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MOBILE BANKING ACCEPTANCE AMONG YOUNG CONSUMERS IN GERMANY: AN EMPIRICAL ANALYSIS

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ABSTRACT

Purpose: While Germany leads the adoption of internet banking with only a few nations beforehand, in terms of mobile banking (MB), the country encounters difficulties. Major banks in Germany spend large budgets on refined MB services. Nonetheless, the share of MB customers is only at approximately 10%. It appears crucial for MB service providers to develop a deeper understanding of MB acceptance, especially among young customers that are usually considered as early adopters of technology. In consequence, this dissertation aims at identifying key MB acceptance factors for young customers in Germany.

Design/Methodology/Approach: Founded on the Unified Theory of Acceptance and Use of Technology (UTAUT), this study develops a research model specifically tailored to the context of MB. Following, it examines 433 young consumers in Germany and applies Structural Equation Modelling (SEM) in order to test the network of hypotheses in the proposed model. Subsequently, a multi-group analysis inspects differences between users and non-users of MB.

Findings: The results indicate strong evidence for the validity of the proposed research model, which explains 67.7% of variance regarding behavioural intention to adopt MB. The study suggests that Perceived Compatibility has the strongest effect on Behavioural Intention. Perceived Credibility, Performance Expectancy, Effort Expectancy, and Social Influence, ordered by their effect size, significantly influence Attitude towards MB, which in turn influences Behavioural Intention.

Originality/Value: The results have several implications for scholars and practitioners. While scholars receive new empirical support for theory development, practitioners gain a deeper understanding of the key adoption factors to design and implement new MB concepts that yield high consumer acceptance.

Keywords: Mobile Banking, Technology Acceptance, Unified Theory of Acceptance and Use of Technology, Germany, Young Consumer

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LIST OF ABBREVIATIONS AND ACRONYMS

3G	= 3rd Generation of Mobile Telecommunication Technology
Android	= Google's Mobile Operating System
AT	= Attitude
ATM	= Automated Teller Machine
AVE	= Average Variance Extracted
BI	= Behavioural Intention
CoR	= Composite Reliability
CR α	= Cronbach's Alpha
EE	= Effort Expectancy
Fed	= Federal Reserve System
GPS	= Global Positioning System
IDT	= Innovation Diffusion Theory
iOS	= iPhone Operating System
LVS	= Latent Variable Score
MB	= Mobile Banking
MM	= Motivational Model
MPCU	= Model of PC Utilization
PC	= Perceived Compatibility
PE	= Performance Expectancy
PLS	= Partial Least Square
PR	= Perceived Credibility
PS	= Perceived Self-Efficacy
SCT	= Social Cognitive Theory
SEM	= Structural Equation Model
SI	= Social Influence
SMS	= Short Message Service
STD	= Standard Deviation
TAM	= Technology Acceptance Model
TAM2	= Technology Acceptance Model Version 2
TPB	= Theory of Planned Behaviour
TRA	= Theory of Reasoned Action
UMTS	= Universal Mobile Telecommunication System
UTAUT	= Unified Theory of Acceptance and Use of Technology
WAP	= Wireless Application Protocol

1. INTRODUCTION

1.1. Problem Definition and Relevance

In the past, banks have benefited from using different service channels to reach customers. Starting from retail banking, services were provided through telephone, automated teller machines (ATMs) and recently via internet. Internet banking encompasses individuals using the Internet to access their bank account to carry out financial transactions. It is usually accessed either through a stationary computer or a notebook (Sathye 1999). Hand in hand with the rise of smartphones and tablets, mobile banking (MB) represents the next step of financial institutions towards providing new services to customers and seizing technological opportunities in terms of new business models (Riquelme and Rios 2010).

First, MB must be set in a wider context of e-commerce. It is explained by Zwass (1996) as "sharing business information, maintaining business relationships and conducting business transaction by means of telecommunications networks" (p. 3). In the context of e-commerce, electronic transactions and online banking, also called internet banking, partly refer to the same subject (Figure 1).

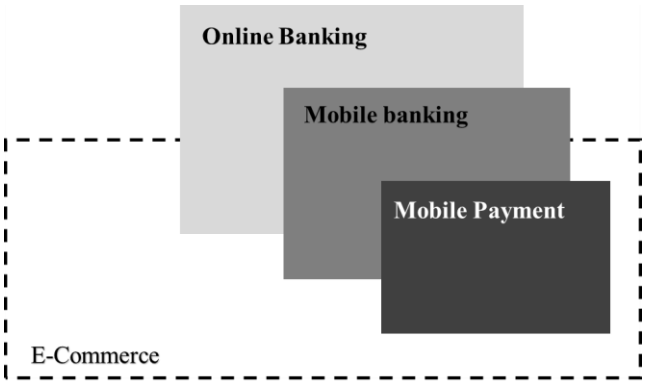

Figure 1: Boundaries of Mobile Banking (Gall 2013)

Compared to online banking, MB represents an extension with its major difference in the devices used to conduct banking tasks. It is accessed with mobile devices (e.g. smartphones or tablets) that are connected to the internet through mobile data transmission or Wi-Fi hotspots (Zhou, Lu and Wang 2010). Georgi and Pinkl (2005) refer to MB as the provision and utilization of a wide range of financial services, including financial information, accounting, and brokerage via mobile devices. MB can be conducted through apps and mobile websites, where most of the time customers do not bear direct costs (Al-Jabri and Sohail 2012).

Practitioners agree that mobile internet represents a main growth opportunity for banks and financial service providers (Deutsche Bank 2012). Large banks in Germany made substantial investments in mobile applications. Commerzbank, for instance, announced to invest more than 200 million Euro in mobile and internet banking until 2016 (Frühauf 2013). In addition, a whole

new industry that focuses on mobile payments emerges. Not only traditional financial institutions are operating in this sector, but also various start-ups and well-known companies such as Apple and Google try to establish themselves in the new market (Ondrus and Lyytinen 2011).

Despite the recent moves, banks do not seem to benefit as much from MB in terms of significant cost savings as from the migration of face-to-face banking to internet banking (Laukkanen et al. 2007). Asserting that at first sight banks might not have strong incentives to advance MB, scholars argue that the future development of MB is highly dependent on the consumer perspective (Mallat, Rossi and Tuunainen 2004; Karjaluoto, Koenig-Lewis, et al. 2010).

Accordingly, many researchers attempt to forecast consumer adoption of MB (e.g. Zhou, Lu and Wang 2010; Lin 2011; Koenig-Lewis, Palmer and Moll 2010). In the US, more than 30% of banking clients already use MB (Fox 2013). Until now, German consumers do not use MB as much. Recent studies suggest that only around 10% of the population or only every fifth smartphone owner in Germany exercises MB (Bitkom 2013; Puls Marktforschung 2013). Moreover, a customer loyalty report from Bain & Company (2013) based on research including 190,200 consumers in 27 countries finds a big discrepancy in Germany. While the country leads the adoption of online banking with only a few countries beforehand, it encounters difficulties in the adoption of MB.

1.2. Research Question

In order to explain the inconsistency between a technologically advanced economy such as Germany and a particularly low MB adoption rate, a comprehensive understanding of facilitators and inhibitors of consumer adoption is key (Karjaluoto, Koenig-Lewis, et al. 2010). Young consumers have been object of several internet and MB adoption studies, because they are perceived as frontrunners in technology adoption (e.g. Sathye 1999; Amin 2007; Karjaluoto, Koenig-Lewis, et al. 2010; Akturan and Tezcan 2012). Moreover, they are usually of particular interest for marketers, because of their role as change agents with regards to novelties (Bigne, Ruiz and Sanz 2005; Blackburn 2011; Simons and Gap 2010). A recent study in the US, for instance, shows that 86% of young consumers (age 18-34) own a smartphone, whereas only 71% of the total population possesses one (Nielsen 2014).

Taking into account that Germany occupies one of the last places in the adoption of MB among advanced economies (Bain & Company 2013) as well as that young consumers are typically

the first group to adopt a novel technology (Blackburn 2011), the following research question is formulated:

RQ: Which technology acceptance factors have an influence on mobile banking adoption among young consumers in Germany?

1.3. Structure of the Thesis

In order to answer the research question, chapter 2 gives an overview of the MB literature, including more general facilitators and barriers of technology acceptance models as well as specific MB acceptance factors. Moreover, the role of young consumers as early adopters in technology and innovation is discussed. Chapter 3 provides an understanding of the evolution and current state of MB in Germany. Based on the Unified Theory of Acceptance and Use of Technology (UTAUT), a research model adapted to the context of MB is developed in Chapter 4. Subsequently, the quantitative research method is explained in chapter 5, including instrument development, data collection and procedure. In chapter 6, the proposed research model is empirically tested through Structural Equation Modelling (SEM). Following, several theoretical and practical implications resulting from the analysis are presented in chapter 7. Finally, a summary, limitations, and an outlook for future research opportunities are provided in chapter 8.

2. LITERATURE REVIEW

2.1. Factors of Innovation and Technology Acceptance

Adoption of innovation has its beginnings in diffusion theory that was spread across many different scientific disciplines such as anthropology, sociology, communication and marketing studies (Rogers 2010; Bass 1969; Rogers and Kincaid 1981; Greenhalgh et al. 2004; Griliches 1957). However, it has merged to a single and integrated theory in which different types of diffusion research such as diffusion networks or adoption of different innovations in social systems are recognized (Wejnert 2002).

Within diffusion literature, innovations have been widely discussed (e.g. Burns and Stalker 1961; Nelson 1993; Davenport 2013). Rogers' (2010) definition captures innovation as an idea, practise, or object that is perceived new by individuals or groups of adopters. According to him, diffusion refers to the "process by which an innovation is communicated through certain channels among the members of a social system over time" (Figure 2) (p. 5). There are various types of innovations, such as technological, social or public sector innovations (e.g. Gilbert, Light and Mosteller 1974; Green and Vergragt 2002; Mulgan and Albury 2003). Most often scholars refer to technological innovations (e.g. Teece 1986; Nelson 1993; Garcia and Calantone 2002). Technology refers to a general concept of knowledge and utilization of tools and techniques including their influence on the human's ability to adjust to the environment. Hence, technology not only encompasses the usage of physical objects such as hardware or machines, but also refers to intangible goods like software, methods of organization and techniques (Oye, Iahad and Rahim 2014).

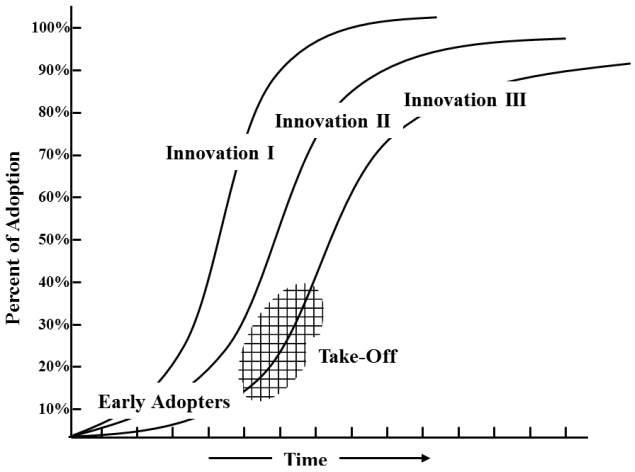

Figure 2: Rogers' Diffusion Process (Hoffmann 2011)

Many different theoretical models coexist in the literature about innovation adoption, each with another focus and confirmed in diverse settings. The majority of the theories attempt to construct models that explain how innovation and technology are adopted and forecast the rate of adoption over time (Rao Hill and Troshani 2007). Whereas some of the models focus on the implementation of innovations on an individual or societal level (e.g. Davis, Bagozzi and Warshaw 1989; Compeau and Higgins 1995), others examine implementation success in a work

setting (e.g. Leonard-Barton and Deschamps 1988). In the literature, scholars do not distinguish between technology adoption and acceptance and usually apply both terms in the same way (Venkatesh et al. 2003; Yu 2012; Shaikh and Karjaluoto 2014).

The most common theories to explain technology acceptance by individuals include Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Theory of Planned Behaviour (TPB), Model of PC Utilization (MPCU), Motivational Model (MM), Innovation Diffusion Theory (IDT), Social Cognitive Theory (SCT), and Unified Theory of Acceptance and Use of Technology (UTAUT) (Fishbein and Ajzen 1975; Bandura 1986; Davis 1989; Thompson, Higgins and Howell 1991; Ajzen 1991; Vallerand 1997; Venkatesh et al. 2003; Rogers 2010).[1]

In all theories, the key dependent variable is intention and/or usage of a new system (Oye, Iahad and Rahim 2014). Each technology accep-tance model identifies different, but often overlapping technology adoption attributes that steer the process of inducing new ideas. Moore and Benbasat (1991), for instance, describe IDT factors in the context of IT and define Relative Advantage, Compatibility, Complexity, Observability, and Trialability as the main drivers for adoption (Table 1). Davis (1989) and later Venkatesh and Davis (1996) focus on technology adoption (the actual usage of the system) as a response of a person's intention, which in turn is directly influenced by a system's Perceived Usefulness and Ease of Use (TAM). Later, they extend their model by including Subjective Norm as a supplementary predictor of usage intention (Venkatesh and Davis 2000). Within the advanced TAM2, Subjective Norm is described as a "person's perception that most people who are important to him think he should or should not perform the behaviour in question" (Venkatesh and Davis 2000, in: Fishbein and Ajzen 1975, p. 302).

Determinant	Definition	Main effect
Relative Advantage	The degree to which an innovation is perceived as being better than the idea/product it supersedes.	Positive
Compatibility	The degree to which an innovation is perceived as consistent with the existing values, past experiences, life style and needs of potential adopters.	Positive
Complexity	The degree to which an innovation is perceived as relatively difficult to understand and use.	Negative
Trialability	The degree to which an innovation may be experimented with on a limited basis.	Positive
Observability	The degree to which the results of an innovation are visible to others.	Positive

Table 1: Rogers' Innovation Factors (Moore and Benbasat 1991)

[1] The Appendix shows a selection of technology acceptance models, including: Theory of Reasoned Action (Appendix 1), Technology Acceptance Model (Appendix 2), Theory of Planned Behaviour (Appendix 3), Model of PC Utilisation (Appendix 4), Innovation Diffusion Theory (Appendix 5), Social Cognitive Theory (Appendix 6)

Scholars have gathered a diverse number of adoption attributes as a result of different technology acceptance models (e.g. Tornatzky and Klein 1982; Kaur Kapoor, K. Dwivedi and D. Williams 2014). Having to deal with innumerable innovation models and attributes, Venkatesh et al. (2003) reviews much of the user acceptance literature and integrates eight prominent models into their Unified Theory of Acceptance and Use of Technology (UTAUT). They conduct a meta-analysis in order to identify conceptual and empirical analogies across acceptance theories. Consequently, no further search, organization and/or integration would be needed, but instead scholars could use the UTAUT model to increase awareness of consumer adoption issues (Williams, Rana and Dwivedi 2012). Herein, they condense 32 attributes to four main effects and four moderating effects (Figure 3).

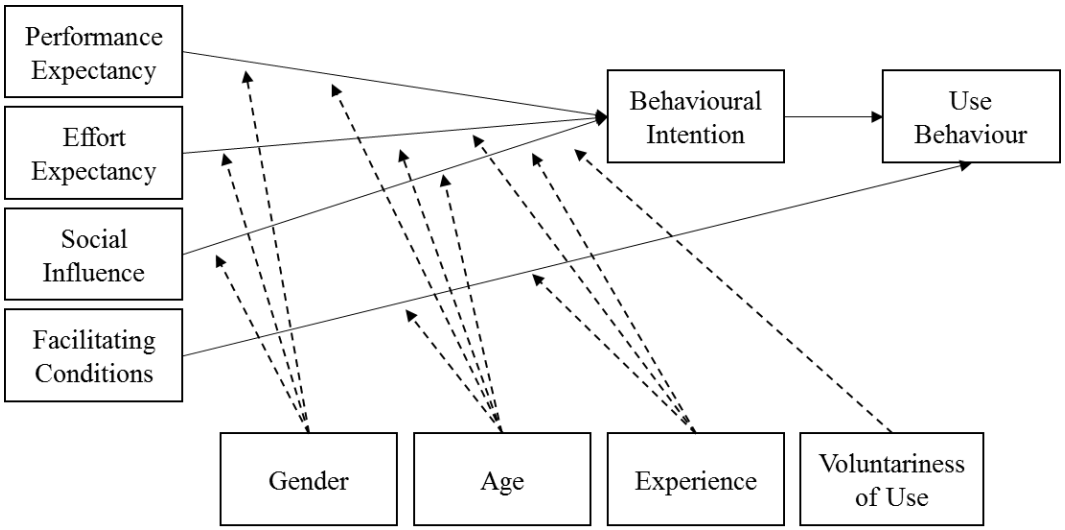

Figure 3: Unified Theory of Acceptance and Use of Technology (Venkatesh et al. 2003)

Three main effects, including 1) Performance Expectancy (PE), 2) Effort Expectancy (EE) and 3) Social Influence (SI) directly affect the behavioural intention to adopt a technology, which in turn determines the actual use behaviour. A fourth construct includes 4) Facilitating Conditions, which is the only variable that directly influences the actual usage behaviour (Venkatesh et al. 2003).

