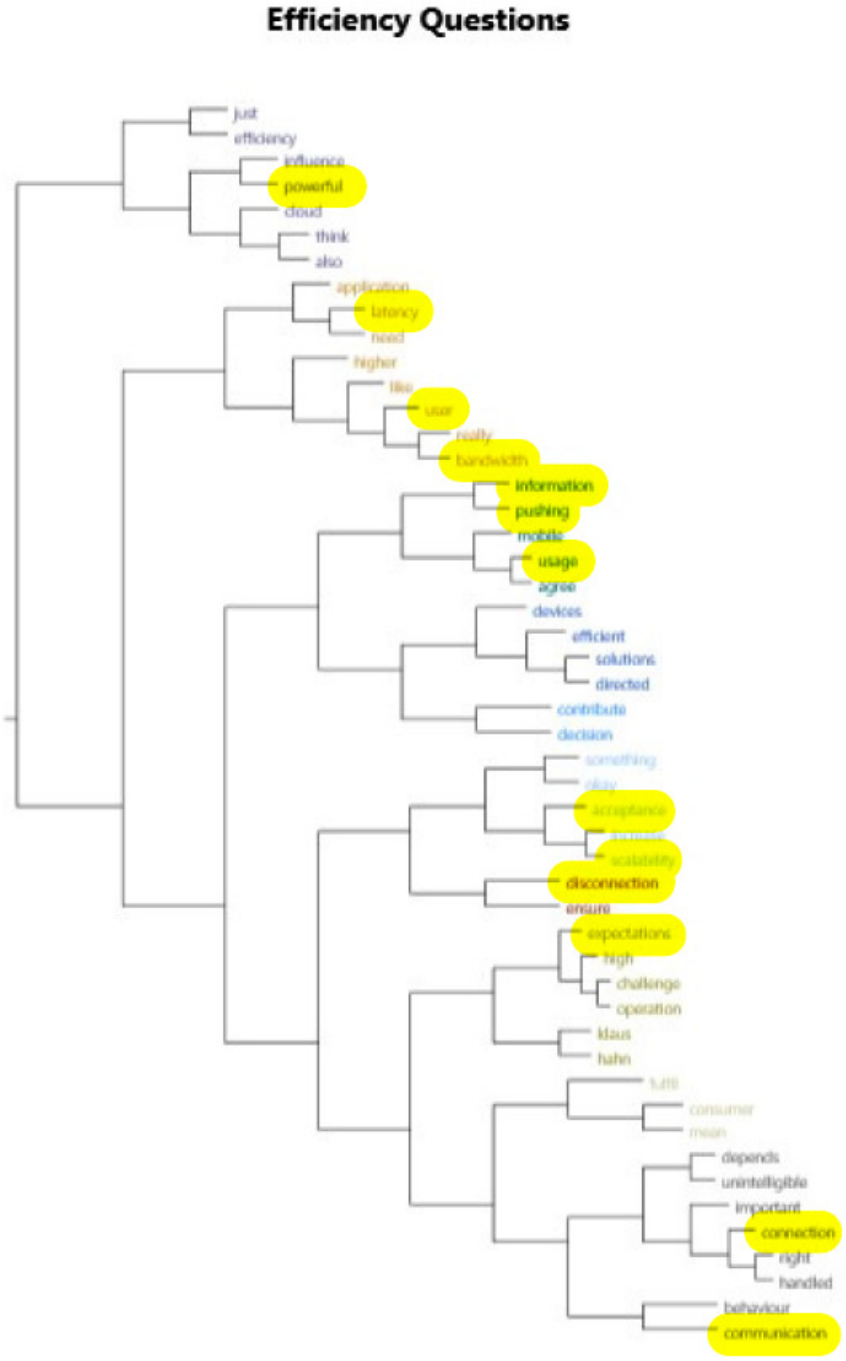
Key theme (key driver)	Research question	Interview question	Code	First order theme	"Higher" order theme
Simplicity	RQ2: Does the latest user interface trends towards simplicity significant change the consumer behaviour?	2.1. What kind of innovation will simplify the mobile device operation in the near future (within the next two years)?	Operation		
			Easy		
			Simple	Easy/Simple operatio	
		2.2. Does an easy operation of a mobile device increase the usage mobile information technology?	Device/s		
			User		
			Change		
			Interface	Device/User interface changed	
		2.3. Do you believe that the non-keypad data entry is the major development in the past to simplify the consumer behaviour.	Innovation		
			Technology		
			Keyboard		
			Keypad	Keyboard/Keypad en is supplemented by I interface innovations	*The ideal app based on easy/simple operation via various input channels*

