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Barriers towards the adoption of mobile payment services

An empirical investigation of consumer resistance in the context of Germany

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Thank you all very much!

Karlstad, June 2017

Kathrin Dotzauer & Fabienne Haiss
Abstract

**Purpose** – Technological innovations continuously impact the daily routines of consumers. In the case of mobile devices, their multifunctionality revolutionizes possibilities for consumers, for example by conducting mobile payments at a point of sale (proximity payments). Despite the advantages of mobile payment services, the number of users of these services is very low among German consumers. Therefore, the purpose of this paper is to examine barriers which impede German consumers from adopting proximity mobile payments by applying the theory of innovation resistance. More specifically, this paper analyzes these obstacles regarding the *usage barrier, value barrier, risk barrier, tradition barrier, image barrier* and the added *information barrier*.

**Methodology** – By utilizing a quantitative research approach with online self-completion questionnaires, 152 answers from German consumers were collected and statistically analyzed in order to empirically test the model of innovation resistance. In addition, the characteristics age and smartphone usage behavior of the participants were analyzed for examining further characteristics of the consumers.

**Findings** – The results indicate that out of the examined six barriers, the *tradition, risk and value barrier* have proven to be significant in influencing the adoption intention of the questioned German consumers towards mobile payment services. Additionally, a connection between the characteristics age and smartphone usage behavior and the adoption intention could be detected.

**Research implications** – A key finding is that an innovation resistance behavior among German consumers towards mobile payment exists according to this study. This paper provides recommendations for service providers for reducing the identified barriers and the consumer resistance for a successful breakthrough of the innovation of mobile payment.

**Originality/Contribution** – This paper contributes to theory by applying the less studied perspective of innovation resistance to the research field of mobile payment, which is a novelty. Furthermore, insights into German consumers were given helping service providers to develop effective marketing strategies to meet the need of the consumers.

**Keywords** – Mobile payment, proximity mobile payment, innovation resistance, adoption barriers, German consumers, smartphones
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<td>Adoption intention</td>
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<td>IB</td>
<td>Image barrier</td>
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<td>Risk barrier</td>
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<td>TB</td>
<td>Tradition barrier</td>
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<td>VB</td>
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1. Introduction

The development of new technologies brings along endless possibilities for new innovations impacting everyday lives. Especially in the field of mobile commerce, the attention for innovations is growing globally (Oliveira et al. 2016). Smartphones do no longer only have the function to serve as a medium to communicate but rather to operate as a multifunctional device enabling consumers for example to perform all kinds of financial services via their smartphones. The possibility to use smartphones or tablets for proximity mobile payments, payments at a point-of-sale (POS) in a store (De Kerviler et al. 2016), offers an alternative to cash or credit card.\(^1\) The innovation of mobile payment (m-payment) revolutionizes these traditional payment methods by utilizing wireless and other technologies of communication (Dahlberg et al. 2015; Oliveira et al. 2016).

In addition, m-payment is supposed to bring along various advantages for all the parties involved in the process. Especially for consumers m-payment services offer a fast and simple alternative to cash while being secure and facilitating purchase overview (Taylor 2016; Hayashi 2012). However, besides the advantages of technological innovations, companies face a high number of innovation failures (Kleijnen et al. 2009) which can be attributable to an innovation resistance behavior of consumers. As a result, challenges and barriers towards the acceptance of innovations appear which could count for the German m-payment market. The source of the skepticism of German consumers towards m-payment remains rather unexplored and therefore needs to be examined more closely, especially when considering the size of the German market. Germany does not only have the largest GDP amongst all European countries but also holds the 4\(^{th}\) position globally behind the US, China and Japan (Knoema 2016). Furthermore, Germany has the highest purchasing power in Europe (GTAI 2017). The importance of the mobile economy in Germany is increasing. Therefore, it requires Germany to continuously focus on what has put them in a leading economic position in the world so far, which is the focus on knowledge and skills in technologies and innovations (ibid).

\(^1\) The focus of this paper will be on proximity mobile payments which is abbreviated as m-payment in the following sections.
1.1. Background & Problem discussion

The increasing number of smartphone users globally has an impact on the development of mobile payment services in general (referring to remote- and proximity mobile payments). While in 2014, 1.57 billion smartphone users were reported worldwide, an increase to 2.87 billion users in 2020 is expected (eMarketer 2016). The rise of the number of smartphones users goes along with the increase of functions smartphones offer, facilitating the everyday life of users, amongst others with the function of performing mobile payment transactions. However, not only the worldwide number of smartphone users in general increases, but also the number of users of m-payment services via smartphones and tablets. The number of users of these services all over the world amounted to 290 million in 2016 and is expected to rise to 663 million users in 2021 (Statista 2016). Taking a more specific look at different continents, one can say that the adoption intention of m-payment services among users in Europe with 13% in 2016 is low compared to other regions such as Asia/Pacific with 37% or Africa with 19% (Nielsen 2016). However, the number of users in Europe are expected to increase as for example in Germany it is expected to rise from 300,000 in 2016 to 6.1 million in 2021 (Statista 2016a).

Consequently, the transaction value is also forecasted to increase and play an important role in the German payment market in the future. In Germany, the transaction value of mobile payments in general amounted to US$15.7 million in 2016 while the value is expected to have an annual growth rate of 85.1% resulting in an expected transaction value of US$827 million in 2021 (Statista 2016a). There are various reasons explaining the increase in the number of users and the transaction value of m-payment services in Germany in the near future, one of them is the status quo of the m-payment market structure. The main global players offering m-payment services at a POS are Samsung Pay, Apple Pay and Android Pay amongst others (Gerstner 2016). However, none of these key players has entered the German market so far, but plan to do so soon (Richter 2017). Countries in Europe offering for instance Apple Pay are to date only from France, Spain, the United Kingdom, Switzerland (Apple 2017) and Ireland (Rentrop 2017). In addition, in-store payment services which are offered by Payback Pay seem to take a promising position as well (UMT 2017). This means that the m-payment market in Germany is considered to expand and develop significantly in the next years, as soon as
the key players will enter the market. Consequently, there is a high need for knowledge about this market and its potential users.

Despite the auspicious numbers forecasting the development of the m-payment market in general, m-payments at a POS are developing only modestly, especially in Germany. As stated by Klotz\(^2\), this development can be explained by the fact that m-payments can so far only be conducted in selected supermarket chains and stores pointing to the early stage of this market. Furthermore, it is crucial to consider the attitude of German consumers. When it comes to the conduction of payments, Germans are supposed to be traditional (ibi research 2015). The most frequently mean of payment is cash, as 80% of the payments at a POS in Germany are made in cash making up half of the total sales at a POS (Deutsche Bundesbank 2016). Especially minor amounts are paid in cash (ibid.). The reason explaining this cash affinity is on the one hand the perceived security of cash and on the other hand, the simplicity when it comes to keeping an overview of expenditures (ibid). The above explained structure of the market is also reflected in the number of consumers of proximity mobile payments, as Germany is far behind other European countries (Deloitte 2016). While people in Italy use their smartphone for m-payments around 11% compared to 9% in the United Kingdom and the Netherlands, Germany in contrast has the least number of users with only 4% (ibid).

Therefore, it is of crucial importance to examine the reasons which prevent German consumers from adopting m-payment services, particularly against the background of the market entry of the aforementioned service providers and the forecasted numbers. By studying the innovations resistance behavior of German consumers, it will be possible to give recommendations for lowering possible adoption barriers. In the end, marketing suggestions for service providers will be made in order to boost adoption rates.

1.2. Research gap

Even though m-payments via smartphones are expected to gain popularity and increase the number of users in the next years, there are challenges to overcome.

First of all, it is important to mention the position of Germany when comparing the number of users to other countries. In 2016, only 4% of the

\(^2\) Maik Klotz Senior Consultant KI Finance, interview on the 15\(^{th}\) of March 2017.
German population conducted m-payments at a POS (Deloitte 2016). The reasons behind the low usage of German consumers for m-payment services remain rather unexplored. Therefore, this paper aims to close this research gap by examining the barriers hindering German consumers from using this cashless payment method, as so far mainly research about the adoption intention to m-payment exists with a focus on other markets (Dahlberg et al. 2015). In addition, academic research on German consumers remains scarce (Khodawandi et al. 2003; Linck et al. 2006; Schierz et al. 2010).

Furthermore, to the knowledge of the authors, there is only one study available examining three barriers to adoption of m-payment among American university students (Pinchot et al. 2016). Therefore, this study takes this different perspective by focusing on reasons behind the innovation resistance behavior and thus on the barriers which impede German consumers from adopting m-payments. For approaching this topic theoretically, models from the innovation resistance theory examining the barriers to adoption will be taken into consideration (Laukkanen 2016; Ram & Sheth 1989). Consequently, the contribution of this thesis will be to apply the innovation resistance theory to the research field of m-payment, which is a novelty. This way, this thesis will contribute knowledge by providing strategical and marketing recommendations for service providers to overcome obstacles consumers face with m-payments.

Lastly, this thesis offers research on proximity mobile payments (De Kerviler et al. 2016). As mobile payment can be understood as a general term describing both remote and proximity payments (Dahlberg et al. 2015), it is rather broad. However, by focusing on proximity m-payments at a POS, the work conducted in this paper is of more specific use as recommendations can be given more specifically. In addition, specifically this kind of payment have so far shown the biggest obstacles in the adoption of consumers and is thus of special interest (De Kerviler et al. 2016).

1.3. Research aims & Question

Resulting from the prior argumentations, the purpose of this research paper is specified more precisely. The aim of this research is:

To examine the barriers which impede the adoption of proximity mobile payment services among German consumers.
More specifically, the following objectives will be covered in this research:

- Testing the theoretical model of Ram and Sheth (1989) in the context of proximity mobile payments
- Verifying whether the added barrier to adoption which is the “information barrier” is a valuable extension of the model
- Examining the influence of age and smartphone usage behavior towards the adoption intention
- Demonstrating the consequences for services providers resulting from the identified barriers

For addressing the aim and objectives, the following overarching research question, which will be the baseline for reaching the subordinated objectives, is developed:

*Which barriers impede the adoption of German consumers to proximity mobile payment services?*

The purpose of this paper is to answer this question and meet the aim and objectives during this research by consulting relevant literature as well as collecting primary empirical data. For the specification of the research question as well as for the objectives, preliminary interviews have been conducted.³

1.4. Structure

The structure of this paper is as follows: the next chapter forms the theoretical framework by describing the context of mobile payment, the theory of innovation resistance dealing with the adoption barriers and prior research on these topics. This is followed by the hypotheses development and the conceptual model of this research, before chapter three covers the methodology. In chapter four the results from collecting primary data are presented which are analyzed and discussed in chapter 5 including theoretical and practical implications. The conclusion as well as limitations and future research possibilities complete this paper.

³ Further information can be found in the method part 3.1 and in appendix 1.
Interview partner: Maik Klotz Senior Consultant KI Finance, interview on the 15th of March 2017; Stefan Krüger VP GK Software AG, interview on the 16th of March 2017 & Klaus Steinkamp Head Cashcloud SA, interview on the 23rd of March 2017.
2. Theoretical framework

For the purpose of studying the barriers to adoption among German consumers, previous research from the fields of mobile payment and innovation resistance is reviewed. This chapter ends with the hypotheses development and the conceptual model of this study.

2.1. Mobile payment

2.1.1. Definition

According to Dahlberg et al. (2008), mobile payment is defined as:

Payments for goods, services, and bills with a mobile device (such as a mobile phone, smart-phone or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies. (Dahlberg et al. 2008, p.165)

With this definition, Karnouskos (2004) adds that during a payment transaction mobile devices have the task to confirm and authorize that a financial value is exchanged for goods and services. Thus, what is new about mobile payment compared to traditional payment methods is that, in this form of transferring value the features of mobile devices are of importance and the financial information of the consumers gets tokenized (Pandy & Crowe 2014). It is a process between three different parties which are costumers, merchants and banks (Ghezzi et al. 2010).