Venkatesh et al. (2003) define **Performance Expectancy** "as the degree to which an individual believes that using the system will help him or her to attain gains in job performance" (p. 447). The new construct combines five core constructs from previous literature, including: Extrinsic Motivation (MM), Perceived Usefulness (TAM/TAM2), Relative Advantage (IDT), Job-fit (MPCU), and Outcome Expectations (SCT) (Davis 1989; Thompson, Higgins and Howell 1991; Moore and Benbasat 1991; Davis, Bagozzi and Warshaw 1992; Compeau and Higgins

1995). Many authors acknowledge similarities between these constructs (e.g. Davis 1989; Moore and Benbasat 1991; Plouffe, Hulland and Vandenbosch 2001).

The second construct refers to **Effort Expectancy** "as the degree of ease associated with the use of the system" (p. 450). Venkatesh et al. (2003) combine three concepts from the adoption literature in order to capture the construct of Effort Expectancy: Ease of Use (IDT), Complexity (MPCU), and Perceived Ease of Use (TAM/TAM2) (Davis 1989; Moore and Benbasat 1991; Thompson, Higgins and Howell 1991). As in the case before, not only Venkatesh et al. (2003) admit strong parallels, but also other scholars note similarities in their research (e.g. Thompson, Higgins and Howell 1991; Plouffe, Hulland and Vandenbosch 2001; Moore and Benbasat 1991).

Social Influence is seen "as the degree to which an individual perceives that important others believe he or she should use the new system" (p. 451). Venkatesh et al. (2003) found SI represented as Subjective Norm in TRA, TPB, and TAM2 (Fishbein and Ajzen 1975; Davis, Bagozzi and Warshaw 1989; Ajzen 1991; Mathieson 1991; Taylor and Todd 1995), as Social Factors in MPCU (Thompson, Higgins and Howell 1991), and as Image in IDT (Moore and Benbasat 1991). While having different labels, each of the constructs contains the idea that the individual's behaviour is affected based on its belief how others will perceive the individual after having used the technology (Venkatesh et al. 2003).

Venkatesh et al. (2003) defined **Facilitating Conditions** "as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system" (p. 453). This definition conceptualizes an idea that is embodied by three other constructs: Facilitating Conditions in MPCU (Thompson, Higgins and Howell 1991), Perceived Behavioural Control in TPB (Ajzen 1991; Taylor and Todd 1995), and Compatibility in IDT (Moore and Benbasat 1991). Finally, **Behavioural Intention (BI)** refers to the degree of strength of an individual's intention to conduct a specified behaviour (Venkatesh et al. 2003).

Venkatesh et al. (2003) confirm that around 70% variance in technology acceptance can be explained through four main effects and four moderating factors, namely gender, age, experience with the technology, and voluntariness of use. Moderators affect the strength of the relationship between a dependent and independent variable. UTAUT shows substantial progress compared to previous models, which could predict around 20% – 50% of technology acceptance (Venkatesh et al. 2003).

Nonetheless, Van Raaij and Schepers (2008) argue that the superior outcome results from adding four more factors to the core constructs and thus, abandoning the simplicity of prior models. Cheng et al. (2011) oppose this evaluation and reason that moderating factors represent rather a strength of the UTAUT model. Im, Hong and Kang (2011) conclude that the major constraint of the model is that it fails to take account of cultural factors. In addition, several other scholars assert that both, UTAUT and TAM were originally constructed to examine organizational change through technology use (Venkatesh et al. 2003; Kim, Shin and Lee 2009). In other words, the focus lies on the innovation adoption of employees, not consumers. Even so, UTAUT has been used in many studies in non-organizational contexts such as in the MB adoption of emerging markets or the effect of gender on MB adoption (Amin et al. 2008; Koenig-Lewis, Palmer and Moll 2010; Riquelme and Rios 2010; Cruz et al. 2010; Zhou, Lu and Wang 2010).

Despite the criticism, Rao Hill and Troshani (2007) extend the UTAUT in a study about user acceptance of mobiles services by Fishbein and Ajzen's (1975) construct Attitude (AT). It is defined as "a learned predisposition to respond in a consistently favourable or unfavourable manner with respect to a given object" (p. 6). Attitude is herein an endogenous variable that on the one hand is affected by the four main UTAUT variables and on the other hand influences Behavioural Intention.

In general, technology acceptance models have often been adjusted to the requirements of specific study contexts. Popular applications include medical technology (e.g. Hu et al. 1999), internet services (Lederer et al. 2000), and mobile commerce (Wu and Wang 2005). Thus, in the following section are relevant determinants of consumer acceptance in MB discussed.

2.2. Determinants of Consumer Acceptance in Mobile Banking

Knowledge intensive innovations such as MB require extensive learning efforts from consumers who have to change their behaviour to adopt innovations. Hence, initial resistance is the natural response to change (Ram 1987). Previous innovation literature encompasses a significant pro-change bias, as it assumes that all innovations are favourable and should be implemented by every member of a society (Laukkanen and Kiviniemi 2010). Accordingly, an objective view on acceptance factors of innovations have been ignored or not adequately studied in the past. Nevertheless, understanding consumer behaviour is crucial in developing, implementing and commercializing a new technology (Ram 1987).

With the aim of identifying the most prevalent MB acceptance factors, this thesis compares and aggregates two literature reviews from Ha et al. (2012) and Shaikh and Karjaluoto (2014). In total, this leads to a list of MB literature that encompasses 66 articles from 36 different journals (Appendix 7). Shaikh and Karjaluoto (2014), for instance, analyse 55 studies that use different acceptance models to explain consumer adoption of MB. They find that some scholars apply one particular acceptance model or an extension of it, for example, TAM (e.g. Aboelmaged and Gebba 2013; Safeena et al. 2012), IDT (e.g. Kim, Shin and Lee 2009; Lin 2011), or UTAUT (e.g. Luo et al. 2010; Yu 2012). Others, however, combine different theories, such as TAM and IDT (Ramdhony and Munien 2013) or TAM and TPB (Aboelmaged and Gebba 2013). Additionally, some authors develop their own models with different constructs (e.g. Zhou 2011a; Laukkanen and Cruz 2012). While MB literature is highly fragmented, most studies rely on TAM, IDT and UTAUT (Shaikh and Karjaluoto 2014).

Construct	Quantity	%
Perceived Usefulness	40	61%
Perceived Ease of Use	34	52%
Perceived Risk	20	30%
Trust	18	27%
Social Influence	16	24%
Perceived Self-Efficacy	15	23%
Perceived Compatibility	10	15%
Perceived Cost	10	15%
Facilitating Conditions	9	14%
Perceived Credibility	8	12%
Culture	8	12%
Total No. of Studies	66	100%

Table 2: Summary Mobile Banking Literature Review

As described in chapter 2.1, several different terms for similar or slightly modified variables are used in order to explain MB adoption (e.g. Venkatesh et al. 2003; Laukkanen and Kiviniemi 2010). Thus, the author aggregates several constructs that are often seen as similar or as strongly related. Herein, Perceived Usefulness (TAM) is combined with Relative Advantages (IDT), Performance Expectancy

(UTAUT), and Perceived Benefit (SDM). Moreover, Perceived Ease of Use (TAM) and Effort Expectancy (UTAUT) are combined (Venkatesh et al. 2003).

Table 2 shows common constructs to explain MB acceptance. The results show that the vast majority of 66 analysed papers use Perceived Usefulness (61%) and Perceived Ease of Use (52%) to explain MB adoption. Besides, Perceived Risk (30%), Trust (27%), Social Influence (24%), Self-Efficacy (23%), Perceived Compatibility (15%) and Perceived Cost (15%) are used in at least ten studies. Facilitating Conditions (14%), Perceived Credibility (12%) and Culture (12%) are used in fewer studies. Next, a brief explanation of the most frequently recognised determinants including an evaluation of their influence on MB adoption is given.

Perceived Usefulness

Davis (1989) describes Perceived Usefulness as "the degree to which a person believes that using a particular system would enhance his job performance" (p. 320). Venkatesh et al. (2003) state the similarities between Perceived Usefulness and Relative Advantage (IDT) as well as Performance Expectancy (UTAUT). In MB, it refers to the assumed relative advantage compared to substitutes of MB such as branches, telebanking, ATMs or internet banking (Zhou, Lu and Wang 2010). Customers would not want to accept additional costs like learning and switching costs if MB did not offer superior performance (Zhou, Lu and Wang 2010). Perhaps more importantly, only if the belief of MB's usefulness is confirmed during continuous usage, users will carry on to use MB services in the long run (Lin 2011). Perceived Usefulness is particularly salient amongst the various facilitators that may stimulate the adoption of MB (Laukkanen et al. 2007; Cruz et al. 2010; Karjaluoto, Koenig-Lewis, et al. 2010; Wessels and Drennan 2010; Lin 2011).

Previous literature examines the main advantages that mobile technologies can offer compared to traditional banking channels. (1) Immediacy, (2) ubiquity, (3) localization, (4) instant connectivity, and (5) proactive functionality are usually specified (Buse 2002; Tiwari and Buse 2007; Kemper and Wolf 2002).

Immediacy and Ubiquity describe that services become available at any time and place and create explicitly opportunities for time critical transactions (e.g. stock market transactions, blocking credit card). Herein, a fast and stable internet connection is an essential precondition for widespread adoption of MB (Tiwari and Buse 2007; Kemper and Wolf 2002).

Localization through GPS technology offers new opportunities to determine the user's location and subsequently to tailor offers and communication better to customer needs. Accordingly,

MB enables banks to offer enhanced services like the localization of the closest ATM (Tiwari and Buse 2007).

Instant connectivity means a constant connection to the internet with no need to boot or connect to a network and thus easier access to banking services. Consequently, MB clients can productively use "dead-time" e.g. by checking the latest transactions while traveling (Tiwari and Buse 2007).

Proactive functionality makes it possible that banks can send immediate and personalized information (push) to the customer's mobile devices (Tiwari, Buse and Herstatt 2006). For instance, banks can notify their customers when the account falls below a certain threshold. This feature brings the advantage of being up to date at all times without requesting information from a system (pull).

Several drawbacks are also being discussed. Tiwari and Buse (2007) ask 488 users and non-users of MB to find disadvantages of MB. Most often security, high costs and less comfort are named. Security concerns are found to be common among all categories. This includes, for instance, the loss of a person's mobile device, which often means that other people could gain access to sensitive financial information. However, the opinions about high costs and less comfort are seen contrary. Almost 50% of non-users answer that MB is too costly, yet more than 90% of users decline the question. In terms of comfort, 32% of non-users recognise devices to be complex and uncomfortable, whereas over 80% of the users do not agree to this description (Tiwari and Buse 2007).

Perceived Ease of Use

Perceived Ease of Use was first presented by Davis' (1989) article introducing the TAM. He defines it as "the degree to which a person believes that using a particular system would be free of effort" (p. 320). Rogers (2010) describes the opposite "complexity" (p. 250) as intellectual effort in learning and employing a new technology. Several authors acknowledge the similarities between Perceived Ease of Use (TAM), Complexity (MPCU), and Effort Expectancy (UTAUT) (Davis, Bagozzi and Warshaw 1989; Plouffe, Hulland and Vandenbosch 2001; Moore and Benbasat 1991; Thompson, Higgins and Howell 1991; Venkatesh et al. 2003).

Al-Jabri and Sohail (2012) describe that less users will adopt a new technology if it requires more mental effort and is time consuming or frustrating. A large amount of empirical studies proves the inhibiting influence of complexity on the user's intention to accept mobile technologies (Ondrus and Pigneur 2006; Mallat 2007; Au and Kauffman 2008). Furthermore,

research shows that Perceived Ease of Use is a highly significant factor of MB acceptance (Amin et al. 2008; Lee et al. 2012). Nevertheless, other authors such as Yu (2012) and Zhou, Lu and Wang (2010) could not prove a relation between MB adoption and Effort Expectancy. Instead, Ha et al. (2012) illustrate that Perceived Ease of Use shares similarities with Perceived Usefulness. Despite the ambiguous results from research, Shaik and Karjaluoto's (2014) literature review indicates a vast majority of adoption studies that apply Perceived Ease of Use (e.g. Hsu, Wang and Lin 2011; Sheng, Wang and Yu 2011; Teo et al. 2012; Chitungo and Munongo 2013; Hanafizadeh et al. 2014).

Perceived Risk, Trust and Credibility

The buyer's decision to adopt an innovative technology can associate a high level of Perceived Risk. Hence, a deep understanding of a user's risk sensitivity is utmost important in order to build and preserve his trust in new technologies (Pavlou 2003).

In banking, Perceived Risk was initially rather restricted to fraud or bad product quality, however nowadays it must be defined in relation to physical, psychological, financial or social risks in online transactions (Hanafizadeh et al. 2014; Im, Kim and Han 2008). Herein, it seems potentially difficult for customers to assess the various risks meaningfully, especially if they don't have much experience in the application of MB (Koenig-Lewis, Palmer and Moll 2010; Harridge-March et al. 2008). Yu (2012) describes three main determinants of Perceived Credibility (PR) in the context of MB, namely technical reliability of a system, privacy protection and security of the banking environment. MB usually takes place in a distant and impersonal environment. Fears of hacking and other malicious attacks that could result in significant economic losses create implicit uncertainty among consumers (Laukkanen et al. 2007; Koenig-Lewis, Palmer and Moll 2010).

Gefen, Karahanna and Straub (2003) find in a study about online shopping that trust is an effective way to resolve fears linked to uncertainty. In accordance, Perceived Credibility is seen "as the belief that a partner is trustworthy and has the required expertise to carry out transactions" (Koenig-Lewis, Palmer and Moll 2010, p. 415).

Perceived Risk, Trust and Credibility are strongly related and have been frequently illustrated as very important barriers to MB adoption (Luo et al. 2010; Laukkanen and Kiviniemi 2010; Koenig-Lewis, Palmer and Moll 2010). Especially in mobile services, Perceived Credibility is considered to have substantial impact as mobile devices (opposed to fixed devices) increase the threat to security. Hence, Coursaris, Hassanein and Head (2003) observe that the high risk

associated to MB is caused by the high probability of theft and loss of the device. Yu (2012) identifies a positive relationship between Perceived Credibility and Behavioural Intention to use MB.

Social Influence (SI)

Adoption models usually rely on Fishbein and Ajzen's (1975) Theory of Reasoned Action where a person's attitude towards perceived subjective norms determines technology adoption. Singh, Srivastava and Srivastava (2010) assert that the individual's decision to embrace a new innovation is not detached from family, peers, authority and media. Amin et al. (2008), for instance, study 158 customers from a major bank in Malaysia and find that the intention to use MB is considerably influenced by peers surrounding an individual. Several other scholars find weak empirical evidence for a relationship between SI and MB adoption (e.g. Hsu, Wang and Lin 2011; Yu 2012; Chitungo and Munongo 2013; Aboelmaged and Gebba 2013). In contrast, Yu's (2012) study about 441 Taiwanese consumers indicates that SI is the most powerful construct influencing people's intention to use MB. Venkatesh et al. (2003) confirm the significance of SI on Behavioural Intention, however they argue that SI is only significant in work settings and early periods of a person's experience with the technology, when the individuals' opinion is relatively ill-informed.

