

Working Paper

Paying Mobile at the Point of Sale – A Question of Culture?

Maximilian Fischer M.Sc. (Corresponding Author)
University of Bayreuth

Riccardo Reith
University of Bayreuth

Prof. Dr. Bettina Lis
University of Bayreuth

Abstract: Contrary to the USA, the breakthrough of mobile payment (MP) in Germany has not yet been realized. Based on an extended technology acceptance model (TAM), we therefore analyzed the moderating effects of Hofstede's cultural dimensions on technological, social, and trust-related aspects influencing the behavioral intention towards using MP. We identified that the impact of social influence on the intention to use MP is stronger affecting German inhabitants. Except for this, culture could not be detected as a moderator within our study. Nevertheless, we identified that the trust in MP, the perceived usefulness, as well as the social influence have the strongest impact on the intention to use in both countries. The results reinforce the importance of emphasizing the trustworthiness of the systems and contribute to MP research across countries.

Introduction

The mobile phone has become indispensable for modern digital society, as it has developed from a communication tool to a multifunctional device, which even allows customers to pay directly at the point of sale (Slade, Dwivedi, Piercy, & Williams, 2015). Recognizing the enormous data-creating potential of mobile payment (MP) solutions, different providers - such as banks, mobile providers and technology companies - have developed their own payment services (Dahlberg & Öörni, 2007). As a result, a diverse landscape of MP systems has arisen in the USA and Germany.

Investigating the adoption of MP systems, researchers have to consider the underlying technology (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008). Accordingly, MP can be divided into remote and proximity payments (Slade, Williams, & Dwivedi, 2013). Remote payments include mobile banking and mobile internet payment services and require a connection to a remote payment server, similar to e-commerce payment systems (Slade et al., 2013; Zhou, 2013). However, the present investigation focuses on payment processes at the stationary point of sale ("Proximity Mobile Payment"). This subcategory is characterized by the physical presence of the customer and a physical infrastructure in trade (Slade et al., 2015; Smart Card Alliance, 2007). Regarding the transfer of data, the near field communication (NFC)-technology is the most promising system for proximity MP (Neßler, Lis, & Fischer, 2016), allowing service providers to store customer preferences and to offer personalized proposals to customers such as coupons or discounts (Ondrus & Pigneur, 2009). Thus, most of the big players such as Apple, Google and Samsung are focusing on NFC for their payment solution (Adams, 2015; International Business Times, 2014; Kharif, 2011). Contrary to the expectation, the breakthrough of MP in Germany has not yet been realized as only 0.4 percent of the population assessed MP to be their favorite payment method (Splendid Research, 2018) and 43 percent of the Germans so far cannot even imagine paying mobile (Statista, 2019). Whereas in the USA, this payment type is growing in popularity. Proximity MP is being used by 64 million customers already (eMarketer, 2019). The latest developments in Germany concerning MP offerings by Google and Apple require MP providers to understand the drivers of consumers' acceptance of this technology. The identification of key drivers for the diffusion of MP enables these companies to modify their development and marketing strategies to meet consumers' needs (Schierz, Schilke, & Wirtz, 2010) and to implement their service solutions successfully. Consequently, many researchers focused on consumers' MP acceptance factors and analyzed their impacts on the intention to use such services (e.g. Mallat, 2007; Thakur, 2013; Yang, Lu,

Gupta, Cao, & Zhang, 2012). The preferred theoretical frameworks used to examine the MP usage intention are TAM based research models (Mondego & Gide, 2018). Besides the basic elements of TAM, which focus on the technological perspective, trust-related and social aspects were identified to play an important role in the context of MP adoption (e.g. Dahlberg & Öörni, 2007; Liébana-Cabanillas, Munoz-Leiva, & Sánchez-Fernández, 2014). While cultural investigations in the domain of technological acceptance are quite common (Cardon, 2008), surprisingly only few researchers have addressed the issue of cultural differences concerning the behavioral intention to use MP. One example is Alshare and Mousa (2014), who examined the moderating role of Hofstede's cultural dimensions on the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003) in Qatar.

Based on previous MP research and encouraged by Dahlberg, Guo and Ondrus (2015), who proposed a deeper analysis of cultural effects, we analyzed transatlantic differences between two highly developed western countries regarding the behavioral intention to use MP. In order to do so, the most important factors influencing MP usage intention were identified by adhering to the nomological structure of TAM and adjusting the model for the context MP. Although Germany and the USA seem to be comparable regarding their cultural background, they differ under consideration of Hofstede's (2001) cultural dimensions of individualism vs. collectivism, uncertainty avoidance and long vs. short-term orientation. Thus, we recognized a research gap by investigating the question of whether cultural differences between Germany and the USA moderate the influences of technological, trust-related and social factors on the behavioral intention towards using MP. To assess the cultural differences and to examine the moderating effects, Hofstede's cultural dimensions were used as theoretical background.

According to Ondrus, Lyytinen and Pigneur (2009), understanding cultural factors regarding MP acceptance is of great importance because successful MP business models cannot directly be transferred to different cultural contexts due to the differing market constraints in terms of the mentioned influencing factors. Consequently, our research aim and motivation were to widen the scope of current research by analyzing one established and one developing market regarding MP diffusion. A comparison of these two countries helps to deepen the understanding of MP adoption and diffusion processes and to improve systems for the largest possible number of customers. To successfully implement and establish MP solutions in different cultures, in-depth knowledge about those processes are relevant for a target group-oriented marketing strategy of MP providers. As the moderating role of culture has been scarcely investigated in the domain of MP but actively encouraged by researchers, such as Dahlberg et al. (2015), the integration of Hofstede's cultural dimension into our research model extends the current state

of research. To the best of knowledge, this is the first approach of comparing two highly developed western countries concerning MP adoption, which allows gaining a deeper understanding of prior research.

The results of our investigation prove that the intention to use MP systems differs significantly between Germany and the USA. Only Hofstede's cultural dimension of individualism vs. collectivism were found to moderate the effects between social influence and the behavior intention to use MP. That does not necessarily mean that cultural differences do not further affect the relationship between the selected variables and the intention to use proximity MP. Instead, the mere distinction based on Hofstede's cultural dimensions could be too unidimensional. Thus, this research contributes to the discussion about and the suitability of using Hofstede's dimensions without collecting own cultural data and widens the scope of current research. We also suggest practical recommendations by recognizing influencing factors for the purposeful control of MP implementation strategies. Hence, providers in Germany and the USA have to focus on the usefulness of the applications and take care of the effects of social influence and the trust aspect while promoting an MP system.

The remainder of the paper is organized as follows. First, we review literature related to current MP and cross-cultural investigation. Afterwards, we clarify the theoretical background of the used research model and develop the hypotheses to be tested. The following section addresses the research design and results of the conducted study. Finally, the findings are discussed and theoretical as well as practical implications are derived. Additionally, we outline the limitations and make suggestions for further research.

Current Research

A multitude of studies have used the Technology Acceptance Model (TAM) (Davis, 1989), the diffusion of innovation (DOI) (Rogers, 2003), as well as the UTAUT (Venkatesh et al., 2003) as a theoretical basis to explain MP adoption (Dahlberg et al., 2008; Dahlberg et al., 2015). Various researchers saw the necessity to expand these models to explain the adoption of MP in an appropriate way.

Therefore, Dahlberg, Mallat and Öörni (2003) enhanced the TAM model with the aspect of trust. The significant influence of trust was later confirmed by Dahlberg and Öörni (2007) and other researchers in the domain of MP (e.g. Liébana-Cabanillas et al., 2014; Lu, Yang, Chau, & Cao, 2011). Especially within a financial context, trust and security issues play a vital role. In order to increase the variance explained of the attitude towards MP adoption, Arvidsson

(2014) integrated trust in actors and perceived security into their research model. Both aspects were found to be significant and not correlated, showing that these two variables specify two separate dimensions. These results are also in line with the theoretical study of Mallat (2007), whose research is based on the DOI and included trust, payment system security and a variety of factors concerning the MP technology. Together with perceived security, researchers often examined the variables social influence or subjective norm in the context of MP (e.g. Schierz et al., 2010; Yang et al., 2012). Yang et al. (2012) investigated the impact of social influence and thereby distinguished between the two groups of “potential adopters” and “current users”. For both groups, they found significant effects of social influence on “behavioral intention to adopt” or “behavioral intention to continue using” (Yang et al., 2012, p. 135f.). Besides social influence, innovativeness significantly impacts the intention to use MP (Oliveira, Thomas, Baptista, & Campos, 2016; Slade et al., 2015; Thakur & Srivastava, 2014). Guhr, Loi, Wiegard and Breitner (2013) detected that innovativeness, as part of technology readiness, influences the intention to use MP. Furthermore, they recognized differences in the relationship between technology readiness and the intention to use MP among various countries.