As displayed in figure 1, a distinction is drawn between remote and proximity mobile payments for m-payment (Slade et al. 2013; De Kerviler et al. 2016). Remote mobile payments are characterized as payments for digital content or online purchases with the help of for instance a mobile internet connection. Proximity mobile payments on the other hand, make payments for amongst others ticketing or point-of-sale products possible. As already indicated in the name of the technology, the main characteristic is the physical proximity, so the close distance needed between the source of the payment and the one receiving it (Ceipidor et al. 2012). The payment is transacted with either a QR-code displayed on the smartphone, with a NFC (Near Field Communication) equipped smartphone or via Bluetooth (Slade et al. 2013). With proximity payments, the purchaser has to be on-site in person in order to receive the product or service paid for (Kaymaz 2011).
Figure 1: Classification mobile payment

Proximity mobile payments can replace traditional in-store payment methods as for example payments with cash, debit or credit cards (Dahlberg et al. 2008). The popularity and adoption of proximity m-payments is lower compared to remote m-payments (De Kerviler et al. 2016) and will thus be in the focus of this paper.

According to Hayashi (2012) proximity mobile payment services entail many advantages for consumers. First of all, there is the advantage of portability since card accounts can be collected and consequently, there is no longer the need to carry several plastic cards (ibid). Another advantage is the speed of proximity mobile payment since depending of the amount of a transaction, the consumer only has to show or wave the smartphone in order to conduct the transaction (ibid). Additionally, using proximity mobile payment can have cost saving advantages since smartphones can connect certain promotions of stores to the payments. Moreover, the management and controlling of finances is supposed to be easier (ibid). Nonetheless, one of the greatest advantages is the high level of security connected to m-payment transactions since the dynamic authentications by the chip integrated in smartphones makes the data transfer unique and does not refer to a static PIN (ibid).

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4 Own representation based on Kaymaz (2011, p.25).
2.1.2. Prior research mobile payment

The research area of mobile payment in general is still in its beginnings compared to related fields such as mobile commerce, internet banking or mobile banking (Oliveira et al. 2016). However, the number of studies increased significantly during the last years as between 2007 and 2014, 188 new articles were published (Dahlberg et al. 2015). This points to the increasing importance and relevance of m-payment which corresponding authors attribute to its potential to change the payment market (Hedman & Henningsson 2015), its success in Asian countries (Miao & Jayakar 2016) and its promising future as a technological innovation in general (Keramati et al. 2012; Oliveira et al. 2016).

The dominating research topics in the field of mobile payments up until today are technology and consumer adoption of m-payments (Dahlberg et al. 2015). This accumulation points to the importance of understanding the needs and preferences of consumers in order to be able to offer a service which creates value for consumers as well as for the whole ecosystem behind (Vargo & Lusch 2016). However, Dahlberg et al. (2015) criticize in their literature review that there is a need to explore new topics in m-payment research for enriching the research field.

Furthermore, research studies conducted on German consumers are relatively rare, but of relevance for this research as the focus is set on German consumers. There only exist three scientific papers with slightly different focuses. In 2003, Khodawandi et al. (2003) conducted a quantitative study with 5110 participants on the acceptance of mobile payment procedures in Germany. The main results indicate that security, convenience and cost are rated as the most important criteria for the acceptance of mobile payment services (ibid). In relation to the obviously high relevance of security issues concerning m-payments, Linck et al. (2006) placed the focus of their study on the dimensions of security of m-payments utilizing the empirical data set from Khodawandi et al. (2003). Findings suggest that confidentiality is the most important aspect of security concerns among German consumers (Linck et al. 2006) which indicates that m-payment service providers should pay attention to confidentiality issues when marketing their services in Germany. However, in contrast to these findings stands the research of Schierz et al. (2010) who found out that perceived security and perceived ease of use (related to convenience) are among the least important factors influencing German consumers’ intention to use m-payment. According to Schierz et al. (2010)
perceived compatibility, individual mobility and subjective norm are the most relevant factors.

However, research specifically about proximity mobile payment is scarce (De Kerviler et al. 2016). So far, the attention was mainly directed to the adoption of remote-payment systems by applying different theoretical approaches (ibid). However, amongst the few researchers having examined proximity mobile payment De Kerviler et al. (2016) contributed by studying the key drivers determining the adoption of consumers. Additionally, Slade et al. (2015) discussed a new model of technology adoption aiming to explain effects influencing the intention of non-users to adopt proximity mobile payments. However, the study is limited to the NFC technology and the market of the United Kingdom. The same limitations emerge for two other studies dealing with proximity mobile payments. They focus on NFC payments and conduct their study in Malaysia (Leong et al. 2013; Tan et al. 2014). Hence, so far German consumers have not been in the focus of research about proximity mobile payments.

2.2. Adoption barriers: Creation of innovation resistance

Throughout the literature, a multitude of research focusing on innovations can be found, varying from companies’ perspectives of how to be innovative through consumers’ acceptance of innovations. In general, the innovation literature concentrates on the point of view that all innovations are good, promise progress to consumers and emphasize the improvements over current offers, thus postulating a pro-change bias (Kleijnen et al. 2009; Laukkanen et al. 2007; Ram 1987). However, in practice companies have to face high numbers of innovation failures (Kleijnen et al. 2009) of which one popular example among numerous others is Coca-Cola. They introduced the “New Coke” in 1985 for the purpose of replacing the old “Classic Coke” (The Coca-Cola Company 2012). Coca-Cola had to face resistance from many consumers and even protest groups were formed which in the end resulted in the reintroduction of the “Classic Coke” (ibid).

This example illustrates that innovations also face resistance from consumers preventing innovations from being successful, which has received much less attention in academic research than innovation adoption (Chemingui & Ben lallahouna 2013; Claudy et al. 2015; Groß 2016; Heidenreich & Handrich 2015; Laukkanen 2016). As innovations also always signify change to consumers, resistance to this change is a normal human reaction (Laukkanen et al. 2007;
Ram & Sheth 1989). More specifically, innovation resistance is defined by the pioneers of innovation resistance research Ram and Sheth as:

> The resistance offered by consumers to an innovation, either because it poses potential changes from a satisfactory status quo or because it conflicts with their belief structure. (Ram & Sheth 1989, p.6)

Bearing this in mind, it becomes clear that studying the reasons (barriers) which prevent consumers from adopting innovations is of particular importance as they need to be overcome before adoption can occur (Laukkanen et al. 2008; Ram 1987). Focusing on barriers to adoption, also affects the marketing of innovations as overcoming obstacles to decrease resistance require different strategies than increasing the adoption of innovations (Claudy et al. 2015; Kleijnen et al. 2009). For example, consumers believe that mobile payments are more insecure compared to traditional payment methods (Hayashi 2012). However, marketing strategies which solely focus on the benefits of m-payment such as the factor of convenience, will fail to convince consumers who are concerned with security issues as they will still be in their minds. In consequence, it is of importance for companies to gain knowledge about the barriers and reasons behind hindering consumers from adopting innovations (Claudy 2011; Kleijnen et al. 2009).

For addressing this need, several prior studies have examined a consumer resistance behavior, whereas the most popular research areas are internet and mobile banking (e.g. Laukkanen et al. 2008; Laukkanen 2016) as well as online and mobile shopping (e.g. Lian & Yen 2013; Groß 2016; Gupta & Arora 2017). The subject of mobile payment remains widely unexplored except for the study of Pinchot et al. (2016). In their systematic literature review Heidenreich and Handrich (2015) identified that there is a distinction between active and passive innovation resistance. Active innovation resistance is formed by consumers through specific product- or service-related attributes (ibid) which implies that they decide to resist a concrete innovation due to certain aspects of that innovation. In contrast to this, passive innovation resistance is a more abstract term describing a general resistance towards innovations and change which is not directly related to a product or service (ibid).

Since this paper focuses on the service of mobile payment, active innovation resistance research will be taken into consideration. Active innovation resistance is determined through functional and psychological barriers (see figure 2)\(^5\)

\(^5\) The elements which are in the focus of this research are highlighted in figure 2.
which had been conceptualized and investigated by several researchers (e.g. Kleijnen et al. 2009; Laukkanen 2016; Ram & Sheth 1989).

For illustrating the explanations of this paragraph, figure 2 summarizes the relationships between innovations, innovation resistance, forms of innovation resistance and the barriers to adoption.

2.3. Innovation resistance model by Ram & Sheth (1989)

The scholars Ram and Sheth (1989) were one of the first ones focusing their research on barriers to adoption which create consumer resistance. They presented a theoretical framework for studying innovation resistance. This framework is the most utilized model in innovation resistance research and has been continuously modified and tested in different contexts (Laukkanen & Kiviniemi 2010). Although it is already quite old, the model is still relevant in today’s research and especially suitable for this study as it has been applied in several studies regarding technological innovations such as mobile banking or online shopping (e.g. Antioco & Kleijnen 2010; Laukkanen 2016; Lian & Yen 2013). Further reasons for the suitability of this framework are that so far only one study in the context of mobile payment focused on barriers to adoption.

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6 Own representation based on findings of Heidenreich & Handrich (2015), Kleijnen et al. (2009) and Ram & Sheth (1989).
(Pinchot et al. 2016). However, they identified these barriers by analyzing previous findings from adoption research and did not consider the concept of innovation resistance. Therefore, this study will be the first one taking this different perspective by systematically identifying barriers which impede German consumers from adopting mobile payments with the help of the theory of innovation resistance. Consequently, it was decided to rely on the most proven and utilized framework of Ram and Sheth (1989).

Ram and Sheth (1989) determined five barriers to adoption which are classified as *functional barriers* directly related to the innovation itself and *psychological barriers* resulting from consumers’ conflicts with prior beliefs. The functional barriers include three aspects which are *usage* patterns, *value* of the product or service and *risks* associated when using the product or service (ibid). Concerning psychological barriers, the authors identified that *traditions* of consumers and the *perceived image* of innovations are most relevant. The original model is summarized in figure 3.

![Barriers to Adoption](image)

**Figure 3: Summary of the innovation resistance model by Ram & Sheth (1989)**

Although Ram and Sheth (1989) developed the concept theoretically, the five identified barriers proved to be relevant and valid as several scholars tested

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7 Own representation based on Ram & Sheth (1989).
them in their empirical studies (e.g. Kuisma et al. 2007; Laukkanen et al. 2008; Lian & Yen 2013).

2.3.1. Usage barrier

Innovations require consumers to change as new skills need to be learned and existing habits need to be modified to be able to use a new product or service (Ram & Sheth 1989). Especially in the beginning innovations require some effort from consumers which can result in innovation resistance, particularly when they are satisfied with their current situation and do not see a reason to change (Kleijnen et al. 2009). The usage barrier (UB) refers to the functional usability of an innovation, mainly including two aspects: The first one is whether the new product or service is easy or difficult to use, whereas the second one refers to the degree of change required from the consumers while using the innovation which is mostly conflicting with habits (Laukkanen 2016).

2.3.2. Value barrier

The next barrier discusses the value the innovation provides to the consumer. More specifically, Ram and Sheth (1989) referred to the innovation’s monetary value and that the innovation needs to provide a convincing “performance-to-price value” (Ram & Sheth 1989, p. 8) compared to alternatives. If the new product or service implies higher efforts for consumers, it is likely that it will face resistance. Applied in relation to mobile payments, this involves that consumers perceive the efforts for utilizing m-payment services as being higher than the benefits compared to traditional payment methods. Additionally, other authors include in the value barrier (VB) the general advantage or added value of utilizing an innovation compared to alternatives (Laukkanen et al. 2008).