Appendix VIII. Cluster analysis

Cluster analysis of the dimensions (key driver of technological development):




Simplicity Questions
know
easy
innovation
simplify
within
consumer
data
example
devices
mobile
right
device
freely
years
near
just
next
also
klaus
hahn
simplicity
keypad
development
like
okay
major
future
kind
past
operation
something
using
technology
usage
increase
latest
entry
believe
behaviour
decision
information
think
important
keyboard
change
things
user
interface
direction
probe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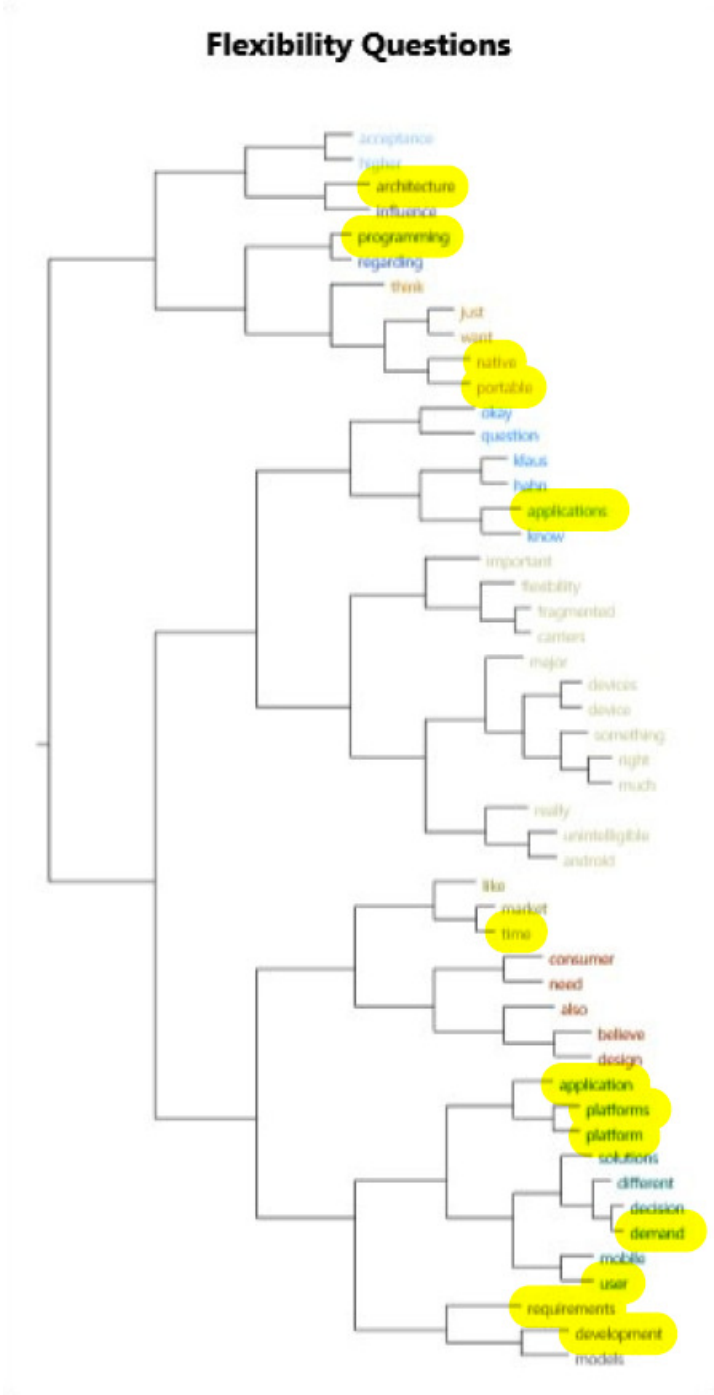
just
efficiency
influence
powerful
cloud
think
also
application
latency
need
higher
like
user
really
bandwidth
information
pushing
mobile
usage
agree
devices
efficient
solutions
directed
contribute
decision
something
okay
acceptance
scalability
disconnection
ensure
expectations
high
challenge
operation
klaus
hahn
consumer
mean
depends
unintelligible
important
connection
right
handled
behaviour