However, leading researchers in the field of MP claim that these factors have been comprehensively investigated and do only provide few new insights (e.g. Dahlberg et al., 2008; Dahlberg et al., 2015). The latter strongly encourage further adoption researchers to conduct studies across several countries, as previous work has been limited to one financial ecosystem and one culture only. As national culture was found to play a key role in technology adoption (e.g. Lee, Trimi, & Kim, 2013) Alshare and Mousa (2014) identified the lack of research in the field of MP and investigated the moderating effect of espoused cultural dimensions on consumer’s intention to use mobile payment devices. They concluded that cultural aspects, adapted from Hofstede’s (2001) cultural dimensions, moderate the factors of UTAUT in Qatar. Cross-cultural studies were conducted by Pavlou and Chai (2002) in the context of e-commerce, by Mortimer, Neale, Hasan, and Dunphy (2015) in the domain of mobile banking and by Singh (2006) concerning the general adoption of innovations. Pavlou and Chai (2002) used Hofstede’s (2001) dimensions long-term orientation, power distance and individualism to examine their moderating impact on the factors given by the Theory of Planned Behavior and found significant results for the USA and China. Mortimer et al. (2015) did not use the dimension of long-term orientation but instead added uncertainty avoidance and masculinity to investigate differences in the intention to use mobile banking. They found differences between Australian and Thai consumers and identified national culture as key antecedent and moderator influencing the adoption of mobile banking. Furthermore, Singh (2006) showed moderating effects of

culture on the propensity to adopt innovations in France and Germany. Additionally, Lee et al. (2013) investigated the impact of cultural differences on mobile phone adoption between the USA and South Korea. The authors used longitudinal data from the entire population of mobile phone subscribers in both countries to confirm their hypothesis concerning a higher “innovation effect” in the USA.

With the above-mentioned cultural studies and findings in mind, this begs the question about the influence regarding cultural dimensions on the variables affecting the intention to use MP. As multi-country studies are explicitly encouraged by Dahlberg et al. (2015), our study aims to contribute and widen the scope of current research by investigating moderating effects of Hofstede’s (2001) cultural dimensions on the effects of our research model, which we based on the TAM of Davis (1989). To the best of our knowledge, our study is the first one comparing two high developed western countries concerning their acceptance of MP.

Theoretical Framework and Hypotheses

Cultural Approach

Our research model is based on a wide range of MP investigations. We integrated chosen differentiating characteristics into the consumer behavior model in order to better comprehend the behavior intention to use MP between selected cultures. In the literature, no commonly accepted definition of “culture” has been established yet. Taras, Rowney and Steel (2009) recognized that culture is generally agreed on as a complex-multi-level construct, shared among individuals belonging to a society which is formed over a long period. Another approach is given by Hofstede, who defined culture “as the collective programming of the mind that distinguishes the members of one group or category of people from another” (Hofstede 2001, p. 9). The influence of Hofstede’s (1980) “Culture’s Consequences” is ubiquitous as most management studies contain at least some dimensions linked to one of his defined cultural dimensions to examine cross-cultural investigations (Nakata & Sivakumar, 2001; Taras et al., 2009). He clustered the cultural construct into five bipolar dimensions, which became the foundation of his characterizations of culture for each country (d’Iribarne, 1996; Lee et al., 2013). To ensure the validity of the results, we only used the dimensions in which the analyzed nations clearly differ (individualism vs. collectivism; uncertainty avoidance; long vs. short-term orientation). A further sixth dimension (indulgence vs. restraint) can be considered as complementary to long vs. short-term orientation (Hofstede, 2011) and was not discussed separately. Table 1 presents the definitions for the selected cultural dimensions together with

the values (scale: 0-100) for Germany and the USA (Hofstede Insights, 2019).

Table 1. Cultural Dimensions.

Cultural Dimension	Values		Definition
	USA	Germany	
Individualism	91	67	Individualism, the high side of this dimension, defines a preference for a loosely-knit social framework in which individuals are expected to take care of only themselves and their immediate families. Collectivism in opposite to Individualism represents a preference for a tightly-knit framework in society in which individuals look after their relatives or members of a specific in-group in exchange for unquestioning loyalty.
Uncertainty Avoidance	46	65	Uncertainty avoidance defines the degree to which members of a society feel objectionable with uncertainty and ambiguity. A strong degree of UAI means the society values rigid codes of belief and behavior and are illiberal of unconventional behavior and ideas. Societies who score low in UAI have a more relaxed attitude and value practice more than principles.
Long Term Orientation	26	83	Long term orientation describes the degree to which a society maintains links with its own past while dealing with the challenges of the present and the future. A low score of long-term orientation means the society maintains traditions and norms and is suspicious about societal change. A society with a high score in this dimension takes a more pragmatic approach. They prepare for the future by encouraging thrift and efforts in modern education.

Studies predominantly use his national cultural dimensions to gather the cultural characteristics at the level of national markets (Chen, Ng, & Rao, 2005; Deleersnyder, Dekimpe, Steenkamp, & Leeflang, 2009). Current research verifies that consumers' acceptance of products is higher when the cultural content of the product matches their own cultural peculiarity (Lee, 2006; Craig, Green, & Douglas, 2005). As the market of financial transaction is heavily influenced by a cultural background, understanding cultural differences is essential for managing services such as MP solutions. For this purpose, Hofstede's theoretical framework obtained strong empirical support (Sondergaard, 1994) and is the most common and suitable approach to investigate cross-cultural differences in the domain of technological and information systems research (Dinev, Goo, Hu, & Nam, 2009; Lee et al., 2013; Taras et al., 2009). Therefore, this study uses his theoretical approach to examine culture as an influencing factor of MP solutions. Within the TAM, numerous investigations used the cultural dimensions as moderating factors (e.g. Straub, Keil, & Brenner, 1997; Zakour, 2004). Guhr et al. (2013) mentioned Hofstede's dimensions in their TAM based MP research without analyzing and explaining a moderating effect of culture. Therefore, we used Hofstede's descriptions of national cultures to examine a moderation between the independent variables and the intention to use MP services.

An Enhanced Technology Acceptance Model

Several studies emphasize that TAM is a parsimonious and robust model of technological acceptance behavior, making it to one of the most used models for explaining customer acceptance in the field of new technologies (e.g. Bouwman, Kommers, & van Deursen, 2014; Lai, 2017) and to investigate the adoption of MP (e.g. Arvidsson, 2014; Dahlberg & Öörni, 2007). Although the theory is useful in explaining behavioral intention, we posit that some extensions need to be made to explain the intention to use MP more appropriately. Based on an extensive literature review and supported by the observation of Mondego and Gide (2018) and Dahlberg et al. (2015), we extend the TAM based research model by the most critical drivers influencing the adoption of MP. This approach is in line with the call for additional research that broadens and deepens TAM by introducing new variables (Bagozzi, 2007).

According to the TAM, two factors, “perceived usefulness (PU)” and “perceived ease of use (EU)” influence the acceptance of new technologies. Perceived usefulness is defined as “the degree, to which a person believes that using a particular system would enhance his or her job performance” (Davis, 1989, p. 320). Furthermore, Davis understands perceived ease of use as “the degree, to which a person believes that using a particular system would be free of effort” (Davis, 1989, p. 320). In this regard, a technological system with a high value on perceived ease of use is assessed to be more useful. Besides, both variables affect the individual’s attitude towards using a technology, which themselves affect the behavioral intention to use (BI) such technology. Lastly, the BI predicts the actual usage (Park, 2009). Considering the expected low attention towards MP in Germany, we had to alter the TAM by focusing on the intention to use MP. As various researches have confirmed the positive relationship between attitude, behavior intention as well as actual usage no additional examination was necessary (e.g. Meharia, 2012; Schierz et al., 2010).

However, to provide relevant marketing information, we have to investigate the behavior intention to use MP appropriately. Therefore, an extension of the TAM was essential (e.g. Kim, Mirusmonov, & Lee, 2010) as in the literature, doubts about the comprehensiveness and appropriateness of this theory rises. Especially the absence of social influence was recognized (López-Nicolás, Molina-Castillo, & Bouwman, 2008). Besides, research detected significant concerns about privacy and security in MP (Au & Kauffman, 2008). Consequently, trust in MP systems was identified to be an essential predictor of MP adoption (e.g. Gong, Zhang, Zhao, & Lee, 2016; Xin, Techatassanasoontorn, & Tan, 2013). Therefore, we enhanced our model by integrating trust-related variables and variables representing social aspects.

Due to the importance of the factor trust in MP research (e.g. Gao & Waechter, 2017; Khalilzadeh, Osturk, & Bilgihan, 2017), and following Dahlberg et al. (2003), who saw the necessity to integrate trust into the TAM for financial services, trust-related aspects were added into the model. Besides “Trust in MP (TR)”, the variable “Perceived Data Security (DS)” is closely related to trust (Harauz, Kaufmann, & Potter, 2009) as it was found to be a predictor for trust in the case of e-banking (Yousafzai, Pallister, & Foxall, 2003) and electronic payment systems (Kim, Ferrin, & Rao, 2008). Furthermore, Dahlberg et al. (2003) postulated data security to be a crucial factor for MP, as the platform receives private financial and personal data. The effect of security on the intention to use MP at the point of sale empirically were proved by Khalilzadeh et al. (2017). The third variable of the trust-related aspects is the “Perceived Fraud Risk (FR)”. As security in the form of protection of users from the risk of fraud and financial loss has shown to have an essential impact on the attitude towards the use of online financial services (e.g. Montoya-Weiss, Voss, & Grewal, 2003) and also has been used in the domain of mobile banking (Luarn & Lin, 2005) and MP (Mallat, 2007; Schierz et al., 2010), it was consequent to integrate this variable into the research model.