Perceived Self-Efficacy (PS)

PS is originated in the Theory of Planned Behaviour, where Ajzen (1991) points out that perceived behavioural control is in close approximation to Bandura's (1977) concept of PS. It "is concerned with judgments of how well one can execute courses of action required to deal with prospective situations" (Bandura 1982, p. 122). Earlier studies on computer self-efficacy confirm a positive relationship between experience with computer technology and computer usage (Johnson and Marakas 2000; Agarwal, Sambamurthy and Stair 2000; Hong, Thong and Wai-Man Wong 2002; Chau 2001). Previously, Venkatesh et al. (2003) considered that PS would directly affect technology adoption within the UTAUT framework. However, they conclude that PS does not play a significant role in influencing actual behaviour. The construct would rather be a determinant of Effort Expectancy.

In the MB context, self-efficacy relates to whether individuals believe they have the required knowledge, skill or ability to use MB. Hence, self-efficacy refers to the judgement of the own ability to use MB services (Luarn and Lin 2005). In their extended TAM model, Mathieson, Peacock and Chin (2001) find that perceived knowledge has a substantial positive effect on the intention to use an information system. Moreover, Davis (1989) and Mathieson (1991) argue

for a connection between self-efficacy and ease of use, since a person with high proficiency might evaluate a system to be simpler than an individual with low proficiency (Wang, Lin and Luarn 2006). In fact, much empirical evidence supports a causal link between these two constructs (Venkatesh and Davis 2000; Agarwal, Sambamurthy and Stair 2000; Wang et al. 2003; Venkatesh and Davis 1996). Other authors could not find a significant link between PS and actual behaviour (Brown et al. 2003) or PS and intention (Karjaluoto, Püschel, et al. 2010).

Perceived Compatibility (PC) and Facilitating Conditions

PC describes the extent to which a new innovation is perceived as coherent with common believes, values, present lifestyles, and past experiences (Chen, Gillenson and Sherrell 2004). In other words, if individuals are not required to carry out substantial changes in their lives, they are more likely to adopt an innovation. Ha et al. (2012) admit that even tough PC is a fairly recent construct for adoption studies, the extensive application has led to widespread awareness in the research community (e.g. Gillenson and Sherrell 2002; Wu and Wang 2005; Chen 2008).

Venkatesh et al. (2003) illustrate the similarities between compatibility and Thompson's et al. (1991) construct of Facilitating Conditions. The latter reflects the effect of a person's knowledge, ability, and resources (Venkatesh et al. 2003). Consequently, it is associated with the extent to which a person believes that it has the required background to support the usage of MB (Yu 2012). A new service such as MB requires users to have specific skills, including the ability to connect to mobile internet and to operate devices (Zhou, Lu and Wang 2010).

The relevance of compatibility is particularly noticed in MB adoption studies by Lin (2011), Lu et al. (2011) and Koenig-Lewis, Palmer and Moll (2010). For example, Lu et al. (2011) claim that on the one hand consumers who normally use digital payment services have higher likelihood to adopt MB, because it is an extension of conventional online banking. On the other hand, transferring money at a branch is different compared to paying an invoice through internet banking. Accordingly, clients who are used to go to their branch are more resistant to the adoption of MB (Lu et al. 2011). In another study about German consumers, Koenig-Lewis, Palmer and Moll (2010) support the findings and notice that consumers are more likely to view MB useful, easy to use and credible if it fits to their believes, values and lifestyles.

Perceived Cost

Luarn and Lin (2005) describe Perceived Cost in the MB context as "the extent to which a person believes that using mobile banking will cost money" (p. 880). They argue that economic motivations and outcomes are most often central to IT adoption studies. Several studies indicate

that the Perceived Costs of MB lessens the intention to its acceptance (Luarn and Lin 2005; Cruz et al. 2010; Wessels and Drennan 2010). For instance, Luarn and Lin (2005) interview several consumers in person and find that costs negatively influence Behavioural Intention to use MB. Similarly, Sripalawat, Thongmak and Ngramyarn (2011) collect 195 questionnaires from banking clients in the greater metropolitan area of Bangkok and observe financial costs to be a salient factor in MB adoption.

Ha et al. (2012) extend the definition and include indirect costs such as switching, transaction, and time costs beside the actual monetary cost of using MB services. Hence, a small and impractical smartphone display incurs indirect costs for transactions. Nevertheless, Ha et al. (2012) already acknowledge that they mix Perceived Costs with Perceived Compatibility and Ease of Use since switching and transaction costs directly relate to the efforts required by users to adopt MB.

The vast majority of adoption studies that find perceived cost being a significant factor to explain adoption originates from developing countries (e.g. Yu 2012; Chitungo and Munongo 2013; Hanafizadeh et al. 2014). Although Wessels and Drennan (2010) found a significant relation between costs and intention to use MB in Australia, there are no recent studies in industrialized countries that apply this construct. A reason for that might be that prices for mobile internet have once been higher than prices for fixed-line internet (Wang, Lin and Luarn 2006), however in recent years, mobile internet access has become much cheaper (Brown 2015).

Culture

Alafeef, Singh and Ahmad (2011) claim that culture has a great influence on the adoption of new technologies. Likewise, Srite and Karahanna (2006) assert that cultural differences between countries impact the efficiency of IT deployment. Hence, several authors express concerns that applying similar behavioural models across cultures is not effective (e.g. Hofstede 1984; Straub, Keil and Brenner 1997; Suh et al. 1998). One of the difficulties in measuring the relevance of culture is due to its macro level nature, which lacks precision in explaining behaviour at the individual level (Srite and Karahanna 2006). Weak adoption rates of new technologies due to cultural differences are studied by several authors (e.g. Sukkar and Hasan 2005; Akour et al. 2006). Moreover, empirical evidence from China and the US shows that national culture affects the acceptance of IT (Srite 2006). Most of the MB adoption studies are confined to one country in order to limit bias from cultural and technological differences. In fact, Shaikh and Karjaluoto (2014) illustrate that a majority of MB adoption studies originates

in developing countries, whereas only a minority were conducted in developed countries. They confirm that the most frequently examined regions are Southeast Asia, East Asia and Africa with only few studies being from Europe and South Asia.

This chapter shows that there is much to investigate concerning the explanatory power of each MB adoption attribute. The described acceptance factors have been frequently applied in adoption studies, albeit mainly in other regions than Central Europe. Thus, the examined studies offer limited explanation for why MB has not yet reached critical mass in Germany. In order to kick off a novelty, it is argued that change agents in the form of early adopters are usually required (Bigne, Ruiz and Sanz 2005). Among others, Morris and Venkatesh (2000) find that age plays a moderating role in technology usage. Similarly, Blackburn (2011) searches for early adopter of technology and finds that especially young consumers are usually earlier in adoption a new technology. For that reason, they build the foundation for this study and are hereafter discussed in more detail.

2.3. Young Consumers as Early Adopters of Technology

Members of a social system are classified in adopter categories based on their innovativeness. Innovativeness describes the degree of some members to be earlier in embracing new ideas than other individuals (Rogers 2010).

Although scholars define different categories to describe innovativeness, the most common classification can be found in Rogers' (2010) work about the diffusion of innovations: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards. The distribution tends to follow a normal distribution (Figure 4). Each category is matched to a certain dominant attribute: Innovators-venturesome; early adopters-respect; early majority-deliberate; late majority-sceptical; and laggards-traditional (Hoffmann 2011). Many scholars adopt this approach in their studies (Rogers and Shoemaker 1971; Pedersen 2005; Chesbrough and Crowther 2006).

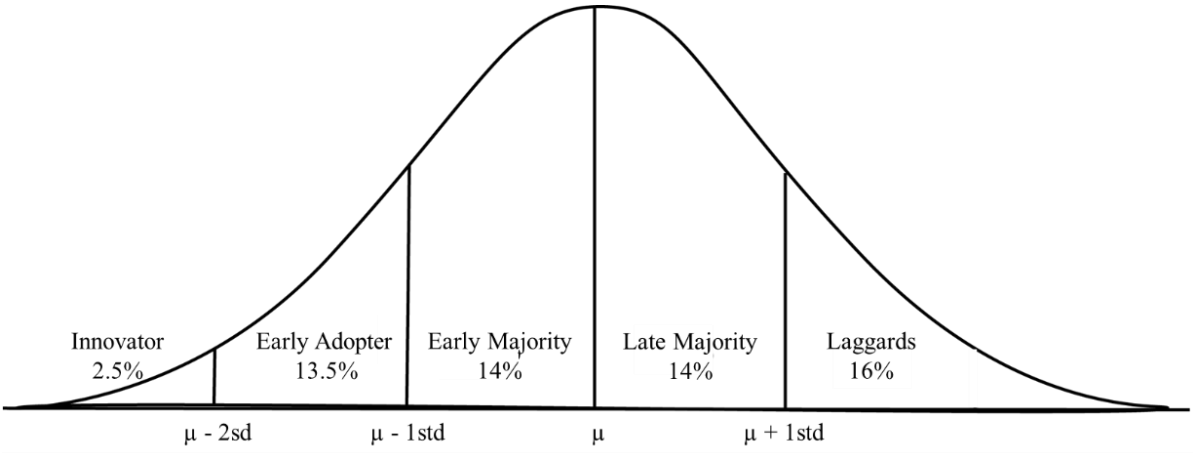

Figure 4: Rogers' Adopter Categories (Hoffmann 2011)

Using time-of-adoption to segment people in groups of adopter, however, is also strongly criticised for both methodological and theoretical reasons (Midgley and Dowling 1978; Hurt, Joseph and Cook 1977; Flynn and Goldsmith 1993). The criticism states that this categorisation is a temporal concept that put innovativeness on a level with time-of-adoption without having any isomorphic relationship (Midgley and Dowling 1978). Consequently, it does not allow for predictions and management interventions and reflects little else than an ex-post descriptor of human behaviour (Flynn and Goldsmith 1993). Instead, Midgley and Dowling (1978) suggest a cross-sectional method that, however, would suffer from many of the same critique points as time-of-adoption and would be problematic to develop and administrate (Goldsmith and Hofacker 1991).

Past studies find major differences among Rogers' (2010) categories of innovation adopters (Pessemier, Burger and Tigert 1967; Taylor 1977; Greco and Fields 1991). They distinguish characteristics based on 1) socioeconomic traits, 2) personality characteristics, and 3) communication behaviour (Rogers 2010; Hoffmann 2011).

Younger people are of particular interest for marketers, as they appear like change agents and are usually early in adopting innovative technologies (e.g. Bigne, Ruiz and Sanz 2005; Blackburn 2011; Simons and Gap 2010). Having grown up with digital technology, young people born after 1980 are seen as "digital natives" with unique characteristics, such as broader attention ranges for diverse inputs, greater critical thinking skills, and preferences to active learning and discovering (Blackburn 2011, p. 2). A much higher share than in the overall population, 20% of them started using computers between the age of five and eight, with the majority checking emails and browsing the Web for fun at least once a day (Jones 2008). Connaway et al. (2008) describe how technology surrounds them and dominates their socialization with over 10,000 hours of talking on mobile phones, over 200,000 e-mails and instant messages sent and received, and everything already happening before they leave college (compare also Gibbons 2007). Young consumers are the first "always-connected" generation with their multifunctional devices being always close to them (Pew Research Center 2010).

Due to their frontrunner role in technology adoption, young consumers have been the object of several internet and MB adoption studies (e.g. Sathye 1999; Amin 2007; Karjaluoto, Koenig-Lewis, et al. 2010; Akturan and Tezcan 2012). Mattila (2003) asks more than 1,300 bank customers from Finland and finds that MB users are fairly young (majority 25-34 years), white-collar workers and students, and on an average income level. Similar, Laforet and Li (2005) find evidence from China that MB users are young, wealthy and employed. In their MB adoption studies, scholars frequently apply similar acceptance models to young consumers as to the general public (Amin 2007; Karjaluoto, Koenig-Lewis, et al. 2010). Taking all this into account, young consumers (age 18-35) build the foundation for this study.

In the following, chapter 3 contains a discussion regarding the evolution and current state of MB in Germany in order to better understand the technology of MB and the characteristics of the German market. Based on the theoretical framework of the literature review, a research model is then developed in chapter 4 to explain young consumer acceptance of MB in Germany.

3. EVOLUTION OF MOBILE BANKING IN GERMANY

In the past, new innovative service channels have been utmost important for banks in order to offer superior services to new and existing clients (Kimball and Gregor 1995; Thornton and White 2001).

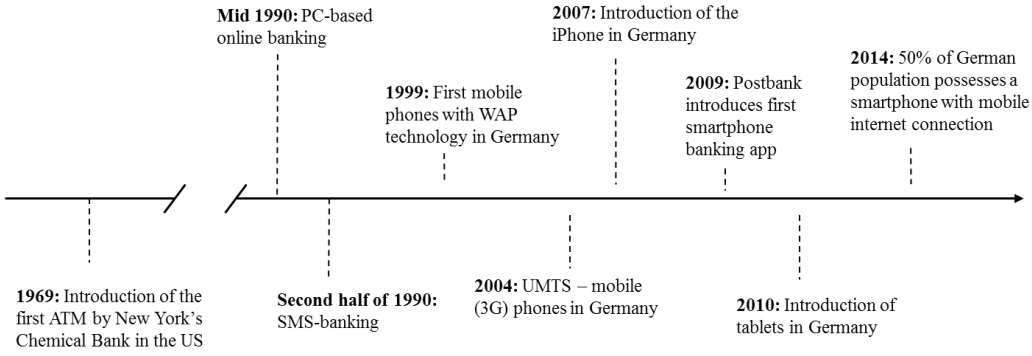

Figure 5: Important Milestones in the Development and Evolution of MB (compare Gall (2013))

A new era of electronic banking was introduced through the ATM that partly substituted face-to-face interactions between customers and bank employees (Calisir and Gumussoy 2008). The introduction of ATMs represented the beginning of banking that was extremely convenient as it was available at any time (Figure 5). After further development of self-service banking, the trend towards computer-based online banking was apparent by the 1990s (DeYoung 2005).

Internet banking revolutionized the banking sector as it allowed clients to access financial services 24 hours a day and simultaneously allowed banks to significantly reduce costs. Several studies show that for many banking services, internet banking is the cheapest distribution channel (e.g. Robinson 2000; Sathye 1999). The main advantages for banking customers include time and cost savings as well as far-reaching independence (Polatoglu and Ekin 2001; Howcroft, Hamilton and Hewer 2002). Especially young customers have significantly adopted online banking as increased digital capabilities made it easier to manage own financial issues online (Calisir and Gumussoy 2008).

After a short time, many banks also launched various MB services (e.g. SMS or WAP), where they offered clients information on accounts, transactions and financial markets. The scope of services, however, was very limited due to the technological boundaries of conventional mobile phones at that time (Dohmen and Moormann 2011). Singer (2009) observed various reasons why MB could not reach customer acceptance in the mass market. First of all, the screen of conventional mobile phones was too small to use online services. Moreover, online access was rather expensive, data transmission much too slow to work productively, and various security concerns among the population existed.

The development of an UMTS based 3G network was a milestone for MB services. It offered transfer speeds of about 3.6Mbits compared to only 144kbit/s transfer speed with the previous 2G and 2.5G technology (Ayadi 2005). In addition, scholars emphasize the importance of Apple's iPhone in the development of MB (e.g. Dohmen and Moormann 2011). The iPhone revolutionized the touch screen technology and offered a significantly larger screen than conventional mobile phones. In combination with faster internet access and the introduction of the App Store (iOS), the iPhone increased the comfort of MB considerably and offered banks a platform to distribute financial services through new electronic channels. Since 2010, tablets such as Samsung's Galaxy Tab and Apple's iPad support the widespread diffusion of MB services. Both tablets offer a much bigger screen and more convenient usage of online services (Bain & Company 2009).

The rise of smartphones and tablets occur at an extraordinary pace and according to a study from the German digital industry union, the number of smartphone users in Germany grew to 50% of the population in 2014 (compared to 40% in 2013). The number of tablet users increased to 20% in 2014 (compared to 15% in 2013) (BVDW 2014). Deloitte (2008) expects radical changes in the banking industry, namely that future banking branches will only serve as sales and service channels. Most transactions, in contrast, will be conducted through electronic banking channels such as internet and mobile banking (Figure 6).