2.3.3. Risk barrier

With the changes innovations bring to consumers, also certain risks are associated with them as new products or services contain several uncertainties (Ram & Sheth 1989). Consumers being aware of risks are likely to resist innovations. Following Ram and Sheth (1989) the risk barrier (RB) can be divided into four risk types. The first one is physical risk describing that an innovation can harm a person or a property (ibid). Transferred to technological innovations this might contain concerns about privacy, confidentiality and personal information (Chemingui & Ben lallouna 2013). Secondly, economic risks are associated with the price paid for a new product or
service which increases when the price is high (Ram & Sheth 1989). The next type of risk is functional risk referred to the functionality of innovations and the fear that as they are relatively new, do not function properly (ibid). One example from mobile and internet banking is that consumers are especially concerned with problems relating to internet connections (Chemingui & Benallou 2013) which could be relevant for m-payments. An additional aspect of functional risks concerning m-payments, is the fear of being hacked while conducting a payment at a POS as well as the fear of not having enough power on the smartphone (Hayashi 2012). Finally, social risks describe the fear of being judged from other people due to the utilization of a new product or service (Ram & Sheth 1989). This last risk type was found to be less relevant in the technology context (Kleijnen et al. 2009).

2.3.4. Tradition barrier

The tradition barrier (TB) is classified as a cause for psychological innovation resistance and outlined by Ram and Sheth (1989) as an interference of long established and valued routines. This barrier is especially important when it comes to eating habits (Ram & Sheth 1989). However, it was also found to be relevant in the context of technological innovations as for example when utilizing self-service technologies with the absence of customary staff members or the general fear of technology replacing human work (Chemingui & Benallou 2013). The greater the extent to which traditions are disrupted, the greater is the resistance from consumers (Ram & Sheth 1989).

2.3.5. Image barrier

If an innovation is associated with unfavorable aspects of the manufacturing brand, the country of origin or the industry, then consumers form a negative image towards this innovation which is likely to result in resistance (Ram & Sheth 1989). The image barrier (IB) is established uniquely through prejudices or clichés and is therefore perceived individually (ibid). Regarding technological innovations this aspect further involves a consumer’s general readiness towards technologies or the belief that technologies are untrustworthy (Laukkanen 2016). One example from mobile payment is that among many consumers the image of not being a secure payment method was created (Hayashi 2012). However, m-payment can significantly reduce misuses as authentication is rather dynamic through for example NFC chips or facial recognition (ibid). Compared to traditional payment methods where a static
PIN or the same signature is used every time, this brings more security (ibid) which is often not recognized by consumers.

### 2.3.6. Extensions and modifications of the model

Since the publication of the model in 1989, it has been continuously extended. Concerning functional barriers, the barrier of complexity was added which occurs when an innovation is hard to use or understand (Claudy 2011; Ram 1987; Talke & Heidenreich 2014). However, these aspects are closely related to the usage barrier from the original model (Laukkanen & Kiviniemi 2010) making it unnecessary to include as an additional barrier.

Concerning psychological barriers, the information barrier (InfB) was found to be relevant, emerging from a lack of information in relation to a new product or service (ibid). When consumers feel that they do not know enough about an innovation and do not receive help from the company offering the innovation, they are likely to resist as it involves too much uncertainty (Kuisma et al. 2007). The information barrier could be important in the context of mobile payments as market research institutes in Germany found out that consumers do not use this new way of payment due to the reasons that they do not know enough about it or that it is too difficult to receive relevant information (eResult 2015; PwC 2016). In contrast to a lack of information causing resistance, stand the recognitions of Kleijnen et al. (2009) who claim that information overload, referring to the ever-increasing amounts of information available in relation to new innovations, is increasing the resistance. Further, the issue of information overload of consumers was problematized in the expert interview. The barrier of information overload was examined by other scholars as well, mainly in conceptual papers (Herbig & Day 1992; Herbig & Kramer 1994; Hirschman 1987). The author Oreg (2006) hypothesized in a quantitative research about employee’s resistance towards organizational change, that more information about the change will reduce resistance. However, the results indicated the opposite, meaning that less information about the change decreases resistance (ibid). He concluded that the relationship between resistance and information highly depends on the context and should be examined more closely in future research. Therefore, it would be beneficial to examine the barrier of information more thoroughly in this research which will be elaborated more closely in the section of the hypotheses development.

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8 Stefan Krüger VP GK Software AG, interview on the 16th of March 2017.
For a better overview, table 1 summarizes the barriers of the original model and its extensions, relevant for this research.

**Table 1: Overview and definitions of the adoption barriers**

<table>
<thead>
<tr>
<th>Functional Barriers</th>
<th></th>
</tr>
</thead>
</table>
| **Usage barrier (UB)** | • The UB arises due to incompatibilities with existing habits and the need to learn new skills (Ram & Sheth 1989).  
• The UB refers to the functional usability of an innovation.  
• This barrier also includes aspects of complexity of an innovation (Talke & Heidenreich 2014). |
| **Value barrier (VB)** | • The VB exists when an innovation fails to provide a convincing performance-to-price value (Ram & Sheth 1989).  
• The VB also concerns the added value of an innovation (Laukkanen et al. 2008). |
| **Risk barrier (RB)** | **Physical risk:**  
• In terms of technological innovations, it refers to privacy, confidentiality and personal information issues (Chemingui & Lalloua 2013).  
**Economic risk:**  
• The fear of making mistakes while conducting financial transactions over the phone (Laukkanen et al. 2007).  
**Functional risk:**  
• This risk type concerns problems with internet connection, hacking and the battery of the phone (Chemingui & Lalloua 2013; Hayashi 2015).  
• In this risk type aspects of co-dependence can be considered when additional products or services are needed (Talke & Heidenreich 2014).  
**Social risk:**  
• The judgement from other people about an innovation, which is less relevant in a technology context (Kleijnen et al. 2009). |

<table>
<thead>
<tr>
<th>Psychological Barriers</th>
<th></th>
</tr>
</thead>
</table>
| **Tradition barrier (TB)** | • The TB arises when long established routines are disrupted (Ram & Sheth 1989).  
• In a technology context, the TB concerns the general fear of technology replacing human work (Chemingui & Lalloua 2013). |
| **Image barrier (IB)** | • The IB emerges due to negative associations with an innovation (Ram & Sheth 1989). |
| **Information barrier (InfB)** | • This barrier is caused due to a lack of information concerning an innovation (Laukkanen & Kiviniemi 2010).  
• A further aspect of the InfB is that there is information overload concerning a lot of new innovations for mobile phones (Kleijnen et al. 2005). |
2.4. Hypotheses development

Derived from the literature reviewed in the previous sections, hypotheses can be developed. The underlying theory which will be utilized is the innovation resistance theory from Ram and Sheth (1989). Additionally, the InfB will be added for a more comprehensive framework. Furthermore, the conducted preliminary interviews were used to refine the hypotheses.9

2.4.1. Hypothesis 1: Usage barrier

The first barrier is the usage barrier. This barrier proved to have a strong negative relationship to the adoption of innovations as detected in several prior studies, especially in related contexts to m-payment such as mobile and internet banking (Kuisma et al. 2007; Laukkanen et al. 2007; Laukkanen et al. 2008; Laukkanen 2016). Earlier studies on mobile banking suggested that issues concerning the UB include the complexity of services, inconvenience, slowness compared to other methods and authorization problems which all prevented consumers from using the innovation (Chemingui & Ben lallouna 2013; Kuisma et al. 2007; Laukkanen 2016). All these attributes could be of importance in relation to m-payment services. Furthermore, a critical question is whether m-payment will be perceived to provide sufficient advantages over existing payment methods concerning the handling of the service which was also confirmed in the expert interview.10 Comparable to the UB is the notion of ease-of-use from adoption research, where it was found that in the context of m-payments, perceived ease-of-use has a significant positive influence on the adoption (Keramati et al. 2012; Kim et al. 2010; Schierz et al. 2010). Among German consumers, the aspects of getting rapidly familiar with the service, few payment process steps and easy handling were found to be important (Schierz et al. 2010). The prior findings show that if m-payment is perceived as difficult to use, a UB will arise which will negatively impact the adoption. Thus, the following hypothesis is developed:

H1: There is a negative relationship between the usage barrier and the adoption intention of mobile payment.

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9 A table with a summary of all studies used for formulating hypotheses can be found in appendix 2.
2.4.2. Hypothesis 2: Value barrier

The value barrier arises when consumers do not perceive m-payment to be superior than existing payment methods. One of the main issues is the question of the added value that m-payment provides over existing payment methods which proved to be mainly unclear for German consumers as detected by market research institutes (Deloitte 2016) and by the interviewed experts. Evidence of the importance of the value aspect can be found in adoption research in the comparable factor of perceived usefulness and relative advantage (Daştan & Gürlər 2016; Keramati et al. 2012; Kim et al. 2010; Pham & Ho 2015; Schierz et al. 2010). It was stated that if m-payment is perceived to increase the flexibility and speed of payment for consumers, it will positively influence the adoption (Daştan & Gürlər 2016; Pham & Ho 2015). The aspect of speed is especially true for NFC payments in stores, as consumers only need to wave their smartphones which proved to be 10-15 seconds faster than other payment methods (Pham & Ho 2015). However, in case consumers do not know or value the benefits of m-payment, they are likely to reject it. Previous literature from innovation resistance confirms that the VB is one of the most significant impediments to adoption (Antioco & Kleijnen 2010), especially in terms of online and mobile banking (Laukkanen et al. 2007; Laukkanen 2016). Resulting from these finding, it can be hypothesized that:

H2: There is a negative relationship between the value barrier and the adoption intention of mobile payment.

2.4.3. Hypothesis 3: Risk barrier

Technological innovations are almost always perceived with risks, especially when it comes to the sensitive topic of innovative payment methods which is even more complex among German consumers. They are very concerned with data protection, fraud and security issues, particularly regarding online services (Dörner 2015) including m-payments (Khodawandi et al. 2003) which was also confirmed in the expert interviews. The scholars Khodawandi et al. (2003) and Linck et al. (2006) found out that perceived security risks are of crucial importance for German consumers and emerged to one of the major

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11 Maik Klotz Senior Consultant KI Finance, interview on the 15th of March 2017; Stefan Krüger VP GK Software AG, interview on the 16th of March 2017 & Klaus Steinkamp Head Cashcloud SA, interview on the 23rd of March 2017.

impediments to m-payment adoption. Furthermore, the RB includes concerns about losing internet connection during a payment transaction, hacker attacks or other abuse by third parties as for example abuse of usage information (Kuisma et al. 2007; Laukkanen 2016; Schierz et al. 2010). Prior studies found out that if the perceived risks are high, then it is likely that consumers will resist the innovation. Thus, the following hypothesis is developed:

H3: There is a negative relationship between the risk barrier and the adoption intention of mobile payment.

2.4.4. Hypothesis 4: Tradition barrier

Concerning the tradition barrier, the results of how tradition influences the resistance varies among the research. According to the study from Chemingui and Ben lallouna (2013) the TB was the largest inhibitor of adoption to mobile financial services. This was confirmed in the expert interview underlining the importance of traditional payment methods such as cash for German consumers.13 However, in contrast to this is the findings of Antioco and Kleijnen (2010) who identified that the TB reveals a positive influence on the adoption of technologies characterized by low incompatibility and low uncertainty. In adoption research the aspect of compatibility which resembles the TB was found to positively influence the adoption when mobile payment services were perceived to be compatible with existing values, experiences and lifestyles (Schierz et al. 2010). Derived from prior findings that the TB has a negative relationship on the adoption, the following hypothesis is developed:

H4: There is a negative relationship between the tradition barrier and the adoption intention of mobile payment.