The social aspects “Social Influence (SI)” and “Technological Innovativeness (TI)” represent the third part of our developed research model. Social influence is defined as the extent to which someone believes that the opinion of important others (e.g. family and friends) influences one’s behavior towards using a new technology system (Venkatesh et al., 2003). It is an essential element of technology acceptance models that were used in cultural comparison research. Herein, this variable is part of the Theory of Planned Behavior (Ajzen, 1991), which was used by Dinev et al. (2009) to investigate cultural differences of user behavior towards protective information technologies. As an element of the Unified Theory of Acceptance and Usage of New Technology (UTAUT) (Venkatesh et al., 2003), social influence was applied to investigate the acceptance of learning technologies across Germany and Romania (Nistor, Baltés, Dascălu, Mihăilă, Smeaton, & Trăușan-Matu, 2014). Finally, Venkatesh and Davis (2000) were able to considerably increase the explanatory power of technology acceptance through the integration of social influence into the TAM 2. They verified this variable to be the most impactful factor on behavioral intention, particularly for inexperienced users of a technology (Venkatesh & Davis, 2000). Empirically validated as a predictor for the intention to use a technological system (Venkatesh & Davis, 2000), it was also found to influence the intention to adopt M-payment services (Yang et al., 2012). Therefore, social influence is a useful enrichment for our model.

Parasuraman (2000) in corporation with Rockbridge Associates implemented the variable of technological innovativeness as part of the so-called “National Technology Readiness Survey”.

They emphasized the relevance of using this scale for comparative studies of technology readiness across countries and cultures (Parasuraman, 2000). Thereby, innovativeness reflects the extent to which an individual believes he or she is a pioneer in using new technology-based services and products like MP (Parasuraman, 2000). Although technological innovativeness is not included in any of the dominant technology acceptance models, it found empirically support as an essential predictor for the behavioral intention to use MP (Thakur & Srivastava, 2014). Furthermore, consumers with a high level of innovativeness were identified to accelerate word of mouth communication, which exert a significant influence on consumers' attitude and purchase decision (Brown, Broderick, & Lee, 2007; Tang, 2017). Due to the important role of the communication process for the diffusion of innovations (Rogers, 2003), this concept is critical for marketing practitioners. Thus, we followed the example of Agarwal and Prasad (1998) and added the technological innovativeness to our TAM based research model.

Hypotheses

The concept of trust has been examined in a wide range of disciplines such as psychology, sociology and economics (Pavlou & Chai, 2002). Since trust is a crucial factor in an online environment in which consumers do not have direct control over the actions of the retailer (Roca, García, & de la Vega, 2009), a lack of trust in a payment system is a main barrier of electronic commerce transactions (e.g. Siau, Sheng, Nah, & Davis, 2004). Therefore, trust aspects were often recognized as a key success factor for e-commerce (e.g. Hassanein & Head, 2007; Lee, Murphy, & Swilley, 2009) and online financial services (Suh & Han, 2002; Yu & Asgarkhani, 2015). Furthermore, several investigations had already verified a significant impact of trust-related aspects on the intention to use MP (e.g. Zhou, 2014; Xin et al., 2013).

Additionally, researchers identified trust to be an antecedent of perceived usefulness (Gefen, Karahanna, & Straub, 2003; Pavlou & Chai, 2002). As usefulness was identified to be an important predictor for MP adoption (e.g. Kim et al., 2010) analyzing influencing potentials on perceived usefulness is reasonable. Trust has proven to be related to the perceived ability of an information system to achieve a defined goal (e.g. Teo, Srivastava, & Jiang, 2009). Consumers do not have any reasons to believe that the information system is useful to accomplish their goals, if the person responsible for the technology is not to be trusted (Pavlou & Chai, 2002). Numerous investigations have already demonstrated the significant relationship of trust with perceived usefulness in the context of electronic commerce (Pavlou & Chai, 2002) and internet banking (Suh & Han, 2002). Consequently, we hypothesize:

H1: Trust in MP positively influences the behavioral intention to use.

H2: Trust in MP positively influences the perceived usefulness.

Perceived data security and fraud risk are both closely related to the trust construct (e.g. Kim et al., 2008). Innovations are commonly associated with risks (Cho, 2004). Since the illegal collection and sale of personal data could harm consumers in a variety of ways (Ratnasingham, 1998), Lwin, Wirtz and Williams (2007) investigated such risks, conceptualized as the likelihood of privacy invasion. They verified these aspects to be a crucial issue in the context of electronic services. Concerning electronic payment systems, the rise of data abuse and the fear of fraud risk is centre stage of consumerism (Levente & Sandor, 2016; Cimiotti & Merschen, 2014). Moreover, MP is often associated with a high loss potential concerning privacy and transaction data (Schierz et al., 2010; Dewan & Chen, 2005; Dong-Hee, 2010). Users feel the need for being in control of the recording and subsequent use of their sensitive data (Kobsa, 2001). Thus, research has shown that concerns about security are large barriers in the adoption of MP (Johnson, Kiser, Washington, & Torres, 2018; Schierz et al., 2010). Consequently, any factors that enhance the perceived security and mitigate the fear of fraud risk increase the likelihood of MP adoption.

H3: Perceived data security has a positive impact on the behavioral intention to use.

H4: Perceived fraud risk has a negative impact on the behavioral intention to use.

As it was shown in several investigations, trust-related aspects significantly impact the intention to use MP (Xin et al., 2013; Zhou, 2014; Khalilzadeh et al., 2017). However, the influence of cultural differences on this relationship is not yet extensively examined. Therefore, Hofstede's dimensions of uncertainty avoidance and individualism vs. collectivism might provide explanations of differences in trust-related impacts. Cultures with a high level of uncertainty avoidance behaviors are organized and have reduced ambiguity and anxiety in the use of new technology (Bankole & Bankole, 2017). As technological solutions are more predictable than human solutions, they seem to be more attractive to them (Hofstede, 2001). In contrast, individuals of cultures with a low level of uncertainty avoidance would trust more on their competence to evaluate a situation and value new technologies (Veiga, Floyd, & Dechant, 2001). MP, as well as mobile banking, provides an organized and thoroughly structured platform with strict regulations regarding data security and fraud risk (e.g. Google, 2019). This is of particular interest in high-level uncertainty avoidance cultures. Therefore, these cultures have a higher initial trust level in those marketable technologies (Bankole & Bankole, 2017), whereupon we expect trust to have a greater influence in low-level uncertainty avoidance

countries. Additionally, nations high in individualism rely on privacy protection and are more likely to possess insurance (Hofstede, 2001). They will be more apt to engage in a behavior if they feel to have enough control over the situation (Dinev et al., 2009). A high level of trust in the technology might provide this feeling of control and is positively associated with the intention to adopt MP (Xin et al., 2013). Consequently, we assume that the effect of trust-related aspects would be stronger for countries high in individualism and low in uncertainty avoidance.

H5: The impact of trust-related aspects on the behavioral intention to use MP is higher in the USA than in Germany.

According to the TAM, a technological system with a high value on PEU is assessed to be more useful. Furthermore, both variables affect the individuals' attitude towards using a technology, which itself affects the BI a technological system (Davis, 1989). Modern applications for M-payment transactions are designed to be easy to use, which results in a greater likelihood of being adopted and also perceived as useful by the customer. Moreover, a consumer evaluate M-payment as useful, if the system will improve their efficiency during the payment process. The faster and easier a consumer can pay at the POS the more likely the system will be used. The relationship between PU, PEU and BI has been verified in a wide range of M-payment research (e.g. Guhr et al., 2013; Kim et al., 2010). Consequently, we suggest a positive correlation between PEU and PU as well as between both constructs and the BI.

H6: Perceived ease of use has a positive impact on the behavioral intention to use M-payment.

H7: Perceived ease of use has a positive impact on the perceived usefulness of M-payment.

H8: Perceived usefulness has a positive impact on the behavioral intention to use M-payment.

As we could find in previous research, perceived usefulness and perceived ease of use had a positive effect on the behavioral intention to use information systems in different countries (e.g. Guhr et al., 2013; Lee et al., 2013; Straub et al., 1997). Further, Guhr et al. (2013) observed a stronger influence of these two variables on the intention to use MP in Germany compared to the USA. The underlying rationale might be reasoned in the cultural differences of uncertainty avoidance. In order to reduce uncertainty, cultures high in uncertainty avoidance especially mitigate unknown situations. Thus, technological solutions seem to be more attractive to them, as these are more predictable than human solutions (Hofstede, 2001). However, specific technological requirements must be met to reduce uncertainty. The easier a technological system is to interact with, the higher the personal control in interacting with the system (Lepper, 1985). Additionally, people will use a technological system when they evaluate the system to be useful for fulfilling their personal needs, for improving their performances and to strengthen

the quality of performing a transaction (Davis, 1989; Kim et al., 2010; López-Nicolás, Molina-Castillo, & Bouwman, 2008). Consequently, a technological system assessed as easy to use and useful can reduce uncertainty in performing a task (Davis, 1989). Therefore, high uncertainty avoidance cultures focus more on the technological aspects of a mobile service (e.g. Hung & Chou, 2014). In the case of bank services, Ladhari, Pons, Bressolles, and Zins (2011), as well as Al-Smadi (2012), proved that consumers in such cultures put an increased emphasis on the usefulness and ease of use of these services. Contrary, cultures low in uncertainty avoidance do not seem to need the added assurance of ease of use and usefulness (McCoy, Galletta, & King, 2007). As MP is assessed to be a fast and easy way to facilitate the payment process at the point of sale (Trütsch, 2016), we assume the following hypothesis:

H9: The impact of technological aspects on the behavioral intention to use MP is higher in Germany than in the USA.