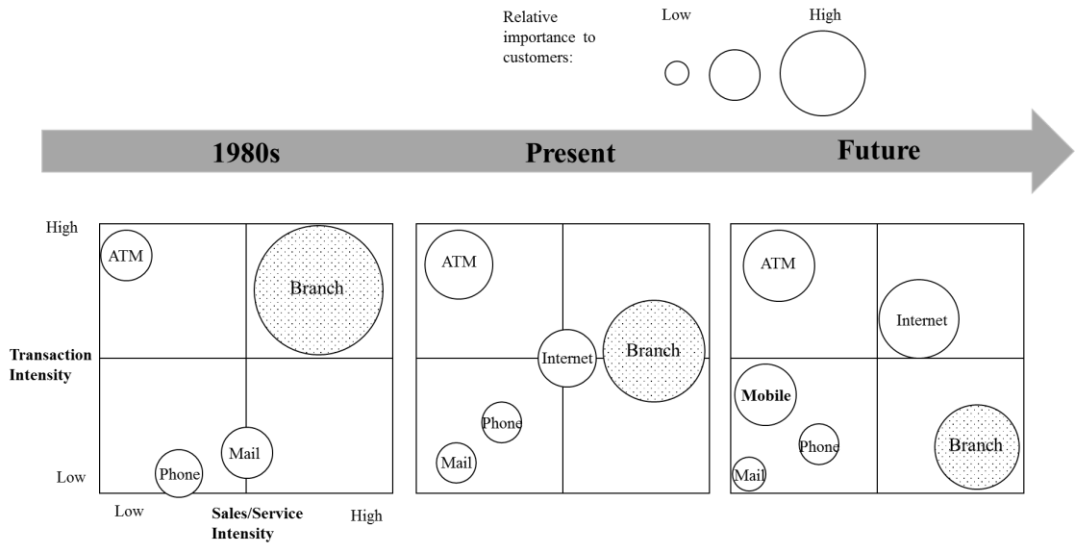

Figure 6: Evolution of Banking Channels (Deloitte, 2008)

Taking place in an international context, these changes are only in part observable in Germany. A recent study among 1135 banking customers in Germany reveals an unpromising result. Only 11% of banking customers in Germany use MB either through a smartphone or tablet. The study shows that many Germans share security concerns resulting from the lack of using cash. This

includes, for instance, the risk to fall into a debt trap (especially for young people), or to become a fully transparent citizen (Puls Marktforschung 2013). A study by Bain & Company (2012) surveyed 9.500 customers from 16 banks. Stating that 16% of the respondents use MB applications, it indicates a slightly higher percentage. Interestingly, another study shows a significant development. In 2013, already 35% of respondents appear to use smartphones or tablets in order to access banking services (Bain & Company 2013). Successful examples include the Deutsche Bank application that has been downloaded more than 500.000 times since its introduction three years ago. Likewise, Georg Fahrenschon, president of the Sparkassen Group, claims that the Sparkassen App has been downloaded more than 5 million times with an average interaction of 16 times a month (Frühauf 2013). Finally, the Volks- and Raiffeisenbanken initiated a digitalization program called "Kundenfokus 2015" with investments in the high two-digit million euro amount (Frühauf 2013). Annabel Oelmann, a German consumer adviser, summarizes the development by confirming an attitude of hesitation of consumers towards MB, but also by recognizing the recent upswing in Germany (Weingartner 2014).

It follows that present MB studies give an ambiguous impression about the future of MB in Germany. They do not seem to offer enough information about the expected behaviour of consumers regarding new and innovative MB services. In order to develop a deeper understanding of consumer acceptance factors among scholars and practitioners, academia usually examines drivers for MB adoption in different geographical and cultural regions of the world (Shaikh and Karjaluoto 2014). With regard to little evidence from Germany, a research model based on the UTAUT and adapted to the context of MB is developed in the following chapter 4. Thereafter, individuals from Germany are empirically tested through SEM in order to gain a deeper understanding of MB acceptance among young consumers within the country.

4. RESEARCH MODEL DEVELOPMENT

As a result of the MB literature review (chapter 2) and additional insight from the evolution of MB in Germany (chapter 3), the research model will now be developed. Due to its large representation of eight models and its superior performance compared to previous models, UTAUT builds the foundation for this study (Venkatesh et al. 2003). Literature demonstrates that many studies using technology adoption models are adjusted to the special characteristics of MB in order to improve their explanatory power (e.g. Kim, Shin and Lee 2009; Karjaluoto, Koenig-Lewis, et al. 2010; Safeena et al. 2012; Ha et al. 2012; Aboelmaged and Gebba 2013). In the following, it is discussed which exogenous and endogenous latent variables are included in the research model.

Performance Expectancy (PE)

PE is analogous to the constructs of Relative Advantage (IDT) and Perceived Usefulness (TAM) (Venkatesh et al. 2003). It is used in the vast majority of the MB studies reviewed in literature (61%). Several authors find, that it is causally linked to Attitude and excels the strongest effect on it (Hsu, Wang and Lin 2011; Raleting and Nel 2011; Crabbe et al. 2009). Hence, it is hypothesized that:

> *H1. Performance Expectancy will have a positive influence on young consumers' Attitude towards MB.*

Effort Expectancy (EE)

EE appears in different technology acceptance theories under the name of Ease of Use (IDT) or Perceived Ease of Use (TAM). A high degree of EE represents a high degree of Ease of Use. It is applied in the majority of MB adoption studies reviewed (52%). Lin (2011) and Karjaluoto, Püschel, et al. (2010) show that EE has a strong significant effect on Attitude. Taking this into account, it is hypothesized that:

> *H2. Effort Expectancy will have a positive influence on young consumers' Attitude towards MB.*

Perceived Self-Efficacy (PS)

Although PS is not included in the UTAUT model, several researchers incorporate PS in their MB adoption models (e.g. Luo et al. 2010; Amin et al. 2012; Amin 2007). Gu, Lee and Suh (2009) as well as Yu (2012) find evidence that consumers perceive MB easier to use when they have a high self-efficacy. Empirical evidence supports a causal link between PS and EE (Venkatesh and Davis 2000; Agarwal, Sambamurthy and Stair 2000; Wang et al. 2003;

Venkatesh and Davis 1996). In the literature review, it is extensively used (23%). Therefore, it is theorised that:

H3. Perceived Self-Efficacy will have a positive influence on young consumers' Effort Expectancy.

Social Influence (SI)

SI is applied as a construct in a quarter of the reviewed MB studies (24%). Schierz, Schilke and Wirtz (2010) describe that it is important in order to explain Attitude towards MB. Venkatesh and Davis (2000) state that SI is only significant in an individual's early use of technology. MB is a relatively new technology with low adoption rates in Germany, thus it is hypothesized that:

H4. Social Influence will have a positive influence on young consumers' Attitude towards MB.

Perceived Compatibility (PC)

PC replaces the original construct of Facilitating Conditions in UTAUT. Although Venkatesh et al. (2003) argue that they included compatibility by Facilitating Conditions in their model, Moore and Benbasat (1991) describe compatibility as "the degree to which an innovation is perceived as being consistent with the existing values, needs and past experience of potential adopters" (p. 195). Hillmer (2009) compares both definitions and opposes the similarity between Facilitating Conditions – a technical and organizational infrastructure (Venkatesh et al. 2003) – and compatibility. Accordingly, there are no distinct similarities with Rogers' (2010) definition of values, needs and past experiences. Scholars describe that PC has a significant effect on Behavioural Intention to use MB instead of Attitude towards MB (e.g. Wessels and Drennan 2010; Sheng, Wang and Yu 2011; Hanafizadeh et al. 2014). Hence, it is theorised that:

H5. Perceived Compatibility will have a positive influence on young consumers' Behavioural Intention towards MB

Perceived Credibility (PR)

Whereas a risk-related factor is not included in the UTAUT, many of the investigated MB studies apply either Risk (30%), Trust (27%) or Credibility (12%). Hanafizadeh et al. (2014) include Risk and Credibility in their model and notice that the latter one shows a stronger effect on MB adoption. Amin et al. (2012) observe that Credibility even shows the strongest effect on MB adoption. In fact, Credibility plays an extraordinary role, especially when it comes to

financially sensitive transactions (Koenig-Lewis, Palmer and Moll 2010). Thus, it is hypothesized that:

H6. Perceived Credibility will have a positive influence on young consumers' Attitude towards MB.

Attitude (AT)

The research model is extended by Fishbein and Ajzen's (1975) construct of Attitude (AT) for a better explanation of Behavioural Intention (Rao Hill and Troshani 2007). It describes "an individual's positive (or negative) feeling about performing the target behaviour" (Fishbein and Ajzen 1975). Moreover, Shaikh and Karjaluoto (2014) state that most research in MB includes two main dependent variables to explain MB adoption: Attitude and Intention. Hence, it is theorised that:

H7. Attitude will have a positive influence on young consumers' Behavioural Intention towards MB.

Behavioural Intention (BI)

Psychological theories describe that a person's behaviour is predictable and subjective to individual intention. UTAUT demonstrates that behavioural intention significantly affects technology usage (Venkatesh et al. 2003; Venkatesh and Zhang 2010; Ha et al. 2012). In addition, Shaikh and Karjaluoto (2014) describe that the majority of MB studies apply BI as the dependent variable in order to forecast actual behaviour, which is (considering time and monetary restrictions) difficult to obtain.

This study utilizes the following research model to examine drivers of MB acceptance among young consumers in Germany:

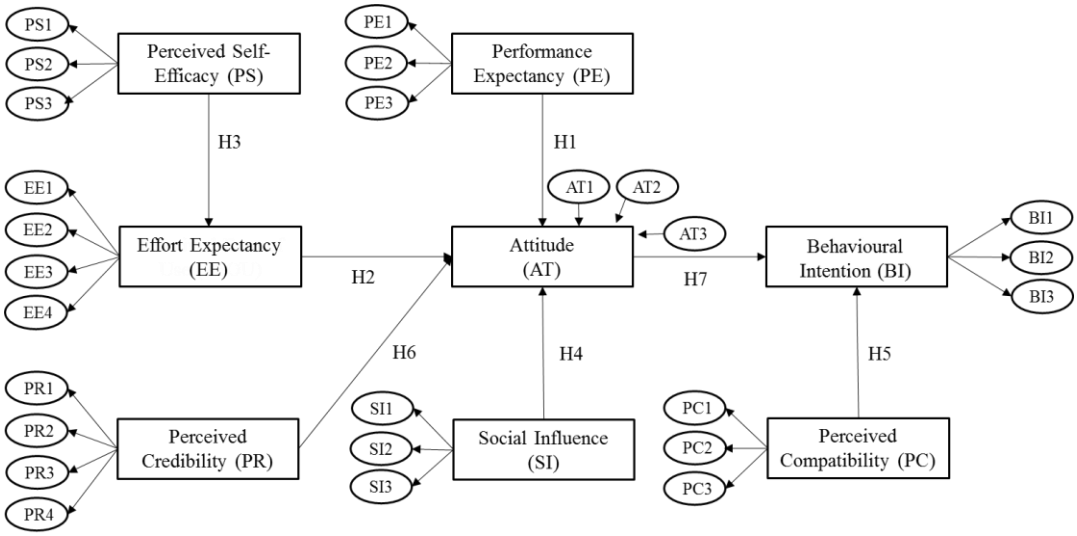

Figure 7: Proposed Research Model for Mobile Banking Acceptance

In summary, the proposed research model claims that Performance Expectancy (PE), Effort Expectancy (EE), Perceived Credibility (PR), and Social Influence (SI) form a certain Attitude (AT) towards MB, which complemented by Perceived Compatibility (PC) determines Behavioural Intention (BI) to adopt MB. The effect of Perceived Self-Efficacy (PS) on AT is mediated through Effort Expectancy.

The UTAUT model is adjusted for this study in order to give consideration to the special characteristics of MB. PE, EE and SI are taken from the UTAUT. Facilitating Conditions are substituted by Perceived Compatibility. In addition, two more constructs PR and PS are incorporated in the model.

Finally, moderating factors, including gender, age, experience with technology and voluntariness of use, which are originally integrated in the UTAUT, are discarded. On the one hand, the data collection inherently controls for age and voluntariness of use because this study is directed to young consumers (age 18-35) in a non-professional environment. On the other hand, it would be difficult to capture the effect of experience in different time periods. This would require a longitudinal study, which severely exceeds the limited time frame of this dissertation.

5. RESEARCH METHOD

5.1. Instrument Development

Consistent with prior studies, an online survey was applied to test the reliability, validity and hypotheses of the research model (Venkatesh et al. 2003; Zhou, Lu and Wang 2010; Lin 2011; Yu 2012). Wright (2005) states advantages of conducting online surveys, including wide reach, time and cost savings. Appendix 8 shows the online survey, which is based on the literature review and organized in three parts:

Part 1 incorporated a brief introduction, so each respondent had a basic understanding of MB. Although, Sheng, Nah and Siau (2008) describe a hazard by accidentally influence respondents, they support this methodology for technologies where many consumers do not have much previous experience. Following the introductory note, question 1 to 4 asked for age and usage patterns in order to qualify respondents for the study and to distinguish users from non-users of MB.

Part 2 included the measurement of the SEM and hence reflected the major part of the survey. All items measuring the latent variables were adapted from prior technology research and cautiously rephrased to match the MB context in Germany:

Performance and Effort Expectancy were adapted from Luarn and Lin (2005), Venkatesh and Zhang (2010), Sripalawat, Thongmak and Ngramyarn (2011), and Foon and Fah (2011). The construct of Social Influence was based on Venkatesh's (2003) and Venkatesh and Zhang's (2010) work. Perceived Compatibility was based on the survey by Wu and Wang (2005). Moreover, the Perceived Credibility scale was adapted from Luarn and Lin (2005) and Foon and Fah (2011). Indicators for Perceived Self-Efficacy were taken from Venkatesh et al. (2003) and Luarn and Lin (2005). The measurement for Attitude was adapted from Cheng's (2006) empirical internet banking study in Hong Kong. Lastly, items for Behavioural Intention were adapted from previous studies of Luarn and Lin (2005), Venkatesh and Zhang (2010), and Sripalawat, Thongmak and Ngramyarn (2011). At least three items were used for each construct to measure (Venkatesh et al. 2003).

Users and non-users received statements that were slightly adjusted in their wording in order to give consideration to either adoption or continued usage behaviour. Based on the research methodology analysis of Dawes (2008), a symmetric seven point Likert scale from "strongly disagree" (1) to "strongly agree" (7) was applied.

Part 3 focused on demographics such as gender, occupation, and education. In addition, the survey concluded with one open-question asking for reasons against using MB. This exploratory add-on to the structural model was incorporated to gather unexpected information that could not be inferred from literature and was not part of the quantitative survey. As a result, MB providers might be encountered with novel insights from the perspective of young consumers in Germany.

After developing the questionnaire, a pilot run with ten respondents was performed in order to guarantee clarity of wording, completeness and sequence. Subsequently, the survey was slightly modified to improve clarity and completeness based on the obtained feedback. Similar procedures were embraced in other MB adoption studies (e.g. Koenig-Lewis, Palmer and Moll 2010; Yu 2012; Hanafizadeh et al. 2014).

5.2. Data Collection

The target population of this study are young consumers (18-35 years) from Germany. The study is tailored to one country in order to limit the effects of economic, cultural, technological, and legal differences among countries. Moreover, the study is limited to smartphone and/or tablet users. Much of the extant literature appears to be limited on SMS-banking in developing countries. By focusing on smartphone and/or tablet users in Germany, this study aims to contribute with new insights to the MB literature (Shaikh and Karjaluoto 2014).

The survey was translated into German by using back translation, which is most frequently used to verify the correctness of translations in marketing research (Douglas and Craig 2007). Data was collected in June 2015 using the above described online survey. Especially among young people, considerable evidence exists for the effectiveness of online surveys in collecting data (Wilson and Laskey 2003; Luo 2009). Following the approach in previous MB adoption studies, a convenience sample technique (non-probabilistic) was applied (e.g. Wu and Wang 2005; Luarn and Lin 2005; Chen 2008; Amin et al. 2008; Karjaluoto, Koenig-Lewis, et al. 2010; Al-Jabri and Sohail 2012). The questionnaire was sent to contacts of the researcher and their relations through a social network (snowball sampling). Eurostat (2015) confirms that 85% of young German consumers (age 16-29) are part of social networks. Accordingly, there is evidence that the majority of the target population takes part in social networks and thereby reduces problems of response bias. In addition, the survey was sent to 208 current business

students of Corporate State University Baden-Württemberg Villingen-Schwenningen through the electronic platform "WILLI".[2]

It is estimated that approximately 1,000 – 1,400 individuals received an invitation to fill in the survey. From this, a total of 440 individuals responded. All obtained questionnaires were tested for completeness. Then all forms were reviewed and illegible, inconsistent and ambiguous responses were dismissed. By cleaning the data, better accuracy and precision for a more thorough treatment of responses were achieved. Finally, 433 usable questionnaires were left, of which 255 were from users (58.9%) and 178 were from non-users (41.1%) of MB. This equals a response rate of approximately 30%, which can be considered high (Koenig-Lewis, Palmer and Moll 2010). One explanation might be that recipients are more likely to fill in a survey that is received from a known contact in contrast to an external organisation. Full sample characteristics are summarised in Table 3.