2.4.5. Hypothesis 5: Image barrier

Previous studies detected that the image barrier is of importance, as in the research of Laukkanen (2016) it was found to be the second largest inhibitor of the adoption of mobile banking. Furthermore, the image that the internet in general is an insecure channel and is difficult to use, negatively influences the adoption (Laukkanen et al. 2008). This is in line with the study findings of Kuisma et al. (2007) that some consumers react negatively when services are moved to the internet or in this case that services are moved to mobile

devices. Hence, a negative relationship between the IB and the adoption was detected by the previous studies from which the following hypothesis evolves:

**H5: There is a negative relationship between the image barrier and the adoption intention of mobile payment.**

2.4.6. **Hypothesis 6: Information barrier**

For an extension of the original model of Ram and Sheth (1989) the additional barrier of information will be included. As stated before, there are contradicting findings concerning an InfB. Kuisma et al. (2007) examined that a lack of information negatively influences the adoption of internet banking services. This is in line with the findings of Laukkanen et al. (2009) that dissatisfaction with information and help provided by service providers increases the resistance. In contrast to that are the results of Oreg (2006) who claims that less information caused less resistance to change in the context of organizational change. However, as an organizational change is different from a change caused by innovative products or services from the consumer perspective, the findings can be unique to this specific situation. Another important aspect in relation to InfB is the concept of information overload, indicating that the mass of technological innovations causes more and more resistance (Kleijnen et al. 2009) which was also discussed in the expert interview.\(^{14}\) The InfB seems to be important, but thus far has not been included in a model of innovation resistance for a quantitative research. Therefore, it will be added as an additional barrier for having a more comprehensive model. Derived from the mainly theoretical findings concerning an InfB it is hypothesized that:

**H6: There is a negative relationship between the information barrier and the adoption intention of mobile payment.**

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\(^{14}\) Stefan Krüger VP GK Software AG, interview on the 16th of March 2017.
2.5. Proposed conceptual framework

Derived from the literature review and the hypotheses development, figure 4 illustrates the conceptual framework for this study.

Whereas the adoption intention builds the dependent variable, the six barriers form the independent variables which will be elaborated more closely in the following chapter.

Figure 4: Conceptual model for the study
3. Methodology

This chapter comprises the methodology of this research including explanations about how the study is carried out and analyzed. More precisely, the research strategy, the research design, the research method with the data collection method and analysis are presented. The chapter ends with a reflection on validity and reliability issues as well as ethical considerations and delimitations.

3.1. Research strategy

Since the m-payment market in Germany is developing modestly and research about German consumers in this context is scarce, this study intends to find out about the reasons hindering consumers from adopting this innovative payment method. With the help of the five barriers examined in the model of Ram and Sheth (1989) and the information barrier added, insights about the opinion of German consumers in relation to m-payments will be given. This way, knowledge will be contributed and the research gaps defined in the first chapter can be closed.

As a starting point, three preliminary expert interviews were conducted for approaching the topic of m-payment. Furthermore, these interviews were used to refine the research aim and question. The interviews were conducted via telephone with experts representing different perspectives of the industry. More specifically, one expert is a consultant and critical author of mobile payments while the other two hold a high position in a service company offering solutions and systems for mobile payments.\(^{15}\)

Additionally, besides reviewing literature of the relevant fields, a quantitative research approach was chosen for collecting primary data. The choice of a quantitative approach is suitable since the relationship between the barriers to adoption and the adoption intention will be tested in the context of mobile payments, which was not done before. Quantitative research is used when data is collected and analyzed in a quantitative manner with, in this case, a positivist approach as epistemological position for generating knowledge (Bryman & Bell 2015; Quinlan 2011). Thereby, the ontological position of objectivism is of relevance (Bryman & Bell 2015). By reviewing previous research on barriers to adoption in a technological innovation context, the choice and suitability of a quantitative approach is supported by various researchers (e.g. Laukkanen 2016; Lian & Yen 2013; Pinchot et al. 2016).

\(^{15}\) Information about the interviewees and the interview guideline can be found in appendix 1.
However, there also exists general criticism about a quantitative research approach, mainly from qualitative researchers (Bryman & Bell 2015). A crucial point is that quantitative research intends to explore the social world with the help of research instruments and constructs which do not reflect reality (Bryman & Bell 2015). Counter to this perspective, one can argue that in this case, it is suitable to use a quantitative approach as the perspective of barriers to adoption in relation to mobile payment was not applied before, but proofed to be relevant in related contexts. Therefore, it is necessary to first examine this concept within a larger framework, before in later stages specific elements of barriers and issues at individual levels can be explored, for example through a qualitative approach.

Further considerations about the research strategy include that in this research a *deductive* research approach is applied as existing theoretical knowledge is tested with self-developed hypotheses which are then subjected to empirical data (Adams et al. 2014). The theoretical concept which is analyzed and tested are the considerations about the aforementioned barriers to adoption in the context of m-payment. Additionally, empirical data was collected in form of primary data from which the results will be compared to the developed six hypotheses leading to either a confirmation or rejection (Adams et al. 2014). In the end, a revision of the theory according to the results is possible, but only if the data is reliable and trustful (Bryman & Bell 2015).

### 3.2. Research design

The research design of a study ensures that a research problem and its aims will be addressed within a logical framework (Quinlan 2011). As the purpose of this research is to examine the barriers which impede the adoption of proximity mobile payment services among German consumers, a situation of reality will be analyzed (Bryman & Bell 2015). The subjects of the investigation are German consumers of all age groups. However, as this project is a student’s project which has some limitations concerning time and money, the sample of the study will be relatively small. Nevertheless, it is intended that the findings and conclusions will contribute knowledge and that generalizations can be made beyond the research objects in focus.

Furthermore, the theoretical concept of the barriers to adoption is tested in practice within the context of mobile payment which was not done before. There are different types of research designs of which the *cross-sectional design*, also known as social survey design, is applied (Bryman & Bell 2015).
benefits of cross-sectional designs include that data is collected at one point in time on several cases and variables which are then compared and analyzed (Bryman & Bell 2015). This means that for example in this research one can compare the relationship of the barriers and the adoption intention between genders or age with little additional effort. The aim is to find variations between consumers as well as examining the relationships between the chosen variables. The form of the cross-sectional design in this case is a social survey with self-completion questionnaires which is elaborated more closely in the next paragraph. Furthermore, considerations about a research design include the level of analysis referring to the main element of analysis (Bryman & Bell 2015), which is here the level of individuals as German consumers are in the focus.

3.3. Research method

The research method describes the measures of how data is collected and analyzed (Quinlan 2011). Besides reviewing secondary data for building a theoretical framework, primary data was collected and analyzed.

3.3.1. Data collection method

The data collection method is based on primary data which is collected in form of self-completion questionnaires. There are various reasons supporting the use of a self-completion questionnaire for this thesis.

First of all, the answers given by the participants will be comparable due to the equality of the questions asked. By formulating the questions in a closed way, except when referring to the demographic questions, the equality of the questions is secured (Bryman & Bell 2015). Secondly, another decisive factor for the suitability of a questionnaire is the elimination of the risk of a bias of the participants since there is no direct contact between researchers and participants (Bryman & Bell 2015). This again leads to a better comparability of the given answers. Thirdly, another factor in favor of self-completion questionnaires is that the completion is not as time-consuming for the participants as other methods which may result in an increasing number of answers (Bryman & Bell 2015). In addition, the design of an online questionnaire made the distribution fast and simple.

Nevertheless, self-completion questionnaires also bring along disadvantages such as the lack of assistance during the completion. In the case of difficulties in understanding questions, participants do not have the possibility of
receiving help. However, to secure a completion without the need for further explanation and assistance, a pilot study with ten participants was conducted before starting the survey. With the feedback from these respondents, questions were modified which is elaborated closer in the validity paragraph (3.4.1).

The sample chosen for this thesis is the population of Germany referring to all people older than 18 and having their place of domicile in Germany (N=approximately 69 million) (Statistisches Bundesamt 2015). The age restriction in the payment context is applied due to the limited contractual ability of under aged persons. As a whole nation is in the focus, the sample is heterogeneous as individuals of a nation differ (Bryman & Bell 2015). The chosen sample technique is a probability sample while the sample directed is a random sample since everyone living in Germany had the same possibility of being selected (Adams et al. 2014; Bryman & Bell 2015). The size of the sample is $n=152$. Even though the questionnaire was open to participants of all age groups, the number of respondents from the Generation Y dominated. This can be explained by the choice of the sampling technique as it was conducted online. However, by having a larger sample than 100, it is considered to increase the precision of the sample as well as to decrease the sampling error (Bryman & Bell 2015).

The social survey was conducted online with the help of the web-based tool “Umfrage Online”. Based on the sample of the German population, the language used in this survey was German for securing the fully comprehensibility of the questions. Social media channels as well as forums were used as a starting point of the distribution of the survey link. In addition, snowball sampling was applied by inviting the participants to spread the link of the survey (Quinlan 2011).

3.3.2. Questionnaire design

The questionnaire is based on the following variables: The dependent variable is the adoption intention. The independent variables are the barriers influencing the adoption intention of users towards m-payments. For the measurement of each barrier and the adoption intention, certain items were developed based on previous research from related fields. The number and type of questions directed are displayed in the following table:
Table 2: Number and type of questions for questionnaire

<table>
<thead>
<tr>
<th>Question number</th>
<th>Type of question</th>
<th>Variable</th>
<th>Number of items</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>Demographics</td>
<td>-</td>
<td>2</td>
<td>Q1: Multiple choice</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q2: Open question</td>
</tr>
<tr>
<td>3 &amp; 4</td>
<td>Additional information of</td>
<td>-</td>
<td>2</td>
<td>Multiple Choice</td>
</tr>
<tr>
<td></td>
<td>participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 to 8</td>
<td>Usage barrier</td>
<td>Independent variable</td>
<td>4</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>9 to 12</td>
<td>Value barrier</td>
<td>Independent variable</td>
<td>4</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>13 to 16</td>
<td>Risk barrier</td>
<td>Independent variable</td>
<td>4</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>17 to 19</td>
<td>Tradition barrier</td>
<td>Independent variable</td>
<td>3</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>20 to 22</td>
<td>Image barrier</td>
<td>Independent variable</td>
<td>3</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>23 to 26</td>
<td>Information barrier</td>
<td>Independent variable</td>
<td>4</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>27 to 29</td>
<td>Adoption intention</td>
<td>Dependent variable</td>
<td>3</td>
<td>Likert-scale</td>
</tr>
</tbody>
</table>

As so far, no questionnaire relating to the barriers of adoption in the context of m-payment has been designed, the questions from related studies were taken into account and adjusted accordingly.16 The studies which were taken as a basis stem from the contexts of mobile and internet banking as well as from adoption research concerning m-payment. In addition, questions have been added based on the preliminary interviews conducted.17

The scale used for the questions relating to the dependent and independent variables is a Likert-scale. As attitudes and beliefs of the participants of the survey are in the focus, Likert-scale provides an adequate possibility to measure them (Bryman & Bell 2015). A five point Likert-scale has been

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16 The complete questionnaire can be found in appendix 3.
17 Further information about the interviews can be found in appendix 1.
applied ranging from 1=totally agree to 5=totally disagree. It also offers the participants to express a neutral opinion on questions asked and to reduce the complexity as well as possible confusion (Chemingui & Ben lallouna 2013; Lian & Yen 2013).

3.3.3. Data analysis

The analysis of the data was done through the statistical program SPSS. In a first step, it was necessary that the scale of positively formulated measurement items was reversed coded in order to make all items comparable (Laukkanen et al. 2008). Therefore, in the results a low score reflects a high barrier to adoption.

For giving an overview of the collected data, a descriptive analysis part is presented. Thereafter, the examination of the quality and usability of the data follows, represented by normality and reliability tests. In this study, the Kolmogorov-Smirnov test is employed since it is suitable for sample sizes larger than 50 (Elliott & Woodward 2007). The reliability of the data is tested with Cronbach’s alpha.

The next steps include inferential analyses methods. Particularly, Pearson’s Correlation is applied in order to measure the strength of linear relationships between the variables (ibid). The scholar Evans (1996) suggested certain levels of correlations which are used for the interpretation of the coefficients.

Furthermore, multiple regression analyses are applied for testing the relationship between the dependent variable (AI) and the six independent variables representing the barriers to adoption. The aim is to find out which of the independent variables are suitable predictors of the dependent variable and whether the model in general is appropriate for predicting the dependent variable (Keller & Gaciu 2015). The equation for the multiple regression for this study is outlined in the following:

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18 Items which had to be reversed coded are presented in table 15 in appendix 3.
\[
\text{AI} = \beta_0 + \beta_1 \text{UB} + \beta_2 \text{VB} + \beta_3 \text{RB} + \beta_4 \text{TB} + \beta_5 \text{IB} + \beta_6 \text{InfB}
\]

AI = adoption intention
UB = usage barrier
VB = value barrier
RB = risk barrier
TB = tradition barrier
IB = image barrier
InfB = information barrier
\(\beta_0\) = regression coefficient
\(\beta_1 \ldots \beta_6\) = regression coefficients for UB, VB, RB, TB, IB and InfB

3.4. Validity & Reliability considerations

Considerations about the evaluation and quality of research data include validity and reliability issues which are especially important in quantitative research (Bryman & Bell 2015).