Corresponding to the explanation of the trust relationships, we expected social influence to have a twofold influence in our research model. Venkatesh and Davis (2000) have suggested the integration of social influence into the TAM and illustrated the relationships between social influence and the TAM variables perceived usefulness and intention to use. Further researches verified this positive relationship between social influence and behavioral intention (Agarwal & Karahanna, 2000; Venkatesh et al., 2003), especially in the case of online services (Bauer, Barnes, Reichardt, & Neumann, 2005; Luarn & Lin, 2005; Richard & Meuli, 2013; Teo & Pok, 2003) and in the domain of MP (Thakur, 2013; Yang et al., 2012). This correlation can be explained by the consumers' beliefs that important referents expect them to perform a specific behavior to enhance one's status within a social system. Thus, people may perform a behavior, even if it is not in accordance with one's beliefs (Venkatesh & Davis, 2000). Besides the direct relationship, Hong and Tam (2006) identified that social influence affects the adoption intention indirectly via perceived usefulness. Furthermore, Lu, Yao and Yu (2005) confirmed a positive direct influence on perceived usefulness in the case of mobile Internet services. A consumer may incorporate the beliefs of important referents into one's own (internalization) and adopt the attitude about the usefulness of technological systems (Kelman, 1958; Warshaw, 1980). Additional, the social expectation that one should intend using a technology can enhance someone's perception of the technology's value (Salancik & Pfeffer, 1978). Therefore, we hypothesize:

H10: Social Influence has a positive impact on the behavioral intention to use MP.

H11: Social Influence has a positive impact on the perceived usefulness of MP.

Individualism vs. Collectivism differs by the extent to which individuals are integrated into groups (Hofstede, 1980). Individuals that belong to an individualistic culture are expected to look only after themselves and their families as ties between individuals in this cultural setting are loose. On the other hand, cultures that score low in individualism are integrated into a group from birth onwards. Therefore, they put higher emphasis on belonging to and respecting the opinion of other society members as well as adapting their views relatively easily to their environment (Hofstede, 2001; McCoy et al., 2007). The results of a meta-analysis by Bond and Smith (1996) could also verify these findings, indicating that more collectivistic cultures tend to show higher levels of conformity than individualistic cultures. Consequently, they attach more importance to the opinions of others (e.g. Shiu, Walsh, Hassan, & Parry, 2015), making them more likely to follow the advice of their familiar bank employees, who recommend them to adopt electronic banking (Zheng et al., 2013). Thus, a stronger correlation between social influence and the behavioral intention to use M-Payment for those countries can be assumed due to social pressure or affiliation motivation.

Furthermore, consumers may perform a behavior to feel more integrated into their social environment, even if they are not pleased with the demonstrated behavior or its consequences themselves (Venkatesh & Davis, 2000). The “Social Identity Theory” by Tajfel and Turner (1986) encompasses a possible explanation of this behavior. According to this theory, people categorize themselves into various groups, which are in correspondence to their behavior in order to reach a positive social identity. To encourage the belonging to a chosen in-group, individuals can demonstrate a specific normative behavior (Hogg & Terry, 2000; Tajfel & Turner, 1986) such as technological adoption (Wieseke, Kraus, & Rajab, 2010). This is particularly true for collectivistic individuals as norms, beliefs, and values of the in-group become more salient for them. As a result, they become more receptive to a complying behavior regarding these norms (Bond & Smith, 1996; Marcus & Kitayama, 1991; Triandis, 1989).

Several researchers have hypothesized that the relationship between social influence and the behavior intention to use a technology is stronger for collectivistic cultures. While some investigations could not support the assumption of a moderating impact of individualism/collectivism in information system research (e.g. Srite & Karahanna, 2006; Li, Hess, McNab, & Yu, 2009), others showed that in more collectivistic cultures, social influence has a stronger influence on the behavioral intention to adopt new technologies (Dinev et al., 2009; Lin, 2014; Tarhini, Hone, Liu, & Tarhini, 2017). Nevertheless, as valid results in the domain of MP are missing, we assume that high individualistic countries do not emphasize

social influences so strong compared to more collectivistic cultures when it comes to the behavioral intention to use MP.

H12: The impact of social influence on the behavioral intention to use MP is higher in Germany than in the USA.

Technological innovativeness is a consumer's inclination to be a pioneer in using technology-based systems (Parasuraman, 2000). Rogers (2003) classified different groups of consumers based on his time-dependent concept of innovativeness. He named innovators and early adopters to be the first consumers of innovative technologies (Rogers, 2003). Such innovators are confident in their technical skills and appreciate the potential benefits of technological innovations (Saaksjarvi, 2003). Therefore, subsequent research identified a positive relationship between domain-specific innovativeness and the adoption of Internet shopping (Citrin, Spratt, Silverman, & Stem, 2000; Lee, Temel, & Uz Kurt, 2016). In the domain of MP, Guhr et al. (2013) used this scale as part of the technology readiness construct and identified a positive effect on the intention to use MP. Further, Slade et al. (2015) could verify a positive relationship in the case of remote MP, while Tan, Ooi, Chong and Hew (2014) found innovativeness to be the most significant predictor of behavioral intention in case of proximity MP. As MP is still in an early stage of technological diffusion, we assume the following hypothesis:

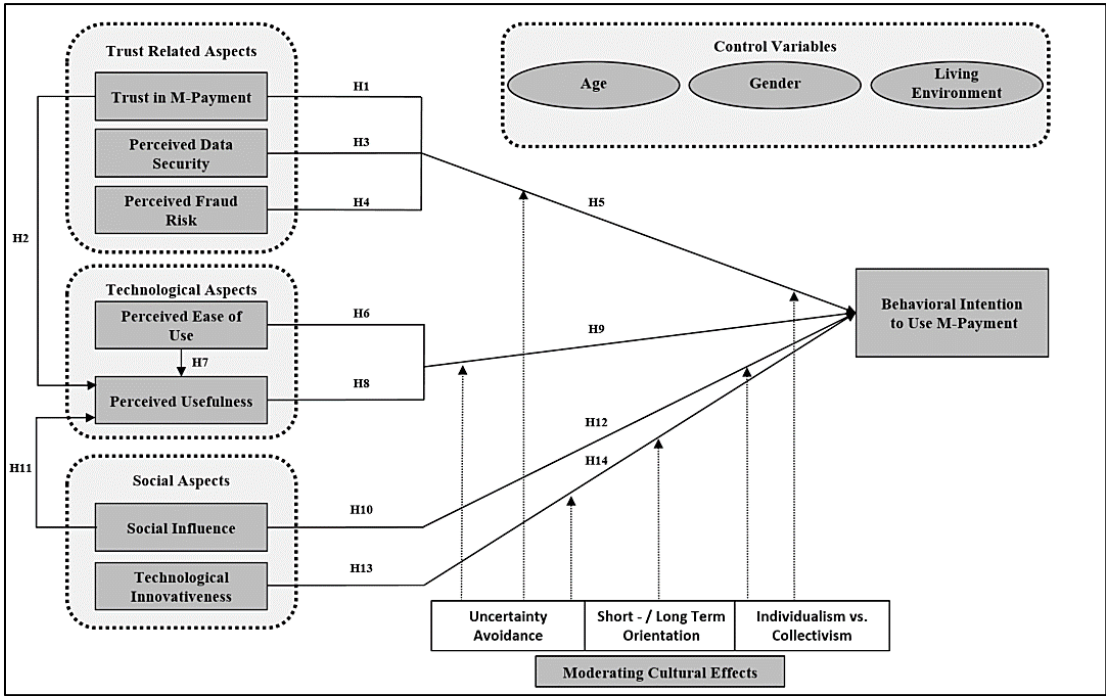
H13: Technological innovativeness has a positive impact on the behavioral intention to use MP.

Subsequently, the cultural dimensions of uncertainty avoidance and short- vs. long term orientation might help to explain a moderating role of culture within this relationship. Cultures scoring low in long-term orientation prefer fostering virtues of the present and past, whereas cultures with a high long-term orientation take a more pragmatic approach. They are more oriented towards the future and can adapt their traditions easily to changing conditions (Hofstede, 2001; G. Hofstede, G. J. Hofstede, & Minkov, 2010). This pragmatic approach correlates with the properties of people scoring high in technological innovativeness. They are defined as persons who adopt new technological products earlier compared to others within their social system based on an intrinsic motivation to try out new technological possibilities (Agarwal & Prasad, 1998; Bruner & Kumar, 2007). Thus, we expect the influence of innovativeness on the adoption of new technologies to be stronger in countries scoring high in long-term orientation.