Measure	Item	Frequency	Percentage
Gender	Male	228	52.7%
	Female	205	47.3%
Age	18-22	57	13.2%
	23-25	239	55.2%
	26-29	115	26.6%
	30-35	22	5.1%
Occupation	Student	197	45.5%
	Full-time employee	210	48.5%
	Part-time employee	8	1.8%
	Self-employed	7	1.6%
	Unemployed	3	0.7%
	Other	8	1.8%
Education level	Secondary Education Diploma	6	1.4%
	High School Diploma	122	28.2%
	Apprenticeship	71	16.4%
	Bachelor/Master	234	54.0%
Hand-held device(s)	Only Smartphone	236	54.5%
	Only Tablet	2	0.5%
	Both	195	45.0%
Operating System(s) (mult. selection possible)	Android	227	46.2%
	iOS	245	49.9%
	Windows	19	3.9%
MB Usage	Never	178	41.1%
	1-5 times	114	26.3%
	6-10 times	70	16.2%
	11-15 times	31	7.2%
	more than 15 times	40	9.2%

Table 3: Sample Characteristics

[2] "WILLI" is the electronic learning platform of the Corporate State University Baden-Württemberg Villingen-Schwenningen, where students manage their mailbox, courses, grades, etc.

The obtained responses contained slightly more male (52.7%) than female (47.3%) respondents. Possession of a smartphone and/or tablet was a necessary precondition to participate in the survey in order to satisfy basic understanding of MB. Moreover, the majority of respondents were between 23-25 years old (55.2%), followed by 26-29 years old (26.6%). This might be due to the author's network that largely consists of these age groups. Furthermore, the sample showed an almost equal share of students (45.5%) and full-time employees (48.5%). The share of students was relatively high, most likely caused by the author's network and distribution to fellow university students. Nevertheless, this seems acceptable given the fact that the target group of this study are young consumers that traditionally make up the majority of students. In the sample, the share of MB users (58.9%) is high compared to the overall share of MB users in the German population. Most respondents either possessed a smartphone (54.5%) or a smartphone and a tablet (45.0%). Finally, respondents almost equally often used Android (46.2%) and iOS (49.9%).

5.3. Procedure

The aim of this study is to examine which and to what extent certain attributes influence MB acceptance among young consumers in Germany. Based on the already developed body of literature about MB, this dissertation applies quantitative methods to answer the research question. A research model has been developed in chapter 4, which hypothesizes relationships between different latent variables. In order to test the hypotheses, Structural Equation Modelling (SEM) was applied to assess empirical data of 433 respondents.

Mayer (2012) distinguishes between two different analysis methodologies, namely variance – and covariance – based approaches. The latter is recommended for a research question with hypotheses that are well founded in the theory. In contrast, variance-based approaches are suggested if the phenomena studied is relatively new and only a small sample size is available. In literature, most MB adoption studies apply variance-based approaches in the form of partial least squares (PLS) regression (e.g. Venkatesh et al. 2003; Venkatesh and Zhang 2010; Yu 2012; Zhou, Lu and Wang 2010).

PLS is an exploratory analysis tool that is least restrictive concerning numerous extensions of multiple linear regression (Mayer 2012). It is especially valuable to construct predictive models when collinearity possibly occurs among factors (Wold, Ruhe and Wold 1984). Furthermore, PLS can be applied regardless of the underlying distribution, while covariance-based approaches need multivariate-normally distributed data. A major disadvantage of PLS is that

the model quality can only be assessed locally. In contrast, covariance-based approaches can be evaluated through global goodness-of-fit tests (Mayer 2012). Geladi and Kowalski (1986) describe further advantages and disadvantages of PLS regression in the literature. Considering the novelty of MB, potential collinearity between Performance Expectancy and Effort Expectancy, and a comparably small sample size, the PLS approach was chosen for this dissertation.

PLS requires that a sample is ten times the highest number of structural paths addressed to a certain construct in the model (Chin 1998; Gefen and Straub 2005). This study's sample (n = 433) met the required criterion to use PLS and to make significant inferences from the model. The statistical analysis was performed by using the software tool SmartPLS (version 3.2.1).

In the following, a two-step approach suggested by Anderson and Gerbing (1988) was utilized to analyse the empirical data.[3] First, the validity and reliability of the measurement model were tested through Confirmatory Factor Analysis. Second, parameters and predictive significance of the model were assessed to examine the proposed structural model. Subsequently, a multi-group analysis was performed to test whether differences among MB users and non-users exist (Sarstedt, Henseler and Ringle 2011). Similar to Mayer's (2012) approach, the last question from the survey was reviewed in a descriptive setting with an open-response option.

[3] First, an Exploratory Factor Analysis was performed to explore the construct dimensions. Indeed, the proposed factor structures are consistent with the data.

6. RESULTS

6.1. Measurement Model

The results of the measurement model, structural model and multi-group analysis are now presented. Several reliability and validity assessments were conducted to test the quality of the measurement model. According to Churchill, Brown and Suter (2010), reliability "refers to the ability to obtain similar results by measuring an object, trait, or construct with independent but comparable measures" (p. 325). Validity defines the quality and correctness of a measure and is approved "when the differences in observed scores reflect true differences in the characteristic one is attempting to measure […]" (Churchill 1979, p. 65). In particular, indicator reliability (loading), convergent validity (CR α, CoR, AVE), and discriminant validity (Fornell - Larcker criterion) are usually performed to test reflective measurement models (Hair, Ringle and Sarstedt 2011). Table 4 summarizes the major reliability and validity examination results of the measurement model.

Indicator	Loading	Mean	STD	LVS	CR α	CoR	AVE
Performance Expectancy (PE)				5.219	0.850	0.909	0.769
PE1	0.882	5.018	1.541				
PE2	0.872	5.665	1.391				
PE3	0.877	4.975	1.558				
Effort Expectancy (EE)				5.946	0.878	0.916	0.732
EE1	0.858	6.185	1.051				
EE2	0.881	5.988	1.022				
EE3	0.802	5.677	1.283				
EE4	0.879	5.933	1.017				
Perceived Credibility (PR)				4.417	0.935	0.954	0.838
PR1	0.924	4.233	1.757				
PR2	0.915	4.654	1.757				
PR3	0.919	4.326	1.731				
PR4	0.903	4.455	1.694				
Social Influence (SI)				3.522	0.942	0.971	0.944
SI1	0.967	3.550	1.605				
SI2	0.977	3.494	1.586				
Perceived Compatibility (PC)				5.142	0.892	0.933	0.823
PC1	0.896	5.316	1.461				
PC2	0.922	5.055	1.542				
PC3	0.903	5.053	1.514				
Perceived Self-Efficiency (PS)				4.001	0.766	0.864	0.680
PS1	0.778	3.975	1.615				
PS2	0.914	4.277	1.835				
PS3	0.773	3.750	2.000				
Attitude (AT)				4.964	0.798	0.880	0.710
AT1	0.813	5.741	1.329				
AT2	0.815	4.487	1.312				
AT3	0.896	4.663	1.441				
Behaviroual Intention (BI)				4.724	0.889	0.931	0.819
BI1	0.848	4.215	1.791				
BI2	0.931	4.991	1.911				
BI3	0.933	4.965	1.734				

Table 4: Summary Measurement Model

Indicator reliability is a measure "for the degree to which an indicator variable is an appropriate indicator for a latent variable" (p. 25). It specifies the variance share of an item that is explained by the respective construct (Mayer 2012). Hair, Ringle and Sarstedt (2011) describe that each item's standardized loading should exceed 0.707, since a lower value would specify that the variance shared between construct and items is less than its error variance. Following their advice, that weak indicators with loadings of 0.400 and lower should always be removed from reflective scales, one item concerning SI with a loading of 0.261 was eliminated from the measurement model. Using only two items for SI, however, does not impose any problems in the measurement model (Bhatiasevi 2015). All other items showed high indicator's reliability (Table 4).

Convergent validity is "the degree to which two or more attempts to measure the same concept through maximally dissimilar methods are in agreement. If two or more measures are true indicators of a concept, then they should necessarily be highly correlated" (Bagozzi and Phillips 1982, p. 468). It signals to which extent a latent variable is measured by every related factor (Homburg and Giering 1996).

Cronbach's α (CR α) is the first concept used to assess the internal consistency of a latent variable and represents the most popular reliability test coefficient (Homburg and Giering 1996). However, a lack of consensus exist among scholars, which threshold CR α should surpass to signal internal consistency. Considering that CR α inflates with the quantity of items linked to a latent variable, Bagozzi (1982) suggests a threshold of 0.5 for two indicator, 0.6 for three and 0.7 for more than three items per construct. A threshold of 0.7 was applied to this dissertation, resulting in good internal consistency for all latent variables (Table 4).

Moreover, Composite Reliability (CoR) - also named factor reliability or Jöreskog's ρ - evaluates internal consistency, while it doesn't assume all indicators to be equally reliable. This assumption is dropped because measurement errors are taken into consideration (Mayer 2012). According to Hair, Ringle and Sarstedt (2011), CoR is more appropriate for PLS than CR α, because PLS ranks items regarding their reliability throughout model estimation. Values between 0.6 - 0.7 are satisfactory in exploratory studies, while values of 0.7 - 0.9 should be obtained in more progressive research. With the lowest value of CoR_{PS} = 0.864, all latent variables showed satisfactory internal consistency (Table 4).

The Average Variance Extracted (AVE) is the third concept to assess the reliability of a construct. It indicates the link between measurement error and explained variance of a construct

(Mayer 2012). An AVE value higher than 0.500 specifies that the construct explains more than half of its items' variance and thus indicates a sufficient degree of convergent validity (Chin 1998; Hair, Ringle and Sarstedt 2011). AVE is a stronger criterion than CoR, because the latter one can take a positive result even if more than 50% of the construct's variance could be traced back to measurement errors (Chin 1998). The lowest value is $AVE_{PS} = 0.680$ and thus all values met the criterion (Table 4).

Lastly, **discriminant validity** is "the degree to which measures of distinct concepts differ" (p.469). In other words, items of dissimilar concepts should have few shared variance because excessive covariance sows doubt on the uniqueness of the constructs and their measures (Bagozzi and Phillips 1982). Discriminant validity is evaluated by using the Fornell/Larcker criterion. It requires that the average AVE of a construct is larger than the squared correlation of this construct with any other construct (Fornell and Larcker 1981; Homburg and Giering 1996; Hair, Ringle and Sarstedt 2011; Mayer 2012). Table 5 displays the square root of the average AVE for the respective constructs in the diagonal (bold) elements and correlations between latent variables in the off-diagonal elements. It can be asserted, that all latent variables were empirically and conceptually distinct from each other.

	PE	EE	SI	PC	PR	PS	AT	BI
PE	**0.877**							
EE	0.198	**0.856**						
SI	0.325	0.029	**0.972**					
PC	0.521	0.362	0.284	**0.907**				
PR	0.340	0.298	0.222	0.526	**0.915**			
PS	-0.135	0.363	-0.170	0.019	0.059	**0.825**		
AT	0.489	0.410	0.285	0.712	0.536	-0.010	**0.843**	
BI	0.569	0.329	0.305	0.788	0.593	0.027	0.729	**0.905**

Table 5: Discriminant Validity - Fornell/Larcker Criterion

The Fornell/Larcker criterion is perceived as a strong measure for discriminant validity (Homburg and Giering 1996). Alternatively, discriminant validity can be assessed by a more relaxed criterion: All item loadings on their related factor must be higher than their cross-loadings on any other factor (Hair, Ringle and Sarstedt 2011). All items in the study showed a clear loading matrix (Appendix 9).

In summary, the measurement model fulfilled all criteria for reliability and validity. Consequently, the preconditions were satisfied to evaluate the structural model in the next step.

6.2. Structural Model

After all reliability and validity tests confirmed the measurement model, the hypotheses and explanatory power of the proposed research model were analysed. Explanatory power was analysed by looking at R^2 values of the endogenous variables. The R^2 value embodies the share of the total variance of a dependent variable that is explained by its associated exogenous variables (Backhaus et al. 2013). Different research disciplines have a tendency to assess different levels of R^2 as sufficient (Hair, Ringle and Sarstedt 2011). While in consumer behaviour research, values exceeding 0.2 are noticed as high, in technology acceptance studies, Chin (1998) suggests that R^2 values of 0.19, 0.33, and 0.67 should be considered as weak, moderate, and substantial, respectively.

The presented research model is able to explain 67.7% (adjusted R^2) of the variance in young consumer's Behavioural Intention to adopt MB, 45.2% (adjusted R^2) of what drives Attitude towards MB, and 13.0% (adjusted R^2) of the variance for the latent variable Effort Expectancy. The first result can be seen as substantial in explaining BI, the second result rather moderate in explaining AT towards MB, and the last result is relatively weak in explaining PS's effect on EE.

The interpretation of PLS path coefficients is comparable to the standardized beta coefficients of Ordinary Least Squares regression analysis (Krafft, Götz and Liehr-Gobbers 2005). Path coefficients are evaluated in respect to their absolute value, sign and significance. Whereas values close to 0 signal weak influence, values close to 1 (or -1) indicate strong positive (or negative) effect of an exogenous variable on its successor (Mayer 2012). PLS does not presume any particular distribution of empirical data, thus significances of coefficients have to be attained through a bootstrapping procedure (Krafft, Götz and Liehr-Gobbers 2005). Based on Chin's (1998) recommendation, a pseudo t-test on the basis of 500 random resamples was conducted. Obtained t-values signal whether the null-hypothesis (the approximation of a parameter equals zero) must be rejected (Mayer 2012).

Figure 8 shows the results of the proposed SEM. Almost all path coefficients are highly significant. Notably, the relationship between Performance Expectancy (H1), Effort Expectancy (H2), as well as Perceived Credibility (H6) and Attitude towards MB are significant at the 0.001 level. Moreover, the coefficients between Perceived Self-Efficacy (H3) and Effort Expectancy is equally significant. Likewise, Perceived Compatibility's direct influence on Behavioural Intention (H5) is significant at the 0.001 level. The relationship between Social

Influence (H4) and Attitude is significant at the 0.05 level. Therefore, all hypotheses (H1, H2, H3, H4, H5, H6, H7) are accepted.

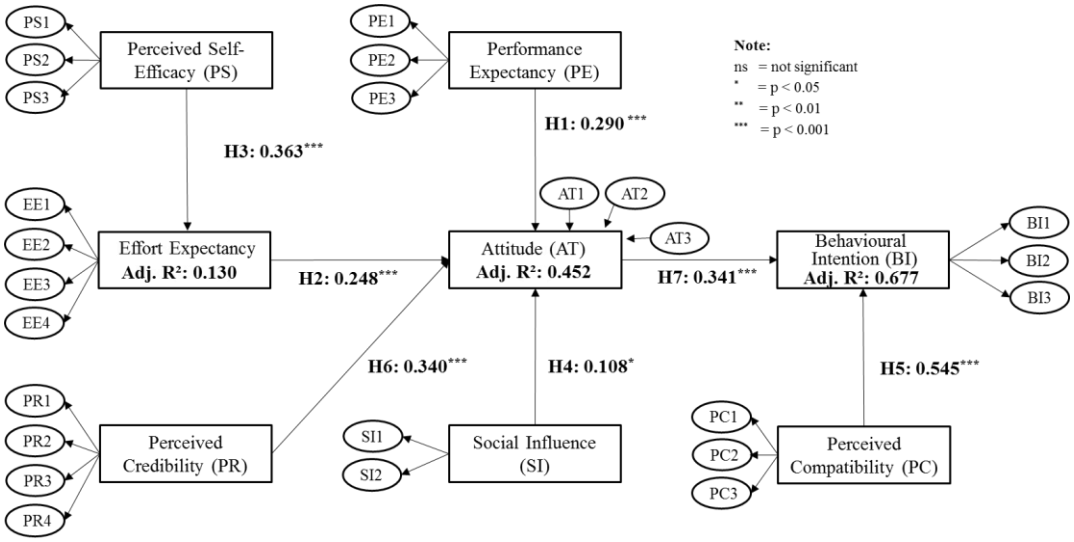

Figure 8: Results of the Structural Equation Model

Two additional criteria are applied in order to assess the quality of the model. First, effect size f^2 (or Cohen's f^2) measures the influence of an exogenous on an endogenous variable. According to Chin (1998), values of 0.02, 0.15, and 0.35 should be regarded as a benchmark for whether an exogenous variable has small, medium, or large impact on the structural model. Table 6 shows the individual effect sizes of each construct.