3.4.1. Validity

One way to test the validity is the conduction of a pilot test by asking a small number of respondents to fill in the questionnaire beforehand (Quinlan 2005). With the feedback from these respondents, formulations can be modified in order to ensure the understandability of the questionnaire. In this case, ten people were chosen for the pilot test. The feedback was helpful and some statements were either reformulated or deleted.\(^*\)

Furthermore, ways to establish measurement validity include among others face validity and construct validity which will be tested (Bryman & Bell 2015). The face validity in this study concerns whether the chosen barriers and its measurements used are appropriate factors for explaining the low adoption intention of German consumers in the context of m-payment. By relying on previous studies concerning barriers to adoption of related fields and by consulting experts in preliminary interviews, face validity can be confirmed. The concept of construct validity refers to the hypotheses development (ibid). As the hypotheses of this research are based upon relevant previous literature and reliable study results, construct validity is given.

\(^*\) The questions before and after the pilot study can be found in table 15 in appendix 3.
3.4.2. Reliability

The reliability will be elaborated on the idea of internal reliability (Bryman & Bell 2015). In this case, it is important that the items used for measuring each of the six barriers are related to guarantee internal reliability. A common statistical test for measuring the internal reliability is Cronbach’s alpha (ibid) which is presented in section 4.3.2.

3.5. Ethical considerations

Ethical issues are important in research as the most important objective is that no one is harmed or suffers negative consequences from a research project. However, as there are no universal rules about what is within the limits of ethics, researchers need to judge for themselves (Bryman & Bell 2015).

Especially important in the context of this study are issues relating to confidentiality of data and anonymity of participants (ibid). In quantitative research and particularly with web-based self-completion questionnaires, it is unproblematic guaranteeing anonymity of the participants. Furthermore, to stick to the requirements of informed consent, participants were informed about the key points of the research project at the start of the questionnaire. It was assured that data will solely be utilized within the context of this research.

By having reflected the most critical issues on ethics in research, it can be concluded that this research is conducted within the line of ethical principles.

3.6. Delimitations

There are two central issues of delimitations. The first one concerns the sample size. The empirical data which is collected in this study concerns German consumers’ attitudes about m-payment. Since this research is a student’s project, only a small number of data can be collected. To represent the whole German population, a higher number of German citizens need to be asked. However, as this study is the first one examining the barriers to adoption in a German context, it will serve as a good starting point for future studies.

Additionally, as the objects of investigation of this study are consumers, the represented perspective is limited to them. The viewpoint of merchants offering m-payment services at a POS will not be considered. However, it would be valuable to examine their perspective as well, as they are the ones deciding to provide these services at a POS. Though, it was not possible to include this perspective in the scope of this work due to time constraints.
4. Results

This chapter contains the results of the collected data. Besides insights into the demographic profiles and statistical key figures of the n=152 participants, the conducted statistical tests as well as their outcomes are presented.

4.1. Descriptive analysis

In the following section the demographic profile and additional information about the respondents will be illustrated.

4.1.1. Demographics

The first question of the questionnaire referred to the gender of the participants.

![Gender distribution](image)

Figure 5: Gender distribution

As displayed in the frequency distribution in figure 5, 55% of the participants were female while 45% were male. Thus, the distribution of the gender of the participants is well balanced.
Followed by the question of gender, the participants were asked to state their age (figure 6).

**Generations**

![Age distribution](image)

- Babyboomers (1946-1960)
- Generation X (1961-1979)

**Figure 6: Age distribution**

For making the distribution of the age of the participants clearer they were grouped into Generation Y, Generation X and Babyboomers (Lissitsa & Kol 2016). In addition, grouping into the different generations offers a starting basis for comparing generational differences within the data set collected which follows in section 4.2.1.

A percentage of 78% of the respondents were born between 1980 and 1999 (Generation Y), followed by the ones born between 1961 and 1979 (Generation X) with a participant rate of 11%. With the equal number of 11%, the participants born between 1946 and 1960 (Babyboomers) follow. The dominance of respondents belonging to the Generation Y can be explained due to the data collection method and the reason that social networks worked as starting point for engaging them to participate in the survey.
4.1.2. Additional information of participants

The following figure 7 displays the daily smartphone usage of the participants.

Figure 7: Daily smartphone usage

With 44%, the majority uses the smartphone up to two hours a day, while 32% use their smartphone up to four hours a day. Almost a quarter of the respondents use their smartphone more than four hours a day while only 1% do not use their smartphones at all. A further analysis of smartphone usage and the adoption intention follows in section 4.2.2.

The last question of the demographic part was the question about prior experiences with mobile payments (figure 8).

Figure 8: Prior experiences with m-payment
As illustrated, 87% of the respondents have never used mobile payment services before indicating that they are non-users and thus, only 13% did. The high number of non-users is not surprising and resembles the low number of users of m-payment services in Germany (Statista 2016a).

4.1.3. Central tendencies

The following table 3 shows the means and standard deviations of the dependent and independent variables. However, when analyzing the means, it is important to bear in mind that according to the Likert-scale applied, a low mean indicates a strong barrier.

Table 3: Means and standard deviations of items

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>UB1</td>
<td>3.89</td>
<td>.862</td>
<td>152</td>
</tr>
<tr>
<td>UB2</td>
<td>3.95</td>
<td>.820</td>
<td>152</td>
</tr>
<tr>
<td>UB3</td>
<td>3.94</td>
<td>.893</td>
<td>152</td>
</tr>
<tr>
<td>UB4</td>
<td>3.40</td>
<td>1.075</td>
<td>152</td>
</tr>
<tr>
<td>VB1</td>
<td>3.34</td>
<td>1.121</td>
<td>152</td>
</tr>
<tr>
<td>VB2</td>
<td>3.48</td>
<td>1.048</td>
<td>152</td>
</tr>
<tr>
<td>VB3</td>
<td>3.38</td>
<td>1.127</td>
<td>152</td>
</tr>
<tr>
<td>VB4</td>
<td>3.11</td>
<td>1.221</td>
<td>152</td>
</tr>
<tr>
<td>RB1</td>
<td>3.00</td>
<td>1.302</td>
<td>152</td>
</tr>
<tr>
<td>RB2</td>
<td>3.32</td>
<td>1.279</td>
<td>152</td>
</tr>
<tr>
<td>RB3</td>
<td>2.01</td>
<td>1.154</td>
<td>152</td>
</tr>
<tr>
<td>RB4</td>
<td>2.16</td>
<td>1.049</td>
<td>152</td>
</tr>
<tr>
<td>TB1</td>
<td>3.07</td>
<td>1.205</td>
<td>152</td>
</tr>
<tr>
<td>TB2</td>
<td>3.03</td>
<td>1.057</td>
<td>152</td>
</tr>
<tr>
<td>TB3</td>
<td>2.81</td>
<td>1.341</td>
<td>152</td>
</tr>
<tr>
<td>IB1</td>
<td>2.53</td>
<td>1.073</td>
<td>152</td>
</tr>
<tr>
<td>IB2</td>
<td>2.89</td>
<td>1.105</td>
<td>152</td>
</tr>
<tr>
<td>IB3</td>
<td>3.53</td>
<td>1.048</td>
<td>152</td>
</tr>
<tr>
<td>InfB1</td>
<td>3.44</td>
<td>1.034</td>
<td>152</td>
</tr>
<tr>
<td>InfB2</td>
<td>3.42</td>
<td>.777</td>
<td>152</td>
</tr>
<tr>
<td>InfB3</td>
<td>2.92</td>
<td>.850</td>
<td>152</td>
</tr>
<tr>
<td>InfB4</td>
<td>2.87</td>
<td>1.238</td>
<td>152</td>
</tr>
<tr>
<td>A1</td>
<td>3.26</td>
<td>1.199</td>
<td>152</td>
</tr>
<tr>
<td>A2</td>
<td>2.99</td>
<td>1.234</td>
<td>152</td>
</tr>
<tr>
<td>A3</td>
<td>2.95</td>
<td>1.480</td>
<td>152</td>
</tr>
</tbody>
</table>

Overall, the means vary between 2.01 (RB3) and 3.95 (UB2). When taking a closer look at the items submitting to one barrier, the means of the UB varies from 3.40 to 3.95 and are thus, quite high compared to other variables. This already indicates that the UB is lower than the other barriers. In addition, the items of the RB show a wide range in the means as they expanse from 2.01 to 3.32 which shows that the questions for the same barrier were answered with
different tendencies. The same applies for the $IB$ ranging between 2.53 and 3.53. The dependent variable $AI$ varies from 2.95 to 3.26.

The standard deviation, showing the average fluctuation around the mean (Keller & Gaciu 2015), varies between 0.777 and 1.480. Moreover, the item $InfB2$ does not only have the lowest standard deviation but also belongs to the variable $InfB$ showing the greatest variance in the standard deviations of the items (0.777-1.238). The values of the variable $UB$ show the least fluctuations as besides the item $UB4$, all of them range below 0.9. The dependent variable $AI$ shows a high standard deviation (1.199-1.480) compared to the independent variables.

4.2. Further analysis: Age and smartphone usage

The aim of having asked the participants to answer demographic questions was firstly, for receiving more information about who participated in the survey and secondly, for performing further analysis.

4.2.1. Age

With the information about the age of the participants it is possible to conduct further analysis about significant differences in the barriers and the adoption intention. For this purpose, participants were grouped into generations for making a comparison. With the help of ANOVA, it could be detected that within the sample there are significant differences within the generations.20

Concerning the $UB$, there is a significant ($p=0.018 <0.05$) difference between the Babyboomers (1946-1960) and the Generation Y (1980-1999). As the mean difference shows, the Generation Y assesses the $UB$ higher than the Babyboomers. Another significant difference can again be found between the Babyboomers and the Generation Y in the $TB$ ($p=0.048 <0.05$) as the Generation Y faces a lower tradition barrier than the Babyboomers as well as lower $IB$ ($p=0.018 <0.05$).

Summed up, it can be said that there are significant differences between the Generation Y and the Babyboomers related to these barriers.

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20 The complete output from SPSS for the comparison of generations can be found in table 16 in appendix 4.1.
### 4.2.2. Smartphone usage

Significant differences in this sample can also be detected depending on the daily smartphone usage of the participants (table 4).\(^\text{21}\)

**Table 4: Smartphone usage differences**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Type of user</th>
<th>Significance</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RB</strong></td>
<td>Up to 2-hour-users &amp; More than 4-hour-users</td>
<td>( p=0.045 &lt; 0.05 )</td>
<td>More than 4-hour-users have a lower RB</td>
</tr>
<tr>
<td></td>
<td>Non-users &amp; More than 4-hour-users</td>
<td>( p=0.045 &lt; 0.05 )</td>
<td>More than 4-hour-users have a lower TB</td>
</tr>
<tr>
<td><strong>AI</strong></td>
<td>Non-users &amp; Up to 2-hour-users</td>
<td>( p=0.002 &lt; 0.05 )</td>
<td>Up to 2-hour-users have a higher AI</td>
</tr>
<tr>
<td></td>
<td>Non-users &amp; Up to 4-hour-users</td>
<td>( p=0.000 &lt; 0.05 )</td>
<td>Up to 4-hour-users have a higher AI</td>
</tr>
<tr>
<td></td>
<td>Non-users &amp; More than 4-hour-users</td>
<td>( p=0.000 &lt; 0.05 )</td>
<td>More than 4-hour-users have a higher AI</td>
</tr>
<tr>
<td></td>
<td>Up to 2-hour users &amp; Up to 4-hour-users</td>
<td>( p=0.016 &lt; 0.05 )</td>
<td>Up to 4-hour-users have a higher AI</td>
</tr>
<tr>
<td></td>
<td>Up to 2-hour users &amp; More than 4-hour users</td>
<td>( p=0.013 &lt; 0.05 )</td>
<td>More than 4-hour-users have a higher AI</td>
</tr>
</tbody>
</table>

Firstly, there is a significant difference in the RB (\( p=0.045 < 0.05 \)) between the participants using their smartphone up to 2 hours daily and the ones using it more than four hours a day. It can be concluded that when using the smartphone more than 4 hours daily, they see a lower RB. For the TB, a significant difference exists between participants not using their smartphone at all and the ones using it more than four hours a day (\( p=0.045 < 0.05 \)). The more frequent users apparently see a lower TB as indicated in a mean difference of 1.491. In addition, there is a significant difference between the participants using the smartphone two hours and four hours a day as again the more frequent users have a lower RB even though not as strong as compared to

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\(^{21}\) The complete output from SPSS for the smartphone usage can be found in table 17 in appendix 4.2.
non-users (mean difference: 0.573). However, for the dependent variable AI all groups differ significantly.