Furthermore, new services carry uncertainty, which hampers its diffusion. People with a high level of technological innovativeness are more willing to take risks and are better informed about new technologies (Rogers, 2003). As the level of uncertainty avoidance is lower in the USA, people are more open-minded to innovation why they are rather searching for information about such novelties. In contrast, people in countries scoring high in uncertainty avoidance are only taking risks they are known (Hofstede, 2001). Therefore, particular attention is paid to the group of well-informed and risk-taking innovators while the MP diffusion process in Germany. Consequently, we argue that technological innovativeness will have a higher impact on the behavioral intention to use MP for high-level uncertainty avoidance countries. This line of argumentation is supported by the investigation of Guhr et al., (2013), who verified significant results for the relationship between technological readiness and the behavioral intention to use MP in Germany but not for the USA.

H14: The impact of technological innovativeness on the behavioral intention to use MP is higher in Germany than in the USA.

Figure 1. Research Model.



Research Design and Method

Operationalization of the Constructs

The TAM forms the theoretical basis of this examination and has been adapted to the subject of investigation. All variables selected could verify their goodness of fit in several investigations mentioned below. We used the behavioural intention to use MP as the dependent variable (e.g. Davis, 1989; Venkatesh et al., 2003). As a far lower dissemination of this payment method was expected in Germany, implementing this variable was appropriate to measure current usage and possible usage. As independent variable we used “perceived ease of use” to evaluate how much effort is required to handle MP technology (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). Furthermore, “perceived usefulness” measures the extent to which a person views the usage of MP as helpful to improve one’s efficiency and effectiveness (Davis et al., 1989; Nysveen, Pederson, & Thorbjørnsen, 2005).

Additionally, we enriched the model by the variable “trust” which was recognized to be a central indicator for the intention to use MP (Arvidsson, 2014; Xin et al., 2013). Through the help of this independent variable, we wanted to determine the general trust in MP systems (Chandra, Srivastava, & Theng, 2010; Gefen, 2000; Xin et al., 2013; Zhou, 2014). Privacy concerns are of special interest regarding the rising need of data security, as disclosing sensitive financial data is required to conduct mobile payment processes. Therefore, we measure the extent to which a consumer is wary that MP providers are gathering personal information and using it for business purposes “data security” (Demoulin & Zidda, 2009; Kim et al., 2008; Leenheer, van Heerde, Bijmolt, & Smidts, 2007). Furthermore, the abuse of transaction data “fraud risk” was of special interest. The factor focuses on the degree of security a person perceived when using MP services (Luarn & Lin, 2005; Schierz et al., 2010). Additionally, the integration of “social influence” was of importance for the explanatory power of our research model. This variable measures the degree to which consumers are influenced by their environment. Following Yang et al. (2012), we modelled the construct by combining subjective norm and image (Thakur & Srivastava, 2014; Yang et al., 2012). Finally, “technological innovativeness” was expected to be an indicator for the intention to use, as it showed to be a distinguishing criterion between the analyzed cultures. The variable pays regard to the extent to which a consumer describes him/herself as a technology pioneer and opinion leader (Mathwick, Wagner, & Ramaprasad, 2010; Parasuraman, 2000). The level of agreement was measured using a seven-point Likert scale (1 = strongly disagree, 7 = strongly agree).

Data Collection and Sample

The results are based on a quantitative online survey. Since this study focuses on cross-cultural differences, the questionnaire has two different language versions (German and English). We focused on the behavioral intention to use MPs at the stationary point of sale (dependent variable) and the subjective assessment of “perceived ease of use”, “perceived usefulness”, “trust”, “data security”, “fraud risk”, “technological innovativeness” and “social influence” (independent variables). Furthermore, we inquired the common use of payment processes in daily life. We added a description of a typical MP process at the stationary point of sale at the beginning of the survey to present the subjects with a realistic idea of the procedure. This brought all participants to a comparable level of knowledge regarding the subject under investigation. Lastly, after focusing on the constructs of the model, we requested the sociodemographic data to be able to classify the participants.

The study took place from the 2nd of December 2017 to January 5th 2018. The main distribution channels for the questionnaire were social media platforms such as “Facebook” and the career networks “Xing”. To acquire American participants, personal e-mail lists and the online marketplace Amazon Mechanical Turk was used. The acquisition of survey participants for research using this platform has been proven to be a reliable instrument and a promising alternative for data collection. Mechanical Turk samples were verified as just as representative as other internet samples and even more compared to student samples (Buhrmester, Kwang, & Gosling, 2011; Landers & Behrend, 2015; Paolacci, Chandler & Ipeirotis, 2010). Particularly in the domain of information systems research, important findings could have been replicated using samples collected via Amazon Mechanical Turk (Goodman, Cryder, & Cheema, 2013; Steelman, Hammer, & Limayem, 2014). In order to ensure credibility and a high-quality sample, the platform offers effective targeting options (Peer, Vosgerau, & Acquisti, 2013). Thus, the participants had to match some specific eligibility requirements to take part in the survey and to get their compensation. First, they had to be American and experienced in taking part in surveys. Second, they had to have a high approval rate. Consequently, only those were getting access to the questionnaire, which before were approved to be reliable in the execution of completed tasks. Finally, they had to be older than 18 years of age. In order to validate our survey, we conducted a pre-test, where we collected data from a sample of 30 participants in Germany and the USA to avoid uncertainties concerning the construct validity and to ensure an accurate understanding of all questionnaire elements.

As a result, 1185 persons participated in the survey, with 921 datasets being usable for further examination. The sample was segmented according to cultural belonging into the group of U.S. and German citizens. We could reach a balanced ratio of 461 U.S. and 460 German citizens. 34.3 percent of the U.S. citizens have already paid mobile at the point of sale, while only 11.3 percent of the German citizens had done so. A realistic distribution of the living environment of the participants is mirrored through this dataset. Thus, in the USA comparatively more people live in cities (United Nation, 2014). Therefore, we could find a higher rate of urbanization for U.S. compared to German citizens (54.7 to 37.6 percent). The following table 2 visualizes the composition and distribution of the samples.

Table 2. Composition and distribution of the samples.

Variable	Characteristic	Frequency		Percentage (%)	
		USA	Germany	USA	Germany
Gender	Male	235	232	51.0	50.4
	Female	226	228	49.0	49.6
	Total	461	460	100.0	100.0
	Male total		467		49.3
	Female total		454		50.7
Age	17 - 24 Years	83	247	18.0	53.7
	25 - 34 Years	185	154	40.1	33.5
	35 - 85 Years	193	59	41.9	12.8
	Total	461	460	100.0	100.0
	Average age in Years per Country	36	27		
Average age in Years overall		32			
Occupation	Pupil	1	7	0.2	1.5
	Student	24	270	5.2	58.7
	Civil Servant	3	12	0.7	2.6
	Employee	262	109	56.8	23.7
	Employee in leading position	33	22	7.2	4.8
	Self-employed	83	21	18.0	4.6
	Housewife/-husband	25	3	5.4	0.7
	Out of work	12	1	2.6	0.2
	Retired or pensioned	13	8	2.8	1.7
	Other professional activity	5	7	1.1	1.5
	Total	461	460	100.0	100.0
Living environment	Rural	97	84	21.0	18.3
	Provincial	112	203	24.3	44.1
	Urban	252	173	54.7	37.6
	Total	461	460	100.0	100.0

Usage Mobile Payment	People who already paid mobile at the Point of Sale	34.3	11.3
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Results

Measurement Model

As this study aims to identify group differences between Germany and the USA, we validated the measurement and structural model for both groups. To evaluate the data, we used the “IBM SPSS AMOS 25” statistical software (Arbuckle, 2017). First, an exploratory factor analysis was conducted and confirmed the assumed one-dimensionality of the variables under investigation. Second, we assessed the reliability and validity of the used scales by calculating Cronbach’s alpha, composite reliability (CR), convergent validity as well as discriminant validity for both groups. Our analysis indicated that all constructs exceeded the recommended thresholds of 0.70 (Nunnally, 1978) for Cronbach’s alpha. We used factor loadings, CR and average variance extracted (AVE) to assess convergent validity. Factor loadings are recommended to exceed 0.5 (Fornell & Larcker, 1981; Hair, Anderson, Tatham, & Black, 1995), CR should be above the value of 0.8 (Nunnally & Bernstein, 1994) and AVE should exceed 0.5 (Barclay, Higgins, & Thompson, 1995). As visualized in table 3 and 4, all the criteria for convergent validity were satisfied.

Following the approach of Fornell and Larcker (1981), discriminant validity is established by showing that the average variance extracted through one construct is greater than its shared variance with the other variables, which is measured by their squared correlations. It is equal to the approach of Fornell and Larcker (1981) to illustrate discriminant validity by showing that the square roots of the AVEs are greater than the corresponding off-diagonal inter-construct correlations (Henseler, Ringe, & Sarstedt, 2015) as shown in table 5 for the entire sample and table 6 for the German and the US sample separately.

Table 3. Internal reliability and convergent validity of the measurements for the total sample.