	Effect Size f^2 (BI)	Interpretation	Effect Size f^2 (AT)	Interpretation	Effect Size f^2 (EE)	Interpretation
PE	-		0.124	small	-	
EE	-		0.102	small	-	
SI	-		0.020	small	-	
PC	0.456	large	-	-	-	
PR	-		0.173	medium	-	
PS	-		-		0.152	medium
AT	0.179	medium	-		-	

Table 6: Effect Sizes of Latent Variables

Perceived Compatibility shows a large effect Behavioural Intention to adopt MB. Perceived Credibility shows a medium effect on Attitude. Performance Expectancy, Effort Expectancy and Social Influence show rather a small effect on Attitude. Attitude on the other hand shows a medium effect on Behavioural Intention. Perceived Self-Efficacy affects Effort Expectancy in the medium range. All effect sizes are higher than 0.02, thus the research model's appropriateness is confirmed.

The second criterion is operationalised by Stone-Geisser's Q^2, which assesses the predictive relevance of the model (Stone 1974; Geisser 1974; Chin 1998). According to Chin (1998), it

explains how well an omitted latent variable is reassembled by the structural part of the model. Herein, values greater than zero suggest predictive relevance, whereas negative values indicate that raw data cannot be predicted better by the model than a simple mean estimation (Krafft, Götz and Liehr-Gobbers 2005). Predictive relevance is evaluated by applying blindfolding methods that omit one specific group of items each time and subsequently attempts to rebuild the omitted part through the residual data input. The process is repeated until every dependent latent variable has been omitted and assessed. As a result, distinct forms of Q^2 are applicable. Based on the suggestion from Chin (1998), the cross-validated redundancy option has been chosen. All three endogenous variables BI, AT, and EE ($Q^2_{BI} = 0.551$, $Q^2_{AT} = 0.304$, $Q^2_{EE} = 0.094$) show a positive Q^2. In summary, the SEM shows high explanatory power, predictive relevance, and path coefficients that are highly significant.

6.3. Multi-Group Analysis and Descriptive Question

In order to gain additional insight, this study distinguished between users and non-users. A group comparison approach is usually recommended for dichotomous variables (Venkatesh and Morris 2000; Hsieh, Rai and Keil 2008; Ahuja and Thatcher 2005; Henseler and Fassott 2010). The basis of this process is to split the data set into two subsets and subsequently assess model parameters for both groups separately. Then, a statistical t-test shows whether differences between path coefficients are significant. Keil et al. (2000) recommends a parametric test that applies standard errors from bootstrapping. Sarstedt, Henseler and Ringle (2011) suggest to apply bootstrapping with 5000 resamples. Table 7 shows the differences in path coefficients for users and non-users of MB.[4]

[4] Besides a multi-group analysis between users and non-users of MB, the author conducted multi-group analyses for gender (Appendix 10), age (Appendix 11), and handheld device (Appendix 12). Occupation and operating system did not show any significant influence between different groups.

Regression	Path Coefficient (non-user, n=178)	Path Coefficient (user, n=255)	Parametric Test
H1: PE ⟶ AT	0.366 ($t = 5.450^{***}$)	0.199 ($t = 3.240^{**}$)	0.167 ($t = 1.813^{ns}$)
H2: EE ⟶ AT	0.223 ($t = 3.774^{***}$)	0.307 ($t = 4.063^{***}$)	0.084 ($t = 0.813^{ns}$)
H3: PS ⟶ EE	0.479 ($t = 8.653^{***}$)	0.186 ($t = 3.729^{***}$)	0.293 ($t = 3.888^{***}$)
H4: SI ⟶ AT	0.022 ($t = 0.383^{ns)}$	0.177 ($t = 2.886^{**}$)	0.155 ($t = 2.009^{*}$)
H5: PC ⟶ BI	0.411 ($t = 6.176^{***}$)	0.514 ($t = 8.609^{***}$)	0.103 ($t = 1.143^{ns}$)
H6: PR ⟶ AT	0.307 ($t = 5.117^{***}$)	0.241 ($t = 3.765^{***}$)	0.066 ($t = 0.726^{ns}$)
H7: AT ⟶ BI	0.462 ($t = 7.939^{***}$)	0.258 ($t = 4.287^{***}$)	0.204 ($t = 2.297^{*}$)

Note: ns = not significant; * = $p < 0.05$; ** = $p < 0.01$, *** = $p < 0.001$

Table 7: Multi-Group Analysis Users vs. Non-Users of MB

The effect of Performance Expectancy, Effort Expectancy, and Perceived Credibility on Attitude towards MB does not change significantly between users and non-users. Nonetheless, Perceived Self-Efficacy has a much stronger effect on Effort Expectancy for non-users than for users. Likewise, the effect of Attitude on Behavioural Intention is stronger for non-users than for users of MB. Interestingly, Social Influence becomes non-significant on Attitude if only non-users are considered, whereas it is still significant for users of MB ($p < 0.05$).

For additional verification of the proposed SEM, users and non-users were asked about reasons why young consumers do not use MB. Respondents could specify a personal cause and choose from a list of 12 different reasons (multiple selection possible). Figure 9 shows the share of respondents that considered different motives to be important. The most frequent answers were: Security concerns (users: 84%, non-users: 75%), Data privacy concerns (users: 71%, non-users: 62%), and banking needs are satisfied without MB (users: 49%, non-users: 79%). The results strongly support the previous inferences from the SEM that showed Perceived Credibility to be

the most compelling effect on Attitude, which in turn influences Behavioural Intention to use MB.

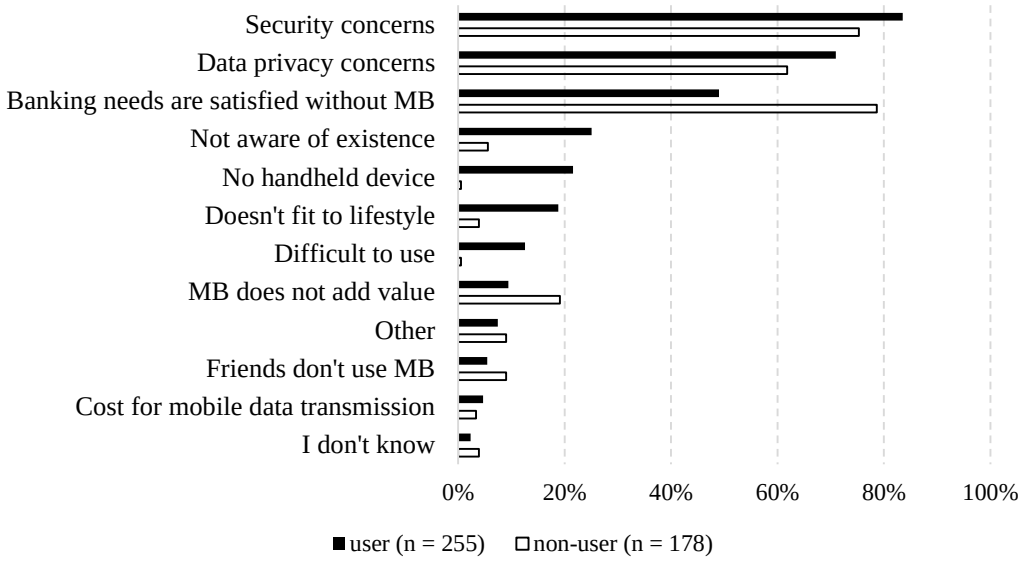

Figure 9: Main reasons why people don't adopt MB

By asking over 1,000 individuals in Germany, TNS Infratest (2012) comes to similar results. According to that, 96% and 94% of respondents share concerns about security and data privacy issues, respectively. Interestingly, a study from Switzerland about students does not confirm data privacy concerns (Gall 2012). This might be due to Germany's peculiar relationship in regard to data privacy (Hornung and Schnabel 2009).

This study also asked whether a respondent's bank offers an app for MB. Whereas more than 90% of MB users know that their bank offers a MB app, about 50% of non-users are not aware of any (Figure 10). In combination with Figure 9, this suggests that non-users are aware of the existence of MB services in general, however they do not know whether their own bank offers a MB app.

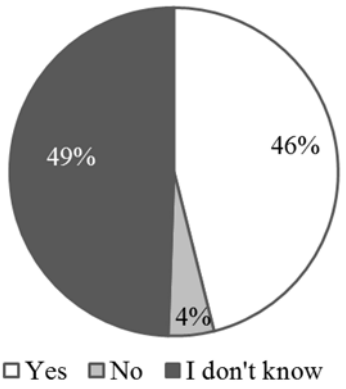

Figure 10: Non-user's answer to whether their bank offers MB

7. DISCUSSION

This paper aims to identify key MB acceptance factors of young consumers in Germany. Thus, scholars receive new empirical support for further theory development and practitioners obtain a deeper understanding of the key adoption factors to design and implement MB services that yield high consumer acceptance. SEM has been applied to test well-founded hypothesis from the literature. In the following, theoretical and practical implications are discussed in more detail.

7.1. Theoretical Implications

First, this study contributes to MB adoption theory by presenting a research model that incorporates a new combination of established MB adoption factors. It shows that Perceived Credibility, Performance Expectancy, and Effort Expectancy, ordered by their effect size, significantly influence Attitude, which in turn influences Behavioural Intention to adopt MB. Moreover, it shows that Perceived Compatibility has the largest (direct) effect on Behavioural Intention to adopt MB. In the same way, Perceived Compatibility has been frequently identified as the strongest predictor for Behavioural Intention in literature (Koenig-Lewis, Palmer and Moll 2010; Shaikh and Karjaluoto 2014). Moreover, the prediction of Venkatesh et al. (2003) that Effort Expectancy ($\beta_{EE} = 0.248$) plays a less salient role than Performance Expectancy ($\beta_{PE} = 0.290$) is confirmed by this study.

One interesting finding is the high significance and effect size of Perceived Credibility ($\beta_{PR} = 0.340$). This concept is not contained within any of the major technology acceptance models, although being applied several times in the context of MB adoption (e.g. Karjaluoto, Koenig-Lewis, et al. 2010; Chitungo and Munongo 2013; Hanafizadeh et al. 2014). Security and privacy questions do seem important for clients when using MB. Being the strongest effect on Attitude towards MB, Perceived Credibility should be included in future MB adoption studies. Notably, the effect was much stronger when people only use a smartphone ($\beta_{PR/S} = 0.407$) instead of smartphone and tablet ($\beta_{PR/ST} = 0.246$) in order to access MB services (Appendix 11). A reason why Perceived Credibility might differ among people that conduct MB only through a smartphone lies in the perception that smartphones are more vulnerable to theft and loss compared to tablets (Kaspersky 2013).

Moreover, Perceived Self-Efficacy ($\beta_{PS} = 0.363$) was found to have a significant effect on Effort Expectancy, which in turn positively influences Attitude towards MB. These findings support

previous research, which confirms that computer self-efficacy significantly influences Perceived Ease of Use (Igbaria and Iivari 1995; Agarwal, Sambamurthy and Stair 2000; Venkatesh and Davis 1996, 2000). A positive relationship emerges as higher self-efficacy, for instance, from build – in help facilities lead to greater Perceived Ease of Use.

In addition, this study supports the integration of SI in future MB research as a significant effect ($p<0.05$) on MB adoption could be asserted. Yu's (2012) study of MB adoption in Taiwan finds SI being the most influential factor to explain intention to adopt MB. However, this study finds a rather weak effect on Attitude ($\beta_{SI} = 0.108$), which then influences BI. One reason might lead back to cultural differences between Germany and Taiwan. Whereas Germany shows an individualistic notion in the population, Taiwan is represented by a strong collectivistic belief in society. In Taiwan, the decision-making-process by individuals is much affected by family members, friends, and colleagues (The Hofstede Centre 2010).

When the study was controlled for users and non-users of MB, the effect of SI slightly changed. Whereas SI still influences Attitude of MB users, it does not significantly influence a non-user's Attitude towards MB. In contrast, other studies describe that the effect of SI diminishes over time with increased system experience (Karahanna, Straub and Chervany 1999; Venkatesh and Davis 2000). Considering the organizational setting of previous research, these results seem appropriate (Yang et al. 2012). However, as technology usage expands beyond corporate settings, this study suggests a more intricate explanation. The participation of individuals in an informal network facilitates the spread of information about the innovation, and consequently influences the probability of continued usage (Yi, Fiedler and Park 2006; Talukder, Quazi and Keating 2014). Therefore, SI might have a significant effect for MB users, but not for non-users of MB. Similarly, in the context of mobile payment services, Yang et al. (2012) show that SI plays a more salient role for current users than for potential users.

In contrast, Perceived Self-Efficacy played a much bigger role in its influence on Effort Expectancy for non-users ($\beta_{PS/N} = 0.479$) than for users ($\beta_{PS/U} = 0.186$). This indicates that regarding ease of use, build-in facilities and assistance from other people seemed more influential on individuals, which are not using MB. This is likely caused by different levels of MB experience between users and non-users. Whereas users do have experienced MB and hence feel to a certain extant capable of using MB, non-users lack experience and thus feel less uncomfortable to be on their own (Amin et al. 2012).

As a second contribution to theory, this study can be used as a basis for further modification of models for consumer adoption. Among technology acceptance models, UTAUT has been demonstrated to be superior over other acceptance models (Venkatesh et al. 2003; Venkatesh and Zhang 2010; Shaikh and Karjaluoto 2014). Whereas TAM has been extensively applied in the context of MB (e.g. Luarn and Lin 2005; Hsu, Wang and Lin 2011; Hanafizadeh et al. 2014; Chitungo and Munongo 2013), UTAUT has not been used for that purpose as much (e.g. Zhou, Lu and Wang 2010; Zhou 2011a).

Based on empirical evidence from Germany (n=433), this study confirms that an extended UTAUT model can be applied in order to explain a significant amount of variance in Behavioural Intention to adopt MB (adjusted $R^2 = 67.7\%$). Compared to the explanatory power of traditional technology acceptance models such as TAM, which achieves on average a value of 40%, this is a considerably better result (Venkatesh and Davis 2000). In technology acceptance studies, Chin (1998) considers a value of $R^2 = 0.67$ as substantial. The chosen research method implicitly controls for moderating factors such as age or voluntariness of use, which are important in Venkatesh's et al (2003) original model. Although these have been omitted in the proposed research model, this study is equally strong. Consequently, the second theoretical implication of this study is that an advanced UTAUT model is applicable to the context of MB adoption by young consumers in Germany.

Finally, this study gives additional support for the applicability of UTAUT in a non-organizational context. Whereas the original UTAUT model was developed in order to explain technology adoption of employees, this study's focus lies on consumers. Likewise, scholars frequently apply the UTAUT in a non-organizational setting and confirm its appropriateness (e.g. Amin et al. 2008; Riquelme and Rios 2010; Cruz et al. 2010; Zhou, Lu and Wang 2010).

7.2. Practical Implications

For MB to be a successful new banking service channel, a comprehensive understanding of consumer's facilitators and barriers is crucial (Mallat, Rossi and Tuunainen 2004; Karjaluoto, Koenig-Lewis, et al. 2010). In practise, the diffusion of new mobile services in banking is still behind the expectations. Hence, the findings of this study support financial institutions that try to establish themselves in the MB context in Germany. The findings rely on young consumers that are most likely to become an important client segment in the future (Bain & Company 2013). In addition, they often act as early adopters of new technology and may potentially become catalysts for the diffusion of MB (Karjaluoto, Koenig-Lewis, et al. 2010). Due to the high practical relevance of MB acceptance among consumers, this study draws several recommendations for practitioners.