It can be concluded that the more hours a participant uses a smartphone daily, the higher is the adoption intention as displayed in the mean differences.

4.3. Scale measurement

4.3.1. Test for normality

According to the performed Kolmogorov-Smirnov test (table 5), the data cannot be assumed to be normally distributed ($p=0.000 < 0.05$).

Table 5: Kolmogorov-Smirnov Test

<table>
<thead>
<tr>
<th>Tests of Normality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kolmogorov-Smirnov$^a$</td>
</tr>
<tr>
<td>Statistic</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>0.172</td>
</tr>
</tbody>
</table>

However, there are arguments supporting the assumption of normal distribution. By looking at the frequency table (table 4), there is mainly one recognizable peak indicating that there is an approximately average value of the data which supports the assumption of a nearly normal distribution being sufficient for the means of this analysis. Additionally, according to the Central Limit Theorem, normal distribution can be assumed when the sample is large enough ($n>40$) (Elliott & Woodward 2007).

In conclusion, given these assumptions, normal distribution can be assumed for the data and the means of this study.

4.3.2. Reliability test: Cronbach’s alpha

For testing the internal reliability of the data, the Cronbach’s alpha test was performed. As shown in table 6, Cronbach’s alpha has a value of 0.921, indicating a very good level of internal reliability. A commonly accepted level among researchers indicating good internal reliability lies between 0.7 and 0.8 (Bryman & Bell 2015; Hair et al. 2006). Additionally, none of the 22 items measuring UB, VB, RB, TB, IB and InfB needs to be removed as this will not lead to an increase in the value.
Table 6: Cronbach's alpha

<table>
<thead>
<tr>
<th>Cronbach's Alpha Based on Standardized Items</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.921</td>
<td>.923</td>
</tr>
<tr>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

Therefore, all items will be included in further analysis and the reliability criterion is fulfilled for this study.

4.4. Inferential analysis

4.4.1. Pearson’s Correlation

For the correlation analysis, the *Pearson Correlation* was applied as displayed in table 7 in order to understand the extent to which the adoption intention is associated with each of the examined barriers. Mainly the marked line of the table is of interest, indicating the correlations between the adoption intention and the six barriers. As shown in table 7, there is a statistically significant linear relationship between AI and each of the six barriers since all p-values are less than the alpha level of 0.05.
The strongest negative relationship can be found between AI and TB ($r = -0.745, p < 0.05$), followed by RB ($r = -0.661, p < 0.05$), IB ($r = -0.634, p < 0.05$) and VB ($r = -0.629, p < 0.05$). The added InfB shows a weak negative relationship with the AI ($r = -0.391, p < 0.05$) and the UB indicates a moderate positive relationship ($r = 0.551, p < 0.05$) which needs to be analyzed further.

Moreover, the issue of multicollinearity can be examined with the correlation coefficients. When the values are lower than 0.9, then no multicollinearity between the variables occurs which is true in this case (Hair et al. 2006).
4.4.2. Multiple regression

The results for the multiple regression analysis indicate a good fit of the model as illustrated in table 8.

Table 8: Multiple regression – Fit of the model

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.806a</td>
<td>.650</td>
<td>.635</td>
<td>.73866</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), InfB, VB, RB, TB, IB, UB

The R² in the table reflects that 65% of the total variation of AI can be explained by the six barriers UB, VB, RB, TB, IB and InfB.

The following table 9, represents the results of the F-test and its p-value.

Table 9: Multiple regression – ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>6</td>
<td>24,445</td>
<td>44,804</td>
<td>.000*</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>145</td>
<td>.546</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>151</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Dependent Variable: AI
b. Predictors: (Constant), InfB, VB, RB, TB, IB, UB

It shows that the F-test is significant as the p-value of 0.000 is below the alpha level of 0.05 and that the null hypothesis is rejected (F-value 44.804 > 2.19 (F-distribution for α= 5% and df₁=6; df₂=145) ⇒ reject H₀). This means that at least one of the independent variables can be used for explaining the AI.

From the next table (table 10), it can be determined which of the independent variables are influencing the AI significantly as well as the equation for the multiple regression can be derived.
The results show that the $VB (p=0.037 <0.05)$, $RB (p=0.000 <0.05)$ and $TB (p=0.000 <0.05)$ are statistically significant in influencing the $AI$. Additionally, as indicated by the $\beta$-coefficient, they have a negative influence on the adoption intention, whereas $TB (-0.525)$ has the strongest influence followed by $RB (-0.443)$ and $VB (-0.241)$. The added information barrier has no significant influence on the adoption intention ($\text{InfB}: p=0.239>0.05$), it even influences the $AI$ positively ($0.128$) which will be discussed further in the next chapter.

However, it can be concluded that the three barriers $VB$, $RB$ and $TB$ are important in explaining the adoption intention of German consumers towards mobile payment.

The equation for the model of this research is as follows:

$$AI = 6.727 -0.045 \text{UB} -0.241 \text{VB} -0.443 \text{RB} -0.525 \text{TB} -0.149 \text{IB} +0.128 \text{InfB}$$
4.5. Hypotheses testing

Derived from the multiple regression analysis and the findings in table 10, the developed hypotheses can be interpreted which is illustrated in table 11.

Table 11: Hypotheses testing

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Test result</th>
</tr>
</thead>
</table>
| **H1:** There is a negative relationship between the *usage barrier* and the adoption intention of mobile payment. | Not supported  
  
  ($p=0.746$) |
| **H2:** There is a negative relationship between the *value barrier* and the adoption intention of mobile payment. | Supported  
  
  ($p=0.037$) |
| **H3:** There is a negative relationship between the *risk barrier* and the adoption intention of mobile payment. | Supported  
  
  ($p=0.000$) |
| **H4:** There is a negative relationship between the *tradition barrier* and the adoption intention of mobile payment. | Supported  
  
  ($p=0.000$) |
| **H5:** There is a negative relationship between the *image barrier* and the adoption intention of mobile payment. | Not supported  
  
  ($p=0.227$) |
| **H6:** There is a negative relationship between the *information barrier* and the adoption intention of mobile payment. | Not supported  
  
  ($p=0.239$) |

In conclusion, H2, H3 and H4 are supported, while H1, H5 and H6 are not supported in this study. More specifically, the psychological *TB* is the strongest inhibitor of German consumer’s intention to use m-payment in this sample, followed by the functional barriers which are the RB and the VB.
These findings lead to an update of the conceptual model presented in the theoretical framework which is illustrated by figure 9:

Figure 9: Updated conceptual framework
5. Discussion & Implications

The aim of this research is to examine the barriers which impede the adoption of m-payment services among German consumers. The main results of the study collected via questionnaires showed that value, risk and tradition barriers are inhibiting the adoption significantly. In the following, each barrier is addressed by referring to results of previous studies. This chapter ends with theoretical and practical implications for overcoming the significant barriers.

5.1. Innovation resistance model in the context of mobile payment

One objective of this thesis is to test the model of Ram & Sheth (1989) in the context of mobile payment. By examining the results, it can be concluded that overall the model is appropriate for exploring the barriers to adoption in the context of m-payment in Germany. In total, two functional barriers (VB and RB) and one psychological barrier (TB) proofed to be significant in explaining the innovation resistance behavior of German consumers in this study.

In the following, each barrier is discussed for fulfilling the formulated objective of examining the relationship between the six barriers and the AI and the degree to which they influence it.

5.1.1. Usage barrier

For the UB no significant negative influences on the AI can be detected within this study. As a result, hypothesis 1 “There is a negative relationship between the usage barrier and the adoption intention of mobile payment” is rejected. This implies that there are no significant problems with the functional usefulness of m-payment for the questioned consumers.

Hence, issues as the inconvenience and complexity in relation to the service usability do not hinder German consumers from using m-payment. This is coherent with studies from fields of mobile shopping and mobile financial services (Chemingui & Ben lallouna 2013; Kuisma et al. 2007; Lian & Yen 2013).

In conclusion, this means that the service design, the ease-of-use and the effort of acquiring new skills do not hinder the questioned German consumers from using m-payment. Consequently, the usability of m-payment does not have to be in the focus of service providers.
5.1.2. Value barrier

The hypothesis 2 “There is a negative relationship between the value barrier and the adoption intention of mobile payment” can be confirmed. As the VB refers to the benefits of using m-payment, it can be concluded that the questioned German consumers do not see the value of using the service. This is supported since 57% of the respondents do not see m-payment as a simplification of their payment process. In addition, 47% stated that they do not see the added value of m-payments. This is confirmed by previous consumer studies conducted in Germany (Deloitte 2016). In addition, this fact meets the statement in the expert interview, explaining that the missing added value prevents German consumers from using m-payment which is a crucial issue. A major concern is that m-payment tries to solve a problem which is not existent since the payment options at a POS are satisfying for German consumers. Therefore, they do not see an incentive for changing to m-payment, especially since the market is still in its beginnings and is not yet fully developed.

By looking at prior studies, it was identified that the VB is one of the major obstacles to the AI in contexts such as online and mobile banking as well as mobile shopping (Antioco & Kleijnen 2010; Kuisma et al. 2007; Laukkanen et al. 2007, Laukkanen 2016; Lian & Yen 2013).

In summary, in accordance with other studies, the results of this paper indicate that German consumers do not see m-payment superior compared to other payment methods since they seem to be satisfied with their payment options offered at a POS. Therefore, lowering this barrier by developing effective strategies for articulating and making the value of m-payment tangible to the consumers, should be of importance to service providers if they want to attract new customers. Furthermore, since the German m-payment market is at an early stage, the market expansion by offering m-payment at more POS stations, should be taken forward for making it more attractive for consumers.

22 The distribution of answers is illustrated by figure 10 in appendix 5.
23 The distribution of answers is illustrated by figure 11 in appendix 5.
26 Recommendations for service providers for addressing the significant barriers follow in section 5.3.
5.1.3. Risk barrier

The RB shows the second strongest negative relationship to the AI to m-payment. In other words, it means that the questioned consumers assess the risk of using m-payment as high which impedes the adoption. For this reason, hypothesis 3 “There is a negative relationship between the risk barrier and the adoption intention of mobile payment” can be confirmed. On the one hand, the negative relationship can be explained due to functional risks of fearing to lose internet connection during the payment and on the other hand, the fear of not having sufficient battery. However, the physical and economic risks are the more crucial factors. 72% of the participants agree to the fear of abuse of their personal data and 71% to feeling insecure revealing personal data.27 As the mean of RB3 is the lowest, the risk of the abuse of data shows the greatest barrier for the questioned German consumers. This can be traced back to the German phenomenon of being very concerned with data protection, fraud and security issues, particularly regarding online services (Dörner 2015).

The scholars Khodawandi et al. (2003) and Linck et al. (2006) already reported the importance of risk issues hindering German consumers from adopting m-payment. Although, m-payment services have been developed since then, the fear of m-payment being insecure still exists as confirmed by this study. This is coherent with the findings of Pinchot et al. (2016) who concluded that consumers are highly concerned with security issues in relation to m-payment being in line with the findings of this study.