Construct	Item	Internal reliability		Convergent and discriminant validity	
		Cronbach's α	Factor loading	CR	AVE
Perceived ease of use (EU)	EU 1	.912	.832	.935	.743
	EU 2		.835		
	EU 3		.889		
	EU 4		.872		
	EU 5		.880		
Perceived usefulness (PU)	PU 1	.925	.883	.927	.808
	PU 2		.926		
	PU 3		.887		
Data security (DS)	DS 1	.905	.912	.908	.767
	DS 2		.921		
	DS 3		.787		
Fraud risk (FR)	FR 1	.939	.891	.940	.839
	FR 2		.936		
	FR 3		.919		
Technological innovativeness (TI)	TI 1	.866	.806	.888	.665
	TI 2		.754		
	TI 3		.830		
	TI 4		.866		
Social influence (SI)	SI 1	.927	.689	.918	.694
	SI 2		.713		
	SI 3		.920		
	SI 4		.923		
	SI 5		.887		
Trust in M-payment (TR)	TR 1	.967	.881	.967	.881
	TR 2		.947		
	TR 3		.963		
	TR 4		.962		
Behavioral Intention to Use M-payment (BI)	BI 1	.975	.982	.976	.931
	BI 2		.961		
	BI 3		.951		

Table 4. Internal reliability and convergent validity of the measurements separated for Germany and USA.

Construct indicators	Germany (n=460)				USA (n=461)			
	Factor loadings	Composite reliability	Cronbach's alpha	AVE	Factor loadings	Composite reliability	Cronbach's alpha	AVE
Perceived Ease of Use (EU)								
EU 1	.824	.924	.925	.709	.891	.952	.954	.798
EU 2	.779				.908			
EU 3	.867				.911			
EU 4	.874				.852			
EU 5	.863				.902			
Perceived Usefulness (PU)								
PU 1	.848	.911	.912	.774	.940	.940	.937	.839
PU 2	.889				.951			
PU 3	.902				.854			
Data Security (DS)								
DS 1	.862	.874	.872	.699	.940	.934	.932	.826
DS 2	.876				.950			
DS 3	.765				.832			
Fraud Risk (FR)								
FR 1	.876	.919	.918	.791	.880	.941	.940	.842
FR 2	.915				.939			
FR 3	.876				.932			
Technological innovativeness (TI)								
TI 1	.807	.878	.887	.644	.814	.898	.903	.689
TI 2	.733				.777			
TI 3	.810				.850			
TI 4	.856				.875			
Social influence (SI)								
SI 1	.664	.907	.916	.666	.668	.911	.922	.675
SI 2	.689				.689			
SI 3	.915				.918			
SI 4	.907				.916			
SI 5	.869				.879			
Trust in M-payment (TR)								
TR 1	.866	.953	.952	.836	.886	.972	.971	.897
TR 2	.908				.962			
TR 3	.946				.966			
TR 4	.936				.971			
Behavioral Intention to Use M-payment (BI)								
BI 1	.981	.966	.964	.903	.985	.981	.980	.944
BI 2	.961				.948			
BI 3	.908				.981			

Table 5. Inter-construct correlations and square roots of AVE for the total sample.

Construct	EU	PU	DS	FR	TI	SI	TR	BI
EU	.862							
PU	.439	.899						
DS	-.213	-.283	.876					
FR	.329	.446	-.501	.916				
TI	.607	.303	-.127	.238	.815			
SI	.078	.376	-.233	.446	.114	.833		
TR	.492	.623	-.527	.764	.359	.432	.939	
BI	.425	.682	-.392	.569	.386	.526	.735	.965

Table 6. Inter-construct correlations and square roots of AVE separated for Germany and USA.

Germany (n=460)									USA (n=461)								
Construct	EU	PU	DS	FR	TI	SI	TR	BI	EU	PU	DS	FR	TI	SI	TR	BI	
EU	.842								.893								
PU	.456	.880							.339	.916							
DS	-.108	-.211	.836						-.262	-.267	.909						
FR	.277	.463	-.284	.889					.285	.330	-.602	.917					
TI	.580	.293	-.035	.175	.803				.639	.276	-.187	.267	.830				
SI	.007	.306	-.096	.346	.088	.816			.000	.332	-.236	.386	.092	.822			
TR	.491	.650	-.304	.727	.371	.337	.915		.424	.522	-.649	.729	.339	.355	.947		
BI	.384	.683	-.240	.494	.387	.488	.678	.950	.381	.609	-.452	.524	.366	.448	.708	.971	

To evaluate the measurement model's fit, we combined numerous model fit indices to reduce the risk of committing type 1 and type 2 errors (e.g. Hu & Bentler, 1995; Sharma, Mukherjee, Kumar, & Dillon, 2005). Hu and Bentler (1995) suggest for case numbers between 150 and 5000 to combine the Tucker-Lewis Index (TLI), the Incremental Fit Index (IFI), the Comparative Fit Index (CFI) as well as the Standardized Root Mean Square Residual (SRMR) to validate the model. This combination promised the lowest risk of committing type 1 and type 2 errors. Additionally, we included the ratio χ^2 to the degrees of freedom (χ^2/df), the normed fit index (NFI) and the root mean square error of approximation (RMSEA). The ratio χ^2 to the degrees of freedom (χ^2/df) = 2.828, CFI = .977, NFI = .965, IFI = .977, TLI = .973, RMSEA = .045 and the SRMR = .050 indicated a good model fit. To summarize, the analysis provides support for the measurement modeling for both cultures.

Structural Model and Hypothesis Test

The structural model assesses the assumed relationships among the constructs for the German and the US sample. To validate the structural model, we incorporated the same fit indices as in the measurement model. The ratio χ^2 to the degrees of freedom (χ^2/df) = 2.822, CFI = .977, NFI = .965, IFI = .977, TLI = .973, RMSEA = .044 and the SRMR = .050 indicated a good model fit. Table 7 summarizes the model fit indices of the measurement models and the structural models and shows the recommended values for each fit index.

Table 7. Model fit indices of the measurement and structural model.

Fit index	Measurement model		Structural model		Recommended value
	GER	USA	GER	USA	
χ^2/df	1.596	2.039	1.584	2.050	≤ 3.00 (Homburg & Giering, 1996)
CFI	.979	.972	.980	.972	≥ 0.92 (Joreskog & Sorbom, 1996)
NFI	.947	.948	.947	.947	≥ 0.90 (Fornell & Larcker, 1981)
IFI	.980	.973	.980	.972	≥ 0.90 (Bollen, 1989)
TLI	.975	.967	.976	.967	≥ 0.90 (Homburg & Baumgartner, 1995)
RMSEA	.036	.048	.036	.048	≤ 0.06 (Joreskog & Sorbom, 1996)
SRMR	.042	.056	.042	.057	≤ 0.08 (Hu & Bentler, 1999)

To account for confounding demographic differences and refine the results of the structural model, we controlled for age, gender and living environment. Gender and living environment did not significantly affect the intention to use MP, whereas a significant relationship between age and intention to use was identified for Germany and the US.

The proposed research model achieved a high value of R^2 (BI) = .628 for the US and R^2 (BI) = .648 for Germany. For the USA trust had the highest effect on BI (H1, $\beta = .442$, $p < .001$),

followed by perceived usefulness (H8, $\beta = .266$, $p < .001$), social influence (H10, $\beta = .216$, $p < .001$) and technological innovativeness (H13, $\beta = .114$, $p < .05$). Comparable results could be detected for Germany. Here, perceived usefulness had the highest effect on BI (H8, $\beta = .377$, $p < .001$), followed by the trust aspect (H1, $\beta = .293$, $p < .001$), social influence (H10, $\beta = .258$, $p < .001$) and technological innovativeness (H13, $\beta = .148$, $p < .001$). Surprisingly, our analysis could not confirm an impact of fraud risk (H4, USA: $\beta = -.032$, n.s.; GER: $\beta = -.034$, n.s.) and perceived ease of use (H6, USA: $\beta = .054$, n.s.; GER: $\beta = -.023$, n.s.) on BI for both countries. The relationship of data security on BI was found to be significant in Germany (H3, $\beta = -.069$, $p < .05$) but not in the USA (H3, $\beta = -.044$, n.s.). Thus, we had to reject H4 and H6, whereas H1, H8, H10 and H13 could be confirmed. H3 could be partly confirmed. Furthermore, perceived usefulness was predicted by perceived ease of use (H7, USA: $\beta = .183$, $p < .001$; GER: $\beta = .208$, $p < .001$), trust (H2, $\beta = .386$, $p < .001$; GER: $\beta = .505$, $p < .001$) and social influence (H11, $\beta = .208$, $p < .001$; GER: $\beta = .138$, $p < .001$) in both countries. The summary of the results can be seen in table 8 and 9.

Table 8. Summary of the hypothesis test (GER).