Perceived Compatibility (PC): The relative magnitude of PC's path coefficient ($\beta_{PC} = 0.545$) reveals that the fit between MB and consumers' values, past experience, current needs and present lifestyle (Rogers 2010) has a strong influence on Behavioural Intention. It seems that using MB anywhere and at any time is a big advantage that fits very well with young consumer's lifestyle (Karjaluoto, Koenig-Lewis, et al. 2010).

PC of a technology is not just related to its features, but also to the personality traits of consumers (Lu et al. 2011; Laukkanen and Kiviniemi 2010). Online banking users share many similarities with MB users in managing their finances as transactions are executed electronically with no personal interaction between consumer and service employee (Karjaluoto, Koenig-Lewis, et al. 2010). It should logically follow that in a first step, banks need to further increase the group of people who use online banking in order to increase MB clients. In general, this may be seen as an instrument of reducing risk and improving the trustworthiness of electronic banking. In a second step, online banking customers could be educated about the advantages of MB. Herein, banks can reach internet banking clients through their own website, where information material about new applications for mobile devices should be included. Rather than urging customers to use MB, banks should focus on developing beliefs and confidence of consumers. Later, internal psychological processes will often result in the envisioned behaviour (Koenig-Lewis, Palmer and Moll 2010).

Similar to the use of social networks via smartphones and tablets, MB may become a vital part of young consumer's life. Mobile phones were initially seen very useful by consumers to make calls. Only later, people noted its usefulness to send messages through social media. In the same

way young consumers feel isolated from their social networks, if they do not have a smartphone, they could feel isolated from their finances without mobile access. In particular, if consumers get used to pay via phone, MB will likely be seen gradually useful. Accordingly, banks need to develop a broad understanding of young consumer's lifestyle in order to leverage their marketing and service activities (Karjaluoto, Koenig-Lewis, et al. 2010).

Perceived Credibility (PR): Based on the SEM, PR shows the strongest effect on Attitude towards MB ($\beta_{PR} = 0.340$). Yu (2012) describes that credibility in MB mainly depends on privacy protection, technical reliability of systems and security of the banking environment. MB is perceived more risky than internet banking due to its mobile nature. The risk of losing or getting the smartphone stolen is imminent. An important determinant of security is therefore the log-in-process of MB applications. New technological means enable banks to include biometrical security check-ups into the app to increase consumer's trust in MB (TNS Infratest 2014).

Empirical evidence suggests that the consumer's perception of MB safety is positively affected by the usage of this technology (Fed 2012). By allowing clients to determine the functionalities of their MB application, banks are able to lower the initial resistance barrier. Subsequently, consumers can try out MB without being exposed to financial risks (DNB 2014).

The security of data transfer between consumers and banks through telecommunication networks is another important aspect of PR. Essential players in this space are not only banks, but also phone/tablet manufacturers and telecommunication providers. A strong cross-sector collaboration would be helpful in order to develop a comprehensive concept for secured MB transactions. Along with a collaborative marketing campaign, Perceived Credibility in the MB infrastructure could be increased (KPMG 2011).

Many security experts emphasize that MB could also be more secure than internet banking (Luo et al. 2010). MB, for instance, enables clients to detect fraud earlier since they can check balances and transactions everywhere instantly. In accordance, GPS verification allows banks to check whether transactions are made from trustworthy places rather than remote areas. These security advantages resulting from mobile technology should be communicated more thoroughly.

The protection against financial loss is absolutely key in persuading consumers. Similar to internet banking protection, MB insurance policies safeguard MB clients from possible losses as a result of malicious attacks. There is evidence that assurances do have a risk-reducing

influence, because they indicate that the bank takes complaints seriously (Björlin Lidén and Skålén 2003). Simultaneously, it would limit negative media coverage due to single cases of abuse. Nevertheless, careful consideration of the legal embodiment is essential as banks cannot be liable for negligent behaviour from the consumer side.

Lastly, the exploratory analysis shows strong consumer concerns about data privacy. A recent analysis of Android banking apps shows that not only many banking apps are not secure, but they also gather much more data than required. For instance, more than 50% of tested apps gather information about the IMEI-number, which uniquely identifies MB users (Wendt 2014). Particularly in the light of the recent NSA incident, banks could promote and foster the strict data privacy laws in Germany. In order to (re)gain customer trust, banks should campaign for data privacy made in Germany. Here, it seems utmost important that banks relinquish certain advantages through mass data collection in exchange for more data privacy.

Performance Expectancy (PE): This study confirms that PE affects Attitude towards MB ($\beta_{PE} = 0.290$). At the same time, non-users' top answer to the question why they do not adopt MB is that their banking needs are already satisfied. This could indicate that advantages are in question or not well-known and banks should communicate the usefulness of MB more thoroughly. EFMA (2011) states that smartphones are regularly used by young adults and by now the most popular electronic device. Therefore, they offer an extensive platform with huge potential to enrich the client's performance in conducting financial transactions. By using "dead time" more productively (e.g. during commuting), consumers find a real alternative in conducting their financial transactions on-the-go. (Zhou, Lu and Wang 2010). Furthermore, pro-active functionality allows for real-time and personalized push messages. This could not only increase awareness for near-by shopping opportunities that could be financed, but also help customers to identify fraud immediately. Subsequently, credit cards could be blocked with only clicking on an emergency button. More examples of useful features that enhance the customer's banking performance should be developed, tested and communicated by banks in the future.

Effort Expectancy (EE): This construct showed a rather small path coefficient ($\beta_{EE} = 0.157$). Slower transaction speed, a smaller screen and keypad are often named arguments against MB's ease of use (Schierholz and Laukkanen 2007; Ha et al. 2012; Fed 2012). Nevertheless, the results suggest that young consumers in Germany perceived required learning efforts as rather low. This confirms Yu's (2012) study that consumers are getting more and more familiar with using electronic devices.

In order to improve ease of use, a number of ideas can be implemented. First and foremost, conducting simple transactions must become easier. Some banks require customers to carry a card reader or a second smartphone in order to conduct money transfers. New security processes, including biometrical authentication, should be explored, reviewed, and implemented. Therefore, the present conflict between security and ease of use might be reduced (Chen 2008).

Second, bill payments are rather inconvenient as large reference numbers must be specified in the reason for payment. Advanced smartphone capabilities such as the camera can be used to capture necessary data, which in turn could be fully structured by the app. Users are only required to confirm the transaction afterwards.

Finally, self-efficacy should be increased by providing step-by-step guidance with demo videos about MB service and live chat options (Luo et al. 2010). This could have a positive influence on Effort Expectancy.

Social Influence (SI): Research conducted in developing (but not developed) countries identifies social factors as strong influencers on MB adoption (e.g. Bankole, Bankole and Brown 2011; Yu 2012). While this study confirms that SI is influential on MB users, it is not significant for non-users in Germany. Banks are suggested to enhance the use of social media to promote MB among users. That is to say, banks are advised to target users by highlighting interpersonal word-of mouth and building a community on social media (such as Facebook, Twitter, Snapchat or Blogs) to increase loyalty among users. This represents a more cost-effective approach than spending large amounts of money on traditional mass media advertisement (e.g. through television). Nevertheless, as it has the weakest impact on Attitude, banks might prioritise other recommendations first.

8. CONCLUSION

In the following, the key results of this dissertation are summarized and the research question is answered. Then, limitations of this research are presented and a brief outlook for future research opportunities is provided.

8.1. Summary

In the past, innovations in the banking sector resulted in disruptive consequences. New distribution channels such as ATMs and internet banking had an immense impact on the sector's profitability and the way people conduct banking (Robinson 2000; Sathye 1999). MB has the potential to once again disrupt the sector and to offer great advantages to consumers and financial institutions (Deloitte 2008).

Nonetheless, the MB adoption rate is very low in Germany. Literature suggests that consumer acceptance is the most important factor in widespread diffusion of MB services (e.g. Yu 2012; Shaikh and Karjaluoto 2014; Hanafizadeh et al. 2014). Accordingly, the research question of this thesis was to identify key acceptance factors of MB regarding young consumers in Germany. In order to answer the research question, the following results were obtained in this dissertation:

First, the literature review suggests several determinants of MB adoption that are most often used in technology acceptance studies (Table 2). Furthermore, it recommends to build a technology acceptance model based on the UTAUT and specifically adapt the proposed model of this dissertation to the context of MB.

Next, this study identifies key MB adoption factors for young consumers in Germany through SEM. The model is empirically tested through an online survey with a sample size of 433 respondents. Perceived Compatibility has a strong and (direct) effect on Behavioural Intention to adopt MB. Perceived Credibility, Performance Expectancy, Effort Expectancy and Social Influence, in systematic order of their effect size, significantly influence Attitude, which in turn influences Behavioural Intention. Moreover, a significant link between Perceived Self-Efficacy and Effort Expectancy could be observed. Overall, the proposed research model shows a substantial result by explaining 67.7% (adjusted R^2) of variance in Behavioural Intention of young consumers to adopt MB in Germany (Figure 8).

The observations support banks that want to enhance their MB services and achieve more acceptance among young consumers. First, banks should further increase the number of online

banking users as these consumers share many similarities with MB users and are therefore easier to convert to MB users. Rather than urging customers to use MB, they should focus on developing confidence of consumers.

Young consumers in Germany not only have concerns regarding the security of MB technical platforms, but also data privacy is of great importance (Figure 9). To overcome the barriers, banks are advised to offer new log-in methods and financial loss protection. Besides, technical infrastructure must be developed in collaboration with other industries, including phone manufacturers and telecommunication companies. Moreover, banks should respect strict data privacy, not gather unnecessary information, and communicate their strong commitment to privacy.

Lastly, the research model suggests that an improvement of Performance Expectancy, Effort Expectancy and Social Influence also leverage Attitude and thus Behavioural Intention to use MB. Retail banks need to proactively communicate advantages such as a more efficient use of "dead-time" and an enhanced security through real-time push notifications. Moreover, conducting financial transactions must become easier through innovative technical features. As a final point, social media should be better integrated into a bank's strategy to build up a loyal user group and communicate marketing messages more efficiently to target consumers.

In summary, this dissertation contributes to a deeper understanding of key MB acceptance factors of young consumers in Germany in order to provide scholars with new empirical support for further theory development and help practitioners to design and implement MB services that yield high consumer acceptance.

8.2. Limitations and Future Research

The results of this study are statistically significant and allow for comprehensive recommendations. However, this study is also exposed to several limitations that must be addressed. First, the sample (n = 433) includes mostly people that are 23-29 years old. The age groups "18-23 years" and "30-35 years" are underrepresented. Despite prior research that supports students to be good surrogates to represent typical consumers (Remus 1986), this study contains 50% students and hence may not fully represent the whole population of young consumers in Germany. For greater external validity, future studies using less students are encouraged. Moreover, the participation of the survey was on a voluntary basis with no monetary compensation. In addition to the choice of the distribution channel, i.e. social

networks and university's mailing list, this could imply a certain bias towards respondents with interest in technology and finance.

Second, the extent to what the results can be generalized to young consumers in other countries is uncertain. The empirical evidence contained exclusively individuals living in Germany that, in terms of national characteristics, is different from other countries such as China, South Korea, USA or Finland. For instance, the level of Perceived Credibility is depending on the technological infrastructure, reputation of related companies and legal framework of the country. Where these variables are not similar, different results and implications might show up. In the future, it would be interesting to test young consumers in neighbouring countries such as Austria and then in more dissimilar cultures.

Third, given the pioneering nature and infancy stage of MB, this dissertation applies Behavioural Intention as dependent variable in order to approximate actual behaviour. In literature, there are mixed results about the link between intention and actual behaviour. Some scholars report a close relationship (Fishbein and Ajzen 1975; Venkatesh and Morris 2000; Venkatesh and Davis 2000), but others, for instance Wang, Lin and Luarn (2006), describe that behavioural intentions are only partially useful. Bagozzi (2007) states that individuals are not always able to realize their intentions, either due to monetary restrictions, time constraints or personal limits. In the future, a longitudinal analysis could help to test the research model, specifically to what extant consumer intention leads to actual MB adoption.

Fourth, Hillmer (2009) criticises that by applying a one-dimensional Likert scale, multifaceted graduations of interpretations disappear. Thus, it would not be possible to measure motivations for actions that lie outside the technology centred questions. Nonetheless, the approach was optimal for this study as a certain amount of participants was required to accomplish the goal of a representative sample. Future research could apply not only a quantitative analysis, but also a more qualitative approach. Herein, in-depth interviews with experts could help to identify new explanatory variables or moderating factors.

In the future, research projects could focus on evaluating the prospects of the proposed recommendations in order to leverage MB adoption factors. Consequently, consumer banks would have more guidance in which recommendations should be prioritised.

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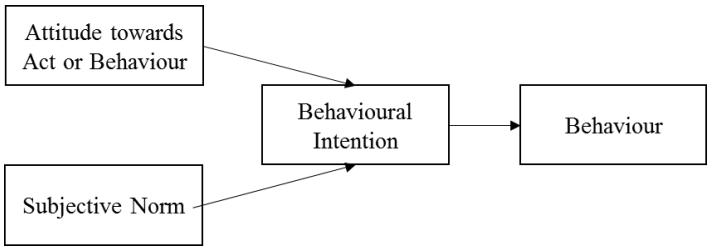
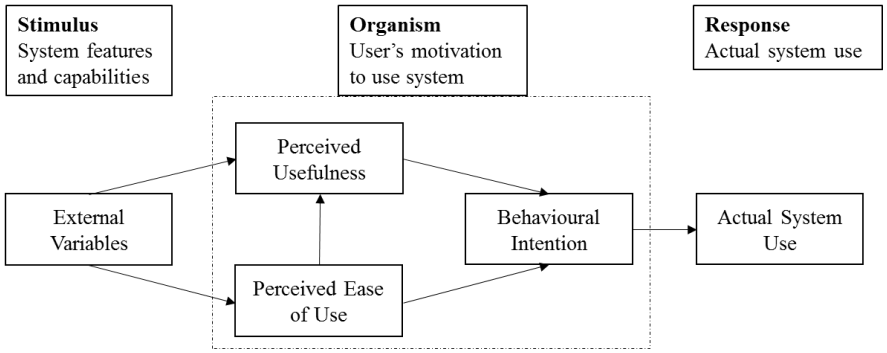
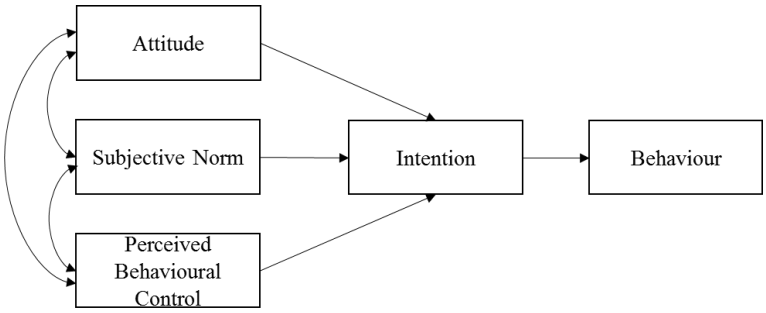
10. APPENDIX



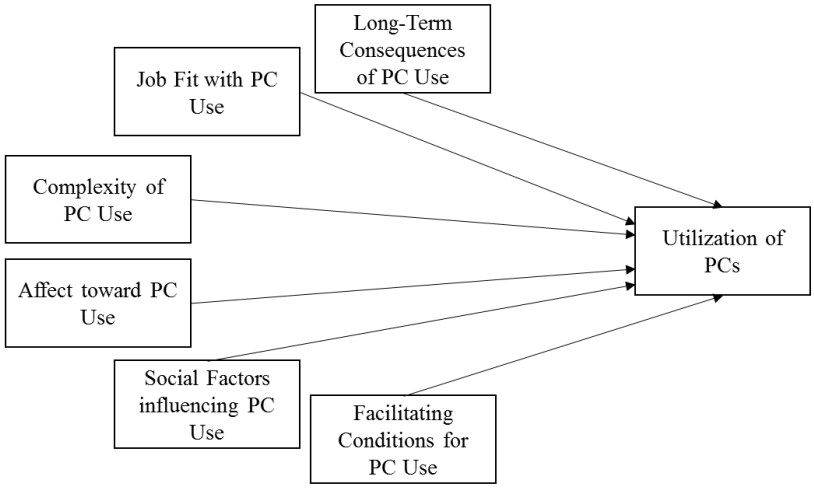
Appendix 1: Theory of Reasoned Action (Fishbein and Ajzen 1975)