In conclusion, it can be stated that risk issues are the second largest inhibitor for the questioned German consumers hindering them from adopting m-payment. Consequently, service providers have to put their focus on clarifying security aspects of the m-payment technology for lowering this barrier and to win the trust of the consumers.29

5.1.4. Tradition barrier

The TB is the strongest barrier negatively influencing the AI of the participating German consumers in relation to m-payment. Therefore, hypothesis 4 “There is a negative relationship between the tradition barrier and the adoption intention of mobile payment” is supported. This

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27 The distribution of answers is illustrated by figure 12 in appendix 5.
28 The distribution of answers is illustrated by figure 13 in appendix 5.
29 Recommendations for service providers for addressing the significant barriers follow in section 5.3.
means that among the questioned German consumers, traditions concerning payment methods seem to be very important and if new payment methods require a change in these routines, they are likely to face resistance. As the payment market is a highly sensitive issue in Germany, banks established to be among the most trustful providers (ibi research 2015). Subsequently, m-payment providers which are mainly Fintech companies, need to put a lot of effort of breaking with these traditions. Another reason for the high TB can be connected to the early phase of the German m-payment market since it is not yet fully developed. Therefore, consumers rely more on traditional payment methods. This is supported by the findings of Laukkanen (2016), who claimed that mobile banking is facing a higher TB than online banking since it is still in the development phase.

Furthermore, 48% of the participants indicated that they prefer paying cash. This is consistent with results from consumer studies in Germany which claim that cash is used for over 80% of payments at POS (Deutsche Bundesbank 2016). This stands in contrast to, for instance Sweden where in 2016 only 15% of payments at POS were conducted in cash with a further descending tendency (Sverige Riskbank 2016). Consequently, the innovation of m-payment faces high resistance, as cash is still the most preferred method by German consumers over payments via debit or credit card. This issue can additionally be explained with the finding that German consumers do not see the value m-payment offers which encourage them to rely on the trusted payment methods. The payment customs, norms and lifestyles have been developed over a long period and therefore even methods such as debit cards are only slowly accepted by German consumers (Girocard 2017). Bearing this in mind, it seems as if German consumers are not yet ready for innovative payment methods (ibi research 2015) which partially explains the currently low number of m-payment users.

By comparing this result to previous studies, it is consistent with them as the TB proved to be among the largest inhibitors of the adoption of technological innovations (Antioco & Kleijnen 2010; Chemingui & Ben Ilalouna 2013; Laukkanen 2016; Lian & Yen 2013).

In conclusion, the TB is significant in influencing the AI of German consumers in this study in relation to m-payment, pointing to the need that

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30 The distribution of answers is illustrated by figure 14 in appendix 5.
this barrier needs to be addressed by service providers. This could be very challenging as payment norms have been long established among German consumers and since it is a psychological barrier it is harder to overcome.\textsuperscript{32}

\textbf{5.1.5. Image barrier}

By looking at the results of the \textit{IB}, it was found that it is not significant in explaining the \textit{AI} of German consumers in the context of m-payment in this study. Thus, hypothesis 5 \textbf{“There is a negative relationship between the usage barrier and the adoption intention of mobile payment”} is not supported. However, still some items of the \textit{IB} showed relatively low means, indicating that participants of this study associate some negative aspects with m-payment. This is especially true when it comes to the image of m-payment being insecure to which 57\% agree\textsuperscript{33} which is also related to the high risk barrier. Furthermore, this finding is comparable to the study of Laukkanen \textit{et al.} (2008) who detected that internet services in general are perceived as insecure.

The result of the \textit{IB} of not being statistically significant is coherent with results from other studies of related contexts (Chemingui \& Ben Ilalouna 2013; Lian \& Yen 2013). However, in contrast to these, stand the findings of Laukkanen (2016) as the \textit{IB} proved to be the second largest inhibitor of the adoption of mobile banking. The deviating results can be attributable to the different context of the study as well as the different sample as Finish consumers were questioned.

In conclusion, the \textit{IB} was not found to be a critical issue in influencing the \textit{AI} of the questioned German consumers in the context of m-payment.

\textbf{5.1.6. Information barrier}

The \textit{InfB} was added as an extension of the original model and one objective is to find out if it is a valuable extension. As indicated by the results, the \textit{InfB} is not statistically significant in influencing the \textit{AI}. Thus hypothesis 6 \textbf{“There is a negative relationship between the usage barrier and the adoption intention of mobile payment”} is not supported. Consequently, the added barrier is not a valuable extension of the model, at least in the context of this study.

\textsuperscript{32} Recommendations for service providers for addressing the significant barriers follow in section 5.3.

\textsuperscript{33} The distribution of answers is illustrated by figure 15 in appendix 5.
Even more unexpected was the finding that the InfB has a positive influence on the AI. This indicates that an InfB does not exist and that the respondents are satisfied with the provided information about m-payment. However, as 87.5% have never used m-payment\textsuperscript{34}, the majority could eventually not evaluate properly whether the support from service providers is sufficient or not (InfB3: mean=2.92). Furthermore, 42% of the participants stated that there is information overload concerning continuous innovations for smartphone services.\textsuperscript{35} It can be concluded that the results concerning the InfB might be distorted as the majority of the respondents are non-users of m-payment and could therefore not evaluate the questions appropriately.

The positive relationship between InfB and AI is in line with the study findings of Oreg (2006) who examined resistance to organizational change. Contradicting to this stand findings from internet banking studies which claimed a negative relationship between lack of information and adoption (Kuisma et al. 2007; Laukkanen et al. 2009). However, none of these studies added the InfB as an additional barrier to the original model which might explain the differing results.

In summary, it can be concluded that the InfB is not a valuable extension of the model of Ram and Sheth (1989), at least in the context of m-payment within this study.

5.2. Theoretical implications

From a theoretical viewpoint, this thesis provides insights into the attitude of German consumers in the context of mobile payment which has not been addressed frequently by previous research. Furthermore, this thesis presents a new perspective within the research field of mobile payment by applying the model of innovation resistance of Ram and Sheth (1989) which has not been done before.

In summary, this study contributes to earlier literature by empirically testing the model of Ram and Sheth (1989) in the context of proximity mobile payment. In this way, the application of the theory was proven in a new context. As discussed, the model proved to be empirically valid for examining the innovation resistance behavior of German consumers in the context of m-payment. The three barriers, TB, RB and VB, were identified as the main

\textsuperscript{34} See Figure 8.

\textsuperscript{35} The distribution of answers is illustrated by figure 16 in appendix 5.
reasons hindering the questioned German consumers from adopting m-payment. Therefore, according to this study, it can be derived that there exists an innovation resistance behavior among German consumers which could explain the currently low number of m-payment users. Additionally, since the questioned consumers showed to have a high tradition barrier which is hard to overcome, it seems as if they are not yet ready for the innovation of m-payment. This finding could challenge the whole market and raises the question whether m-payment will ever be successful in Germany (ibi research 2015). However, by looking at other innovations of the payment market, in general German consumers need more time to adopt to them. One example is the slow acceptance of debit or credit card payments (Girocard 2017) which is still very low compared to other countries such as for example Sweden (Sverige Riskbank 2016).

Therefore, according to the results of this study, it can be concluded that besides the promising forecasted numbers of growth rates of 85.1% (Statista 2016a), the German m-payment market will develop, but only slowly. Consequently, meeting the forecasts will be challenging. Furthermore, if the resistance of German consumers towards m-payment cannot be reduced, then there is a possibility of failure of this innovation.

For this reason, addressing the identified barriers is a first step for service providers for facing this resistance which directly leads to the next paragraph.

5.3. Practical implications

A central issue of this paper is to understand the resistance behavior of German consumers in order to provide suggestions for service providers for successfully promoting mobile payment.

Firstly, the TB is the largest inhibitor of the AI, pointing to the importance of customs of German consumers. As the payment market is a highly sensitive issue, banks established to be the most trustful providers (ibi research 2015). Therefore, with the further expansion of the German m-payment market, consumers might get more convinced since at the moment this market is still at an early stage (ibi research 2015). Overcoming the TB is rather complicated since traditions have been long established and guidance from service providers does not help to reduce this barrier as it reflects a mindset of the consumers (Laukkanen & Kiviniemi 2010). In the case of Germany, a special focus has to be put on the communication of the advantages of m-payment
against the most preferred payment method cash. As German consumers especially prefer to pay small amounts in cash, the incentives of m-payment have to be emphasized and promoted more attractively. A possibility in this context could be the advantage of even saving money with coupons when paying minor amounts. However, this is related to challenges.

Moreover, it was found that the RB is the second largest inhibitor of m-payment in this study, meaning that security issues are among the major concerns of potential users being in line with further studies (Khodawandi et al. 2003; Linck et al. 2006). Consequently, it is suggested that service providers should point more to the security aspects of m-payments. It is important to inform consumers that in fact m-payment provides several security advantages over other payment methods. These are for example dynamic authentication methods where data is unique to each transaction which is more secure than a never changing static PIN or signature (Hayashi 2012). Furthermore, an extra layer of security can be used by password protection of the smartphone and the m-payment app (ibid). However, most consumers are not informed about these security benefits. Therefore, promoting the security advantages of m-payment should be a central position in communication strategies (Linck et al. 2006). Additionally, by presenting privacy and security guidelines, it should be demonstrated that service providers act in interest of their customers. In summary, it is of crucial importance that trust in m-payment services is established in order to win more customers.

Lastly, the VB proved to be another obstacle of m-payments, indicating that the questioned German consumers do not see benefits when utilizing m-payment instead of other payment methods. Therefore, service providers need to carefully think of the value m-payment provides to consumers which is required to be transferred into an appropriate communication strategy. One example of a value proposition could be the time-saving aspect of m-payments. Inspired by Starbucks in the USA where it is possible to order and pay coffee with a payment app beforehand for avoiding long waiting lines (Vogt 2017), it provides less pressure for both merchants and customers delivering real value for both parties. Another possibility could be to integrate further functions into m-payment services, as for example discounts and loyalty points which can be directly used when conducting payments (Deloitte 2016). Additionally, it should be highlighted that the smartphone will function as the new wallet where everything is connected and that neither cards need to be carried nor can be forgotten. Furthermore, as identified by Laukkanen and
Kiviniemi (2010), the VB can be reduced by offering sufficient information and guidance from service providers.

Overall, it is important to consider that certain consumer characteristics influence the perception of barriers and thus, influence the adoption intention within this study. With regard to smartphone usage patterns, it is concluded that the more smartphones are used, the higher is the adoption intention. Consequently, when attempting to gain customers, providers should put their focus on consumers using their smartphone more than 4 hours a day. As an alternative, consumers using their smartphone less, should be addressed differently. The same goes for the generational aspect, since different generations evaluate barriers differently as for instance, the Generation Y in our sample faces a lower TB than the Babyboomers. This means that according to the target group, service providers might need to communicate the critical factors hindering consumers from an adoption differently.

Regarding the results, demonstrating the barriers and consumer characteristics influencing the adoption, possible conclusions about the future development of the market can be drawn. Resulting from the analysis, the question of which group is the driving force behind the solidification of m-payment in Germany arises. According to this study, it can be said that frequent smartphone users might be promising in terms of a further market development. In addition, the attitude of consumers of the Generation Y towards m-payment of this sample, offers promising opportunities for service providers in the future. Nevertheless, according to the results of this paper, the numbers forecasting an increase of approximately 6 million users until 2021 (Statista 2016a), have to be questioned. Even though, the number of users is forecasted to increase significantly, it is important to consider the consumer resistance behavior towards m-payment in Germany detected in this study. Especially since the tradition barrier reflects the widespread preference of cash of German consumers which was further confirmed by other studies, concrete actions have to be taken to change the mindset of the consumers. As experienced in the past with the introduction of debit cards in 1990 to pay electronically at a POS, German consumers confronted this new method before adopting it (Girocard 2017). Hence, as demonstrated by the past, the breakthrough of innovative payment methods can be time-consuming in Germany compared to other countries (ibi research 2015).