Hypotheses	B (unstandardized coefficient)	SE B	C.R. (critical ratio)	β	P
H1: TR \rightarrow BI	.359	.074	4.848	.296	<.001***
H2: TR \rightarrow PU	.600	.061	9.914	.505	<.001***
H3: DS \rightarrow BI	-.097	.048	-1.996	-.069	<.05*
H4: FR \rightarrow BI	-.049	.071	-0.691	-.034	n.s.
H6: PE \rightarrow BI	-.032	.065	-0.500	-.023	n.s.
H7: EU \rightarrow PU	.294	.068	4.348	.208	<.001***
H8: PU \rightarrow BI	.384	.046	8.334	.377	<.001***
H10: SI \rightarrow BI	.395	.054	7.347	.258	<.001***
H11: SI \rightarrow PU	.208	.064	3.221	.138	<.01**
H13: TI \rightarrow BI	.207	.061	3.398	.148	<.001***

Note: B = unstandardized coefficient, SE B = standard error B, C.R = critical ratio, β = standardized coefficient, p = p-value; (* $p < .05$; ** $p < .01$; *** $p < .001$)

Table 9. Summary of the hypothesis test (USA)

Hypotheses	B (unstandardized coefficient)	SE B	C .R. (critical ratio)	β	P
H1: TR \rightarrow BI	.462	.058	7.992	.442	<.001***
H2: TR \rightarrow PU	.306	.040	7.735	.386	<.001***
H3: DS \rightarrow BI	-.051	.050	-1.018	-.044	n.s.
H4: FR \rightarrow BI	-.039	.061	-0.641	-.032	n.s.
H6: EU \rightarrow BI	.100	.086	1.164	.054	n.s.
H7: EU \rightarrow PU	.258	.067	3.831	.183	<.001***
H8: PU \rightarrow BI	.350	.051	6.812	.266	<.001***
H10: SI \rightarrow BI	.246	.042	5.877	.216	<.001***
H11: SI \rightarrow PU	.180	.040	4.516	.208	<.001***
H13: TI \rightarrow BI	.174	.068	2.558	.114	<.05*

Note: B = unstandardized coefficient, SE B = standard error B, C.R. = critical ratio, β = standardized coefficient, p = p-value; (* p < .05; ** p < .01; *** p < .001)

To evaluate the moderating effect of culture, we followed the procedure proposed by Chin (2000), which was already applied to validate the moderating effects of experience in the domain of MP (Liébana-Cabanillas et al., 2014). According to Chin (2000), interaction effects can be analyzed by comparing the path coefficients of each group and calculate pair-wise t-tests to test for significance.

In a first step, an invariance test through a χ^2 value comparison (and the degrees of freedom) for the overall model and the constrained model was conducted, resulting in a significant difference (table 10). This is important, as the computation of the t-value depends on the invariance of the standard errors. Our results indicate that the standard errors were unequal in the two groups, as the invariance could not be confirmed. In the case of standard error inequality, Chin (2000) proposed to compute a t-test based on the unstandardized path coefficients and the corresponding standard errors. The results and the formula used for the calculation can be seen in table 11.

The results of the moderation analysis could confirm H12, as the coefficient of the effect of social influence towards BI was significantly higher among the German citizens ($\beta_{GER} = .208$; $\beta_{USA} = .180$; $t = 2.18$, $p < .01$). Accordingly, the impact of social influence is higher in Germany. Concerning H5, H9 and H14, the results cannot confirm the made hypothesized assumptions and we had to reject all of them. The influence of technological innovativeness, the trust-related- and technological aspects on BI did not differ between Germany compared to the USA.

Table 10. Invariance analysis

Overall model	χ^2	df	$\Delta\chi^2$	Δ gl	p-Value	Invariant
Unconstrained	1617.36	890	319.56	16	<.001***	No
Fully constrained	1936.92	1006				

Table 11. Results of the moderation hypothesis testing

Moderating effect		Culture					Differences	
Hypothesis	Effect	GER	p	USA	p	t-test		
H5	Trust related aspects							
	TR	→ BI	.359	<.001***	.462	<.001***	-1.10	No
	FR	→ BI	-.049	n.s.	-.039	n.s.	-.11	No
H9	Technological aspects							
	DS	→ BI	-.097	<.05*	-.051	n.s.	-.66	No
	EU	→ BI	-.032	n.s.	.100	n.s.	-1.22	No
H12	Social aspects							
	PU	→ BI	.384	<.001***	.350	<.001***	.50	No
H14	SI	→ BI	.208	<.001***	.180	<.001***	2.18**	Yes
	TI	→ BI	.207	<.001***	.174	<.05*	0.36	No

Procedure suggested by Chin (2000): A multi-group analysis based on Student's t-test: $H_0: B_1 = B_2$,

where $t = \frac{B_1 - B_2}{\sqrt{SE_1^2 + SE_2^2}}$; B_i : path weights; SE_i : standard error of the path in the structural model

p = p-value; (* p < .1; ** p < .01; *** p < .001)

Discussion

Summary of the Results

The aim and motivation of this study was to attain a deeper understanding of MP adoption and diffusion processes. Thus, we developed a research model by integrating important variables of MP and cultural research to compare two western societies characterized by a different level of MP diffusion. Herein, this study followed the call of the renowned scientists Dahlberg et al. (2015), who encouraged multi-country studies concerning MP to ensure a better generalizability of current results. By doing so, we compared Germany and the USA among trust-related, technological and social aspects to investigate differences in the influence of mentioned variables on the behavioral intention to use MP.

The results of the investigation confirmed that the intention to use MP systems differ significantly between Germany and the USA. More precisely, U.S. citizens assessed MP to be more useful, easier to use and more trustworthy. In addition, the intention to use MP was decisively higher among U.S. citizens. In a separate assessment of the dataset, we identified trust in MP to have the strongest impact on the intention to use in the USA, while perceived usefulness exerts the strongest influence in Germany. Additionally, social influence and technological innovativeness were detected as important factors to affect the intention to use

MP in both countries. Concerning the crucial predictors of perceived usefulness, trust was detected to have the strongest correlation in Germany and the USA. But also ease of use and social influence had an impact on perceived usefulness in both countries. Furthermore, Hofstede's cultural dimension of individualism vs. collectivism as distinctive features between chosen cultures were found to moderate the effects between social influence and the BI. We identified that the positive impact of social influence on the BI was significantly stronger in the country with a lower level of individualism. Thus, the impact of social influence on the behavioral intention to use MP is higher in Germany than in the USA. Apart from this moderating effect, we could not detect any other cultural influence on the investigated relationships within our research model. Surprisingly, perceived ease of use and fraud risk did not reveal any significant effects. Data security impact the intention to use for the German sample only. The absent significance of perceived ease of use is in line with the results of Roca et al. (2009), who illustrated that e-investors are more concerned about their investment performance rather than the platform's perceived ease of use. Similar results were found in case of online banking (Selvanathan, Krisnan, & Jun, 2017). Contrary to prevailing findings in MP literature, data security and fraud risk appeared among the factors with a weak or without a significant impact on the BI in the present study. Since German citizens in particular assessed these variables to be problematic in dealing with MP systems, a possible reason can be found in the study of Pousttchi and Wiedemann (2007) and Aydin and Burnaz (2016). They recognized subjective security as not being an important influencer of MP acceptance and BI. The relatively low influence of these security aspects on the BI indicates that users are slowly overcoming this barrier. They expect those systems to be secure so that they do not consider security aspects in their decision-making process to use MP. Thus, the consumers' security concerns are less important than their concerns regarding general trust to the provider and the perceived usefulness of the system (Aydin & Burnaz, 2016).

Theoretical and Practical Implications

The examination of cultural differences between two western societies concerning the BI proximity MP widens the scope of current research and responds to the call for deeper investigations in this area (Dahlberg et al., 2015). For this reason, the extracted findings allow us to draw more relevant theoretical and practical implications. With the development and validation of an extended TAM, our study attempts to contribute to a deeper understanding of MP adoption. Although the TAM is a parsimonious and robust model of technology acceptance behaviors across countries (e.g. Rose & Straub, 1998), we posit that some extensions need to

be done to explain the intention to use MP more appropriately. Consequently, the study adopted and empirically tested several constructs previously considered as being beneficial to investigate MP adoption. Beside trust-related aspects (Xin et al., 2013; Zhou, 2014) also personal traits, such as social influence (Dinev et al., 2009; Thakur, 2013; Yang et al., 2012) and technological innovativeness (Guhr et al., 2013; Thakur & Srivastava, 2014) were included. To examine the cultural influence between Germany and the USA considering MP adoption, Hofstede's (2001) cultural dimensions were integrated into our model. Thus, we could develop our model based on the integration of different theories and could make an essential contribution to the emerging literature on MP.

The results justify the extension of TAM through personal trait factors as social influence and technological innovativeness were found to be crucial drivers for the intention to use MP in both countries. Further, our results confirm the importance of social influence, particularly for inexperienced users detected by Venkatesh and Davis (2000). As the adoption of MP is distinctly higher in the USA, we could verify that the impact of social influence on the behavioral intention to use MP is higher in Germany. Besides, technological innovativeness was also found to have an influence in Germany as well as in the USA, supporting the integration into our research model. Due to the growing importance of word-of-mouth communication on consumer attitude and purchase intention (Tang, 2017), innovators represent a crucial customer group for the diffusion of innovation. Thus, the detected results are particularly essential for marketing research.