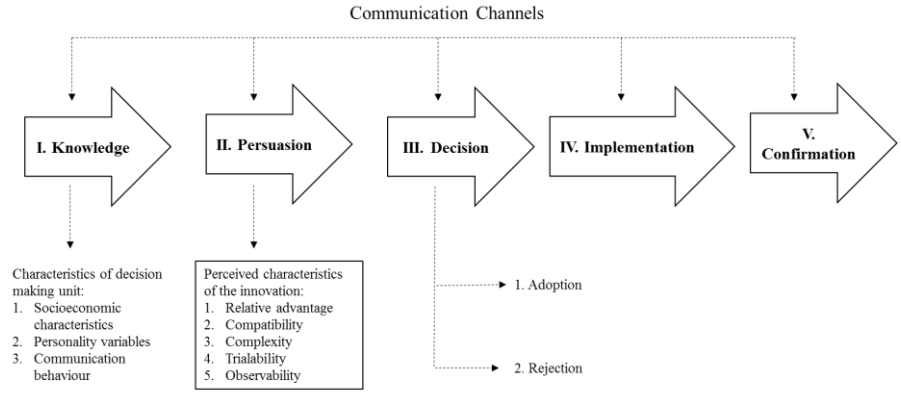
Appendix 2: Technology Acceptance Model (Davis 1989)



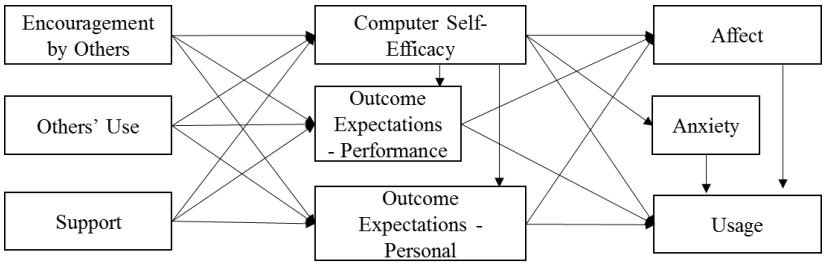
Appendix 3: Theory of Planned Behaviour (Ajzen 1991)



Appendix 4: Model of PC Utilization (Thompson, Higgins and Howell 1991)



Appendix 5: Innovation Diffusion Theory (Rogers 2010)



Appendix 6: Social Cognitive Theory (Compeau and Higgins 1995)

	Name of Journals	No.	%	References
1	African Journal of Business Management	1	1.52%	Raleting and Nel (2011)
2	Australian Journal of Basics and Applied Sciences	1	1.52%	Daud et al. (2011)
3	Behavior and Information Technology	2	3.03%	Shen et al. (2010); Chung and Kwon (2009)
4	Canadian Journal of Administrative Sciences	1	1.52%	Yang (2009)
5	Computers in Human Behavior	5	7.58%	Luarn and Lin (2005); Zhou, Lu and Wang (2010); Zhou (2012b); Shin (2009); Kim, Mirusmonov and Lee (2010)
	Conference Proceedings	7	10.61%	Ravendran, MacColl and Docherty (2012); Liu, Min and Ji (2009); Laukkanen and Cruz (2012); Saeed (2011); Sheng, Wang

				and Yu (2011); Bankole and Cloete (2011); Barati and Mohammadi (2009)
6	Decision Support Systems	1	1.52%	Luo et al. (2010)
7	Electronic Commerce Research and Applications	2	3.03%	Schierz, Schilke and Wirtz (2010); Dahlberg et al. (2008)
8	Expert Systems with Applications	1	1.52%	Gu, Lee and Suh (2009)
9	Industrial Management & Data Systems	1	1.52%	Zhou (2011b)
10	Info	1	1.52%	Tobbin (2012)
11	Information Systems Journal	1	1.52%	Kim, Shin and Lee (2009)
12	Information Technology Management	1	1.52%	Zhou (2012a)
13	Interacting with Computers	1	1.52%	Lee and Chung (2009)
14	International Business and Management	1	1.52%	Huili, Shanzhi and Yinghui (2013)
15	International Journal of Bank Marketing	7	10.61%	Riquelme and Rios (2010); Karjaluoto, Püschel, et al. (2010); Koenig-Lewis, Palmer and Moll (2010); Wessels and Drennan (2010); Cruz et al. (2010); Laukkanen and Kiviniemi (2010); Karjaluoto and Kanniainen (2010)
16	International Journal of Business and Social Sciences	1	1.52%	Khraim, Shoubaki and Khraim (2011)
17	International Journal of Business Research and Development	1	1.52%	Aboelmaged and Gebba (2013)
18	International Journal of Computer Theory and Engineering	1	1.52%	Safeena et al. (2012)
19	International Journal of Information Management	1	1.52%	Lin (2011)
20	International Journal of Innovative Research and Development	1	1.52%	Jain (2013)
21	International Journal of Mobile Communications	9	13.64%	Teo et al. (2012); Sulaiman, Jaafar and Mohezar (2006); Crabbe et al. (2009); Rao Hill and Troshani (2010); Shih, Hung and Lin (2010); Tan et al. (2010); Hsu, Wang and Lin (2011); Laukkanen (2006); Chen (2008)
22	International Journal of Multidisciplinary Research	1	1.52%	Sharma (2011)
23	International Journal of Trade, Economics and Finance	1	1.52%	Saleem and Rashid (2011)
24	Internationalization, Design and Global Development Lecture Notes in CS	1	1.52%	Medhi, Ratan and Toyama (2009)
25	Internet Research	1	1.52%	Zhou (2011a)
26	Journal of Business Administration and Education	1	1.52%	Chitungo and Munongo (2013)
27	Journal of Business Strategies	1	1.52%	Clarke III (2001)
28	Journal of Electronic Commerce Research	1	1.52%	Yu (2012)
29	Journal of Internet Banking and Commerce	3	4.55%	Amin et al. (2006); Thulani et al. (2011); Amin et al. (2012)
30	Journal of Service Marketing	1	1.52%	Lee and Allaway (2008)
31	Marketing Intelligence & Planning	1	1.52%	Akturan and Tezcan (2012)
32	Research Journal of Applied Sciences	1	1.52%	Alafeef, Singh and Ahmad (2011)
33	Sunway Academic Journal	1	1.52%	Amin, Baba and Muhammad (2007)
34	Telematics and Informatics	1	1.52%	Hanafizadeh et al. (2014)
35	The Electronic Journal of Information Systems in Developing Countries	2	3.03%	Amin and Ramayah (2010); Bankole, Bankole and Brown (2011)
36	World Journal of Social Sciences	1	1.52%	Ramdhony and Munien (2013)
	Total	66	100%	

Appendix 7: Journals included in the MB literature review

	Part 1: Introduction & Entrance Qualification
I1	Thank you very much for accepting to participate in this survey. The questionnaire takes approximately 5 minutes to complete and is addressed to young individuals (18-35 years). All information collected will be treated as confidential and will be used only for statistical purposes. If you have any further questions, please do not hesitate to contact me: steffenrilling@gmail.com
I2	We are interested in your experience with Mobile Banking (MB). MB represents an extension of online banking with its major difference in the devices used to access banking services (smartphone, tablet). Usually, the following banking services are offered via app or website: 1. Mobile Accounting (transactions, accounting, blocking credit card, etc.) 2. Mobile Brokerage (buy and sell stocks, etc.) 3. Mobile Information (balances, localise ATM, information about products, etc.) With your help we want to improve the way people manage their finances
Q1	How old are you?
Q2	Which of the following mobile devices do you possess?
Q3	Which operating system do you use for your smartphone/tablet?
Q4	How often do you use MB with your mobile devices?
	Part 2: Structural Equation Model – MB Adoption Factors
Q5	Performance Expectancy (PE) - PE1: MB improves my efficiency. - PE2: MB helps to save time. - PE3: MB improves my convenience.
Q6	Effort Expectancy (EE) - EE1: Learning to use MB is easy for me. - EE2: Becoming skilful at using MB is easy for me. - EE3: Interaction with MB does <u>not</u> require a lot of mental effort. - EE4: I think MB is easy to use.
Q7	Social Influence (SI) - SI1: People who influence my behaviour think that I should use MB. - SI2: People who are important to me think I should use MB. - SI3: People who use MB tend to have a higher status.
Q8	Perceived Credibility (PR) When using MB, - PR1: I believe my information is kept confidential. - PR2: I believe my transactions are secured. - PR3: I believe my privacy would not be divulged. - PR4: I believe the banking environment is safe (IT-systems, processes).
Q9	Perceived Compatibility (PC) - PC1: I believe using MB fits my lifestyle well. - PC2: Adopting MB suits well with the way I like to manage my finances. - PC3: Conducting banking transactions via MB fits into my working style.
Q10	Perceived Self – Efficacy (PS) I could use MB …. - PS1 if I had the built-in help guidance for assistance. - PS2 if someone showed me how to do it. - PS3 if I had seen someone else using it.
Q11	Attitude (AT) - AT1: MB is a good idea. - AT2: It is fun to work with MB

	- AT3: I like using MB.
Q12	Behavioural Intention (BI)
	- BI1: I prefer MB to other service channel (e.g. branch, internet)
	- BI2: I intend to use MB in the future
	- BI3: I believe it is worthwhile for me to use MB.

	Part 3: Demographics and Exploratory Question
Q13	What is your gender?
Q14	What is your current occupation?
Q15	What is the highest educational degree that you possess?
Q16	Does your bank offer a MB app?
Q17	How many MB apps do you have installed on your device?
Q18	What are the main reasons, why people do not use MB?

Appendix 8: English version of the online questionnaire

	PE	**EE**	**SI**	**PC**	**PR**	**PS**	**AT**	**BI**
PE_1	**0.882**	0.191	0.274	0.463	0.324	0.061	0.432	0.505
PE_2	**0.872**	0.154	0.281	0.471	0.293	0.151	0.435	0.515
PE_3	**0.877**	0.176	0.301	0.436	0.276	0.144	0.419	0.476
EE_1	0.137	**0.858**	-0.002	0.286	0.247	-0.298	0.325	0.257
EE_2	0.125	**0.881**	0.007	0.278	0.237	-0.362	0.344	0.240
EE_3	0.146	**0.802**	0.089	0.287	0.248	-0.253	0.338	0.273
EE_4	0.262	**0.879**	0.013	0.382	0.286	-0.322	0.393	0.354
SI_1	0.290	0.002	**0.967**	0.248	0.201	0.144	0.249	0.261
SI_2	0.339	0.050	**0.977**	0.300	0.229	0.183	0.300	0.326
PC_1	0.447	0.290	0.255	**0.895**	0.469	0.014	0.622	0.711
PC_2	0.526	0.361	0.273	**0.923**	0.506	-0.029	0.677	0.739
PC_3	0.443	0.332	0.245	**0.904**	0.454	-0.036	0.638	0.694
PR_1	0.287	0.248	0.215	0.482	**0.924**	-0.048	0.476	0.542
PR_2	0.332	0.279	0.203	0.504	**0.915**	-0.075	0.500	0.590
PR_3	0.352	0.265	0.236	0.484	**0.919**	-0.043	0.496	0.533
PR_4	0.270	0.297	0.159	0.453	**0.903**	-0.051	0.489	0.505
PS_1	-0.117	0.274	-0.161	-0.059	-0.017	**0.778**	-0.109	-0.065
PS_2	-0.095	0.375	-0.151	0.102	0.108	**0.914**	0.094	0.110
PS_4	-0.138	0.218	-0.104	-0.038	0.032	**0.773**	-0.058	-0.020
AT_1	0.450	0.369	0.275	0.672	0.554	-0.056	**0.812**	0.693
AT_3	0.342	0.285	0.231	0.483	0.328	0.083	**0.817**	0.478
AT_4	0.424	0.366	0.208	0.610	0.434	0.022	**0.897**	0.633
BI_1	0.457	0.275	0.233	0.607	0.447	0.026	0.587	**0.848**
BI_2	0.509	0.305	0.287	0.725	0.603	-0.059	0.667	**0.931**
BI_3	0.571	0.312	0.303	0.792	0.551	-0.031	0.716	**0.933**

Appendix 9: Cross Loadings Matrix

Regression	Path Coeffcient (male, n=228)	Path Coeffcient (female, n=205)	Parametric Test
H1: PE ⟶ AT	0.333 (t =5.376***)	0.256 (t = 4.120**)	0.077 (t = 0.883^{ns})
H2: EE ⟶ AT	0.179 (t = 3.323**)	0.287 (t =5.013***)	0.108 (t =1.380^{ns})
H3: PS ⟶ EE	0.273 (t = 4.673***)	0.441 (t = 9.380***)	0.168 (t = 2.209*)
H4: SI ⟶ AT	0.13 (t =2.306*$^{)}$	0.098 (t = 1.643^{ns})	0.032 (t = 0.390^{ns})
H5: PC ⟶ BI	0.565 (t = 10.473***)	0.52 (t = 10.235***)	0.045 (t =0.605^{ns})
H6: PR ⟶ AT	0.289 (t = 4.903***)	0.372 (t = 6.346***)	0.083 (t =1.001^{ns})
H7: AT ⟶ BI	0.290 (t = 4.981***)	0.394 (t = 7.946***)	0.105 (t = 1.358^{ns})

Note: ns = not significant; * = p < 0.05; ** = p < 0.01, *** = p < 0.001

Appendix 10: Multi-Group Analysis Gender

Regression	Path Coeffcient (Smartphone, n=236)	Path Coeffcient (Smartphone and Tablet, n=195)	Parametric Test
H1: PE ⟶ AT	0.276 (t =4.793***)	0.281 (t =4.012***)	0.004 (t = 0.049^{ns})
H2: EE ⟶ AT	0.187 (t = 3.229**)	0.347 (t =5.450***)	0.160 (t =1.863^{ns})
H3: PS ⟶ EE	0.423 (t = 8.348***)	0.286 (t = 5.095***)	0.137 (t = 1.820^{ns})
H4: SI ⟶ AT	0.126 (t =2.362$^{*)}$	0.053 (t = 0.919^{ns})	0.072 (t = 0.920^{ns})
H5: PC ⟶ BI	0.541 (t = 11.131***)	0.556 (t = 9.539***)	0.015 (t =0.197^{ns})
H6: PR ⟶ AT	0.407 (t = 7.891***)	0.246 (t = 3.936***)	0.162 (t =2.018*)
H7: AT ⟶ BI	0.343 (t = 7.032***)	0.317 (t = 4.986***)	0.026 (t = 0.335^{ns})

Note: ns = not significant; * = p < 0.05; ** = p < 0.01, *** = p < 0.001

Appendix 11: Multi-Group Analysis Handheld Device

Regression	Path Coeffcient (18-24 years, n=176)	Path Coeffcient (25-35 years, n=257)	Parametric Test
H1: PE ⟶ AT	0.116 (t =1.777^{ns})	0.356 (t =6.246***)	0.240 (t = 2.744**)
H2: EE ⟶ AT	0.281 (t =4.413**)	0.231 (t =4.566***)	0.050 (t =0.621^{ns})
H3: PS ⟶ EE	0.381 (t = 6.106***)	0.353 (t = 7.059***)	0.029 (t = 0.361^{ns})
H4: SI ⟶ AT	0.109 (t =1.999$^{*)}$	0.108 (t = 2.067*)	0.001 (t = 0.014^{ns})
H5: PC ⟶ BI	0.594 (t = 10.302***)	0.518 (t = 10.950***)	0.077 (t =1.030^{ns})
H6: PR ⟶ AT	0.468 (t = 7.139***)	0.288 (t = 5.711***)	0.180 (t =2.207*)
H7: AT ⟶ BI	0.301 (t = 4.731***)	0.364 (t = 7.852***)	0.063 (t = 0.826^{ns})

Note: ns = not significant; * = p < 0.05; ** = p < 0.01, *** = p < 0.001

Appendix 12: Multi-Group Analysis Age