communication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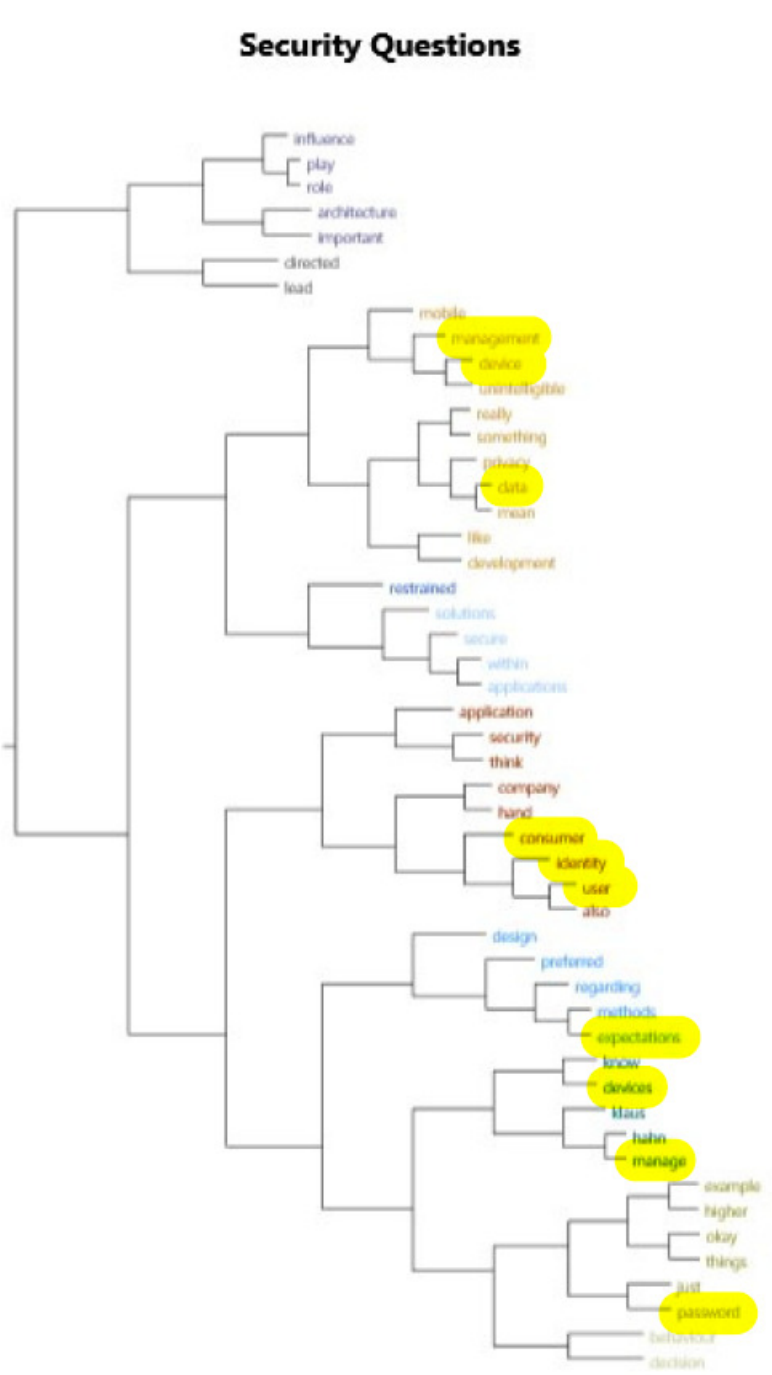
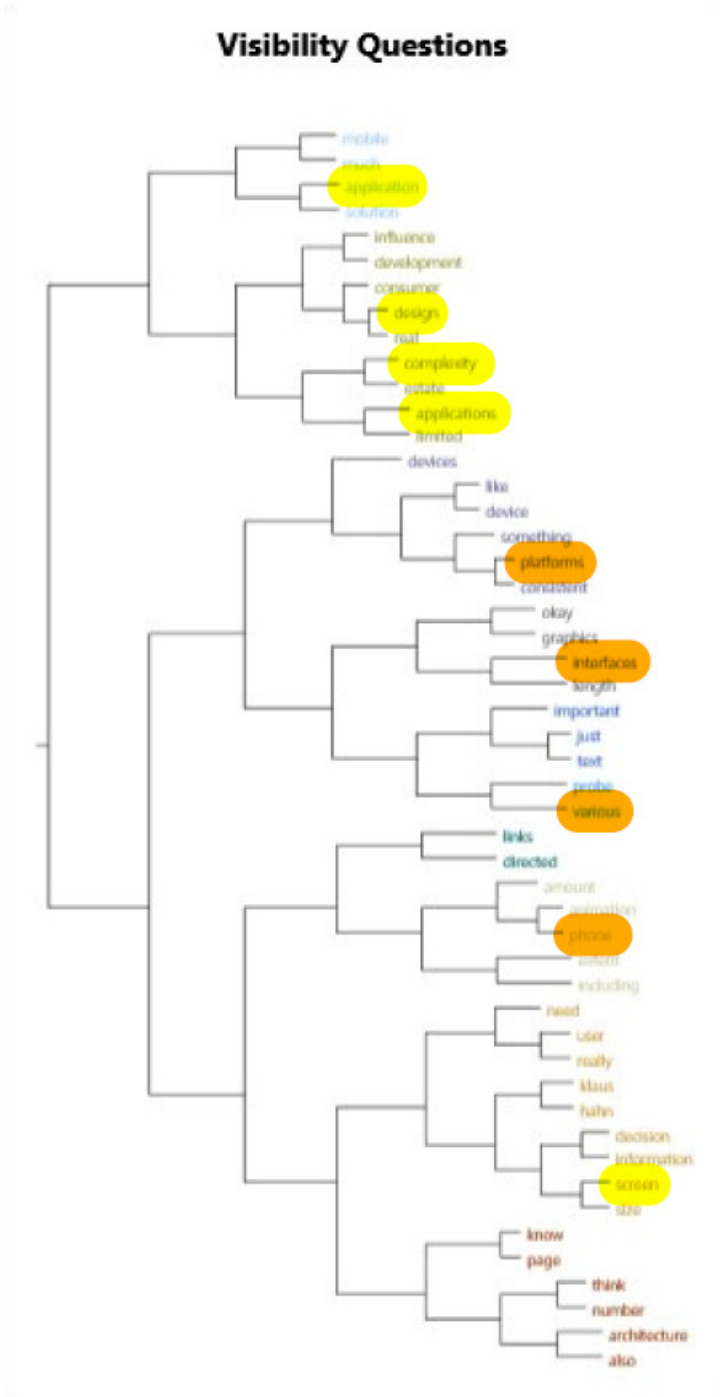
acceptance
architecture
influence
programming
regarding
think
just
want
native
portable
okay
question
klaus
hahn
applications
know
important
flexibility
fragmented
carriers
major
devices
device
something
right
much
really
unintelligible
android
like
market
time
consumer
need
also
believe
design
application
platforms
platform
solutions
different
decision
demand
mobile
user
requirements
development
models