Contrary to previous expectations, the core TAM variable "perceived ease of use" did not show a significant effect on the BI for both countries investigated. According to Venkatesh et al. (2003), perceived ease of use will only show a significant influence on attitude in the initial stage of technology adoption. This could be an explanation of why there is no significant influence in the USA as MP is far more adopted there than in Germany. Additionally, other research regarding mobile services in general and particular in mobile payment was not able to confirm the significant effects of ease of use on the behavior intention either. (Slade et al., 2015; Zarpou et al., 2012). Besides, the two trust-related aspects of data security (only for the USA) and fraud risk did not show a significant effect on the BI. Consumers might consider security aspects to be a fundamental prerequisite so that their decision to use an MP system depends on other factors.

Further, it is essential to figure out in which way cultural differences related to BI, not only for the theory but also for MP providers in order to develop solutions that meet the customers'

needs. Through the integration of Hofstede's cultural dimensions into this field of digital technology, divergent findings of technological adoption and diffusion can be explained. This is particularly true for countries with very different cultures. While Dastan and Gürlér (2016) identified perceived usefulness not to be a significant predictor for MP adoption in Turkey, Kim et al. (2010) for Korea and Liébana-Cabanillas et al. (2014) for Spain identified the opposite effect. Thus, current results should be reconsidered concerning cultural differences, even if culture seems to be similar as our results can show. Especially in the theoretical explanation of divergent impacts of social influence on BI, Hofstede's proven approach seems reasonable. In conclusion, we can state that the defined research model can be transferred to other fields of technological innovation studies, as the results concerning the goodness of fit of the models are satisfactory. However, as we could only detect one moderating effect of Hofstede's cultural dimensions, this investigation contributes to the discussion if national/regional culture averages becoming obsolete in times of continuing globalization (Tara et al., 2008).

We also suggest practical recommendations to recognize influencing factors for the expedient control of MP strategies. For a successful implementation of MP services, it is of crucial relevance to get knowledge about the consumers' crucial drivers explaining their usage intention (Bailey, Pentina, Mishra, & Ben Mimoun, 2017). As MP is well established in the USA, a comparison to a less-developed market such as Germany can create valuable insights for marketing strategies. A broad range of companies such as technology companies, credit card providers, banks and retailers within the MP eco-system can profit from the growing market and its enormous potential. While successful MP business models cannot directly be transferred to different cultural contexts due to varying market constraints (Ondrus et al., 2009), the same applies to marketing communication strategies. MP providers need to know the crucial drivers of the intention to use such a system to emphasize these issues within their customer communication. Taking the results into account, they could benefit regarding the process of design, style and configuration of MP applications.

We identified trust to have a very high impact on BI in Germany and the USA. Analyzing the content of the websites of the most established MP providers in Germany and the USA, we can develop target-oriented recommendations. While "Google pay" and "PayPal" emphasize the trust-related aspect on their promotion websites in the USA, more profound trust-building remarks are missing on the German "PayPal" website (Google, 2019; PayPal, 2020 a, b). Furthermore, the German "Sparkasse" corrected false rumors around MP safeness to build up a trustful relationship with potential users (Sparkasse, 2018). Apple copied these strategies to promote its market entry in Germany and to improve its market development in the USA

(Apple, 2020). As banks are trusted the most regarding handling payment transactions (e.g. Mallat, 2007), technology companies should enter into cooperation with such institutes to establish their systems on both markets.

As described, perceived ease of use is not a significant predictor of the intention to use MP, whereas perceived usefulness had a strong correlation with BI in both countries. By analyzing the contents of named MP providers, we noticed that all of them highlight the fast and easy way to use MP. Instead of the device's intuitive use, we recommend to emphasize on the aspects of usefulness and trust in the system. All providers point out the usefulness of paying mobile at the point of sale, but it can be improved by offering value-added services. For instance, Google pay offers the possibility to pay friends in the USA, even those not using the service, or to buy transit tickets online and save it directly within the application (Google, 2019). Google's strategy can be a role model for entering the German market. Additionally, a cooperation with Payback as the largest German provider of bonus systems might be an option of adding value to MP customers.

Regarding the relationship of social influence on the behavioral intention to use MP, a significant influence was ascertained. Additionally, the results verified that the impact of social influence on the behavioral intention to use MP is higher in Germany. German citizens score lower in individualism compared to the U.S. citizens. Thus, they pay more attention to the opinion of other society members and they adapt their views relatively easily to their environment (Hofstede, 2001; McCoy et al., 2007). In order to guide social influence on target customers, provoking electronic word of mouth processes appear to be a powerful instrument with the potential to change the attitude towards using a service (e.g. Lee, Rodgers, & Kim, 2009). Therefore, MP providers in Germany should try to trigger word of mouth concerning their systems on social platforms such as YouTube and Facebook. This gains in importance because technological innovativeness has a significant impact on BI in Germany and the USA. As people scoring high in technological innovativeness are essential for the diffusion process of innovative technologies (Rogers, 2003), a target-orientated communication of this group in order to provoke electronic word of mouth process promises great potential for German marketers.

Limitations and Future Research

We are aware that the research presented may have some limitations. This offers opportunities for further research by investigating not only inter-, but also intra-cultural differences

concerning the behavioral intention to use MP. Thus, differences in age, income and the educational background can lead to varying results. Furthermore, investigating the circumstances of the living environment is very interesting because many rural areas lack in high-speed broadband, a necessity in today's economy. This hampers the diffusion of Internet technologies (Whitacre, 2010). Analysing existing research papers in the domain of MP has led to the presented model. However, there might be some disregarded independent variables not mentioned in the research model, which can be responsible for differences in the use of the MP depending on cultural disparities between Germany and the USA. To investigate cultural differences in the intention to use MP more comprehensively, variables representing individual specific differences such as mobile self-efficacy (Duane, O'Reilly, & Andreev, 2014) and mobility (Lu, Wei, Yu, & Liu, 2017) can be used. Although Hofstede's cultural dimension theory is extensively used and empirically validated in information system research (e.g. Srite & Karahanna, 2006) there are a few critiques. Herein, several studies identified national cultures to be fast changing constructs (Taras et al., 2009) while others believe that culture is relatively enduring (e.g. Hofstede, 2001). Therefore, Hofstede's cultural indicators are assessed as a stable and slowly changing representation of culture (Dinev et al., 2009). Additionally, people across the world have different cultural values. Consequently, they might be influenced by more than just geography (Taras et al., 2009). Thus, future research could implement selected cultural variables into their model to separate different groups more accurately.

Appendix

Variables	Items	Source	
Trust in M-Payment (TR)	TR 1	I trust mobile payment systems to be reliable.	Arvidsson, 2014; Xin et al., 2013
	TR 2	I trust mobile payment systems to be secure.	
	TR 3	I believe mobile payment systems are trustworthy.	
	TR 4	I trust mobile payment systems.	
Perceived Data Security (DS)	DS 1	I dread that M-Payment transaction Data will be used to gather personal information.	Demoulin and Zidda, 2009; Kim et al., 2008; Leenheer et al., 2007
	DS 2	I fear that the M-Payment Provider will use my personal data for commercial reasons.	
	DS 3	I am not confident about how the M-Payment provider will use my personal information.	
Perceived Fraud Risk (FR)	FR 1	The risk of an unauthorized third party overseeing the payment process is low.	Luarn and Lin, 2005; Schierz et al., 2010
	FR 2	The risk of abuse of usage information (e.g. names of business partners, payment amount) is low when using mobile payment services.	
	FR 3	The risk of abuse of billing information (e.g. credit card number, bank account data) is low when using mobile payment services.	
Perceived Ease of Use (EU)	EU 1	Learning to operate the M-Payment (system) would be easy for me.	Davis, 1989; Davis, Bagozzi and Warshaw, 1989
	EU 2	I would find it easy to get the M-Payment (system) to do what I want it to do.	
	EU 3	My interaction with the M-Payment (system) would be clear and understandable.	
	EU 4	It would be easy for me to become skillful at using M-Payment.	
	EU 5	I would find M-Payment easy to use.	
Perceived Usefulness (PU)	PU 1	Using M-Payment (would) make me save time.	Davis et al., 1989; Nysveen et al., 2005
	PU 2	Using M-Payment (would) improve my efficiency.	
	PU 3	M-Payment (would) be useful to me.	
Social Influence (SI)	SI 1	People who influence my behavior think that I should use mobile payment.	Thakur and Srivastava, 2014; Yang et al., 2012
	SI 2	People how are important to me think that I should use mobile payment.	
	SI 3	People around me who use mobile payment have more prestige than those who not do.	
	SI 4	People who use mobile payment have a high profile.	
	SI 5	Using mobile payment is considered as a status symbol among my friends.	
Technological Innovativeness (TI)	TI 1	You can usually figure out new high-tech products and services without help from others	Mathwick, et al., 2010; Parasuraman, 2000
	TI 2	You keep up with the latest technological developments in your areas of interest.	
	TI 3	You enjoy the challenge of figuring out high-tech gadgets.	
	TI 4	You are always open to learn about new and different technologies.	

Behavioral Intention to Use M-payment (BI)	BI 1	I intend to use M-Payment systems in the near future.	Davis, 1989; Venkatesh et al., 2003
	BI 2	I predict I would use M-Payment systems in the near future.	
	BI 3	I plan to use M-Payment systems in the near future.	

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