Security Questions
influence
play
role
architecture
important
directed
lead
mobile
management
device
really
something
privacy
data
mean
like
development
restrained
solutions
secure
within
applications
application
security
think
company
hand
consumer
identity
user
also
design
preferred
regarding
methods
expectations
know
devices
klaus
hahn
manage
example
higher
okay
things
just
password
behavioral
decision


Visibility Questions
application
influence
development
design
complexity
applications
devices
like
device
platforms
interfaces
important
just
text
various
links
directed
phone
need
user
really
klaus
hahn
decision
information
screen
know
page
think
number
architecture
also

Appendix IX. Word frequency query

Key word identification in regard to e.g. the key theme 'Simplicity'. The table is ordered by weighted percentage:

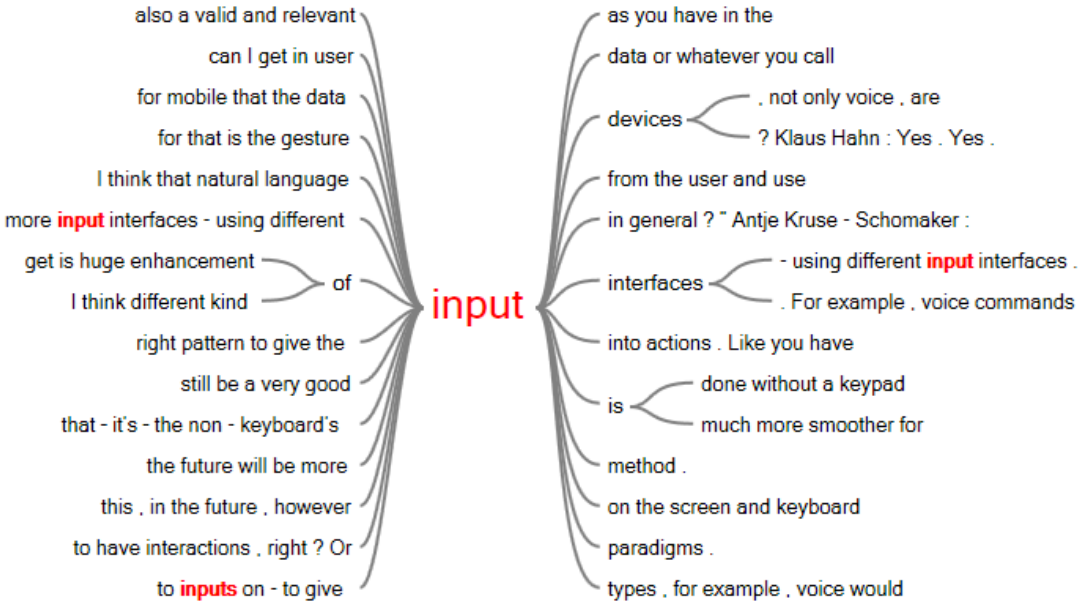
Word	Length	Count	Weighted Percentage (%)	Code
mobile	6	122	2,79	
device	6	93	2,12	2.1
think	5	85	1,94	
user	4	52	1,19	2.1
operation	9	46	1,05	2.2
easy	4	44	1,00	2.2
like	4	43	0,98	
something	9	43	0,98	
consumer	8	40	0,91	
simplify	8	39	0,89	2.2
really	6	38	0,87	
simplicity	10	37	0,84	2.2
behaviour	9	36	0,82	
major	5	35	0,80	
kind	4	34	0,78	
usage	5	34	0,78	
development	11	30	0,68	
innovation	10	30	0,68	2.3b
keyboard	8	30	0,68	2.3a
increase	8	29	0,66	
know	4	29	0,66	
change	6	28	0,64	2.1
entry	5	28	0,64	
future	6	27	0,62	
keypad	6	27	0,62	2.3a
technology	10	27	0,62	2.3c
data	4	26	0,59	
information	11	26	0,59	
years	5	26	0,59	
believe	7	25	0,57	
interface	9	24	0,55	2.1
past	4	24	0,55	
example	7	23	0,53	
within	6	23	0,53	
right	5	22	0,50	
using	5	22	0,50	
devices	7	20	0,46	2.1
latest	6	20	0,46	
near	4	20	0,46	
things	6	19	0,43	
decision	8	18	0,41	
important	9	18	0,41	

World cloud:


important
directed
change
using
keyboard
think
klaus
behaviour
latest
simplicity
right
near
really
example
within
easy
next
keypad
just
usage
hahn
like
major
something
mobile
data
probe
technology
entry
increase
okay
know
years
past
also
device
interface
future
things
user
simplify
kind
operation
believe
innovation
consumer
devices
decision
development
information

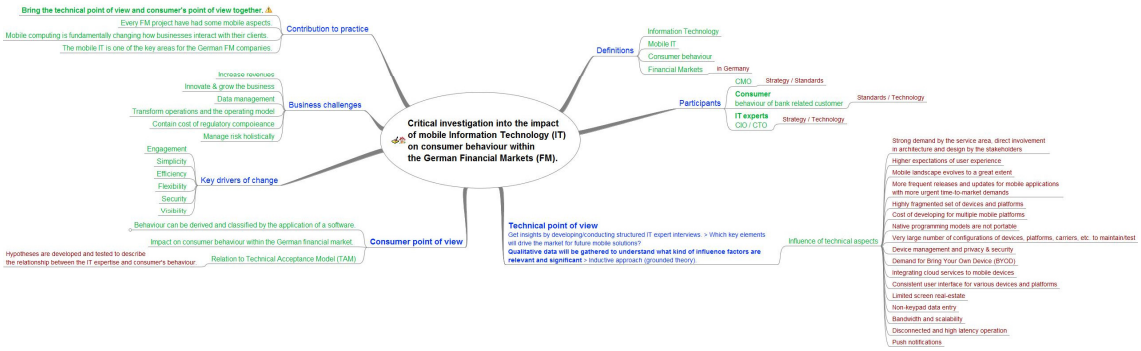
Appendix X. Text search query

Major phrases or words in regard to e.g. the key theme ‘Simplicity’.



Appendix XI. Mind map

An example of the mind map developed in parallel to the interview coding. The mind map helped to bridge the gap between codes and further the meanings behind the data.



Declaration

I declare that this Doctorate of Business Administration thesis is my own work and that all sources literary and electronic have been properly acknowledged as and when they occur in the body of the text.

Klaus Hahn

Date: 7. May 2017