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In conclusion, it is considered that the results and recommendations of this study are a starting point for service providers to reduce the concerns of German consumers and encourage them to take the technological innovation of mobile payment.
6. Conclusion

The overall guiding question of this thesis has been: “Which barriers impede the adoption of German consumers to proximity mobile payment services?” With expected annual growth rates of 52% globally (Statista 2016), the innovation of mobile payment is a highly topical subject worldwide and is considered to revolutionize the whole payment market. However, against the background that m-payment services are developing only modestly in Germany, this thesis has been examining the reasons hindering German consumers from using this innovation.

For this purpose, the less studied perspective of innovation resistance concentrating on five barriers to adoption has been applied to the research field of m-payment for the first time. By collecting primary data from conducting an online survey on German consumers, it was found that value, risk and tradition barriers are impeding the adoption of m-payment services. Besides the identification of these barriers it could be demonstrated that the adoption intention is related to the characteristics age and smartphone usage behavior within this study. As a result, it was detected that consumers belonging to the Generation Y and using their smartphones on a regular basis, might be the most promising potential customers for service providers.

From a theoretical point of view, it was proven that the innovation resistance model of Ram and Sheth from 1989 is suitable for examining the innovation resistance behavior in the context of m-payment. Consequently, there is a contribution to the literature by presenting a new perspective in mobile payment research. The original model with its five barriers was enlarged to a sixth barrier, the InfB, in this paper. However, the added barrier has not been proven to be relevant in relation to m-payment.

Moreover, these findings include several practical implications for service providers to market m-payment in Germany. Special attention should be payed to addressing security issues, articulating the value of m-payments, as well as overcoming the traditions of German consumers. An effective marketing program for m-payment in Germany brings together all these elements to create value for both service providers and customers. Thus, the most successful service providers will be those which can eliminate adoption barriers and therefore meet the need of the consumers most effectively.
By taking a look into the future of the payment market, the development of even newer innovative methods has to be considered. One example might be the introduction of payments with wearables which could further revolutionize the German payment market, also bringing additional challenges to the success and the adoption of proximity mobile payments (Blasche 2017). However, it is likely that future payment methods might face similar barriers to adoption. Consequently, the study conducted in this paper with a focus on a consumer resistance behavior, can serve as a basis for research on future innovative payment methods. Especially in the case of the German market, the introduction of new payment methods deviating from long-established payment traditions, make it important to bear in mind that the process of adoption can be rather time-consuming.

As mentioned in the beginning of this paper, the development of mobile technologies provides endless possibilities, but also challenges for new service innovations. In the case of m-payment in Germany, the breakthrough of this innovation is highly dependent on the consumer acceptance and the further consolidation of the market. Therefore, it should be taken into account that innovations are demanding changes in consumer behavior, thus facing consumer resistance as demonstrated by this thesis. It has to be considered that, although mobile technologies change the world, these changes need to be embraced carefully. However, in the end, change is the only thing bringing progress as reflected in the following quote:

„The world hates change, yet it is the only thing that has brought progress.“

-Charles Kettering

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38 The source of the quote is Happy Publishing (2016).
6.1. Limitations & Future research

This study is conducted within the scope of a student’s project. Therefore, certain limitations and possibilities for further research opportunities arise.

Concerning the limitations, it is crucial to mention that this study is limited to German consumers being 18 years or older. However, the respondents belonging to a younger age group dominated in this study. As this survey is restricted to a certain country and culture, it might not be applicable in other contexts. Thereof, future research possibilities arise as studies can be conducted in other countries and even cross-cultural studies could be performed. Subsequently, age is of importance when it comes to the introduction of new technologies and the adoption intention. Therefore, it could be of interest to examine adoption barriers with a focus on generational differences and further demographic variables (Chemingui & Ben lallouna 2013). With this, it could be examined how barriers are formed and influenced.

Secondly, the number of participants of this survey is limited as the data collection was conducted within the scope of a student’s project. For the future, it would be valuable having a larger sample representing the whole population of Germany. Furthermore, in order to research the topic of innovation resistance more deeply, a qualitative research approach could be applied, e.g. in the form of focus group discussions. Within this scope, also passive innovation resistance could be included which was not part of this thesis.

Thirdly, this paper can serve as a basis for research on further innovative payment methods in Germany. Since wearable payments could develop as a new technological innovation in the future (Blasche 2017), it could be another aspect to focus on in further research.

The last limitation of this paper is that only the perspective of consumers in relation to proximity mobile payments is considered. For the future, it would be interesting to investigate the perspective of merchants offering the services at a POS and whether adoption barriers can be detected amongst them. Additionally, a focus on remote payments could contribute to further examine the whole mobile payment market.

Notwithstanding, it is important to mention that this research serves as a valuable basis and impulse for further research on German consumers in the field of mobile payment.
References


Pham, T., & Ho, J. (2015). The effects of product-related, personal-related factors and attractiveness of alternatives on consumer adoption of NFC-based mobile payments. Technology In Society, 43, 159-172.


Appendix

Appendix 1.1: Preliminary interviews

The interviews were conducted in German in order to ensure that all interview partners understand the questions properly as well as giving them the possibility to express themselves properly. In the following the original German version and its translation into English are presented.

*Der Fokus unserer Masterthesis liegt auf der Erforschung der Faktoren, die Konsumenten auf dem deutschen Markt davon abhalten mobile Bezahlsysteme zu nutzen (speziell Proximity Payments also Zahlungen vor Ort).*

*Vielen Dank, dass Sie sich die Zeit nehmen um uns ein paar Fragen zu beantworten*

*The focus of our master thesis is to find out which factors prevent German consumers from using mobile payment (especially proximity payment, so in-store payments).*

*Thanks for taking the time to answer some questions for us.*

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Original question in German</th>
<th>Translated question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Würde es Ihnen etwas ausmachen, wenn ich unser Gespräch aufzeichne?</td>
<td>Would you mind if I record our conversation?</td>
</tr>
<tr>
<td>2</td>
<td>Bevor wir starten, könnten Sie mir ein paar Informationen zu Ihrem beruflichen Hintergrund geben? Beispielsweise wann haben Sie angefangen sich mit Mobile Payment auseinander zu setzen? Wie sieht Ihre Arbeit mit Mobile Payment aus?</td>
<td>Before we start would you mind giving me some information about your professional background? As for instance when did you start working in the field of mobile payment? What does your work in the field of mobile payment look like?</td>
</tr>
<tr>
<td>3</td>
<td>Wie sehen Sie die Zukunft von Mobile Payment in Deutschland, speziell in den kommenden 5 Jahren?</td>
<td>How do you see the future of mobile payment in Germany- especially in the next 5 years?</td>
</tr>
<tr>
<td>4</td>
<td>Wie sehen Sie speziell die Zukunft von Proximity mobile payments, also Zahlungen im Geschäft mit Smartphone oder Tablet?</td>
<td>How do you see the future of proximity mobile payments, so payments at a point-of-sale with a mobile device?</td>
</tr>
<tr>
<td>5</td>
<td>Es ist allgemein bekannt, dass die Zahlung mit dem Smartphone, speziell in Geschäften, in Deutschland nur langsam vorankommt. Stimmen Sie dem zu?</td>
<td>There is a consensus saying that payments with smartphones in stores are making slow progress in Germany. Do you agree with that?</td>
</tr>
<tr>
<td>6</td>
<td>Was sind Ihrer Meinung nach die größten Hindernisse bei der Entwicklung davon?</td>
<td>What do you think are the greatest obstacles when it comes to its development?</td>
</tr>
<tr>
<td>6</td>
<td>Gibt es spezielle Probleme bei der Akzeptanz von Proximity-mobile-payment Services aus Sicht deutscher Konsumenten?</td>
<td>Are there any special problems concerning the acceptance of proximity mobile payment services from the point of view of German consumers?</td>
</tr>
<tr>
<td>7</td>
<td>Denken Sie, dass sich der deutsche Markt von anderen europäischen oder globalen Märkten unterscheidet?</td>
<td>Do you think that the German market differs from other European or global markets?</td>
</tr>
<tr>
<td>8</td>
<td>Auf welche Kriterien kommt es aus Ihrer Sicht an, um eine kritische Masse an neuen potentiellen Konsumenten zu überzeugen?</td>
<td>What criteria do you think are important to convince new potential consumers to start using mobile payment services?</td>
</tr>
<tr>
<td>9</td>
<td>Konnten Sie abhängig von der Altersgruppe der Konsumenten Unterschiede in der Haltung gegenüber Mobile Payment feststellen?</td>
<td>Did you notice any differences in the attitude of consumers towards mobile payment depending on the age group?</td>
</tr>
</tbody>
</table>
Appendix 1.2: Interview partner

In total, three preliminary interviews were conducted at the beginning of this research work. In the following table, further information about the interview partners are presented:

Table 13: Information about interview partner

<table>
<thead>
<tr>
<th>Interview partner</th>
<th>Company</th>
<th>Additional information</th>
<th>Date of the interview</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Maik Klotz</td>
<td>Senior consultant at <em>KI Finance</em></td>
<td>Consultant and critical author about the topics banking, payment and retail</td>
<td>15.03.2017</td>
</tr>
<tr>
<td>2. Stefan Krüger</td>
<td>Vice president at <em>GK Software AG</em> (listed)</td>
<td>Software solutions for integrated store solutions; software provider for POS</td>
<td>16.03.2015</td>
</tr>
<tr>
<td>3. Klaus Steinkamp</td>
<td>Head of Business Development and Sales at <em>cashcloud SA</em> (listed)</td>
<td>Development of mobile payment systems</td>
<td>23.03.2017</td>
</tr>
</tbody>
</table>
Appendix 2: Summary of studies used for hypotheses development

For a better overview of the utilized studies for the hypotheses development, the following table summarizes the most important aspects. Studies from innovation resistance research as well as studies from adoption research can be found.

<table>
<thead>
<tr>
<th>Author</th>
<th>Country &amp; Context</th>
<th>Method</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antioco &amp; Kleijnen 2010</td>
<td>Country not specified</td>
<td>Questionnaire</td>
<td>The VB, the RB and IB are negatively related to the adoption in a LoC situation. In a Poc situation the VB, the IB and the RB are the main inhibitors of the adoption.</td>
</tr>
<tr>
<td></td>
<td>Technological innovations</td>
<td>225 respondents from Master students</td>
<td>The VB proofed to be the most significant inhibitor of the adoption. The TB revealed a positive effect on the adoption.</td>
</tr>
<tr>
<td></td>
<td>Lack of content situation (LoC) (high incompatibility and high uncertainty)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presence of content situation (PoC) (low incompatibility and low uncertainty)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemingui &amp; Ben lallouna 2013</td>
<td>Tunisia Mobile Financial Services</td>
<td>Direct and online questionnaires 300 non-users of mobile financial services</td>
<td>The TB has a negative and significant impact on the intention to use mobile financial services.</td>
</tr>
<tr>
<td>Kleijnen et al. 2009</td>
<td>Netherlands Antecedents of innovation resistance</td>
<td>Focus groups 58 subjects Eight focus group discussions</td>
<td>Against the findings from previous research, they detected that information overload was not significant among the participants of the study.</td>
</tr>
</tbody>
</table>
Kuisma et al. 2007
- Finland
- Internet banking
- In-depth interviews
- 30 non-adopters of internet banking
- The UB strongly prevents banking customers from using internet banking.
- The RB negatively influences the adoption of internet banking.
- Concerning the InfB, a lack of information increases feelings of uncertainty, thus preventing an adoption.

Laukkanen et al. 2007
- Finland
- Mobile banking among mature consumers
- Online questionnaire
- 1525 non-users of mobile banking services
- 370 mature consumers
- 1155 young consumers
- The UB and the VB are the most intense barriers among both mature and young consumers, negatively influencing the adoption.
- RB and IB inhibit the adoption of mature consumers.

Laukkanen et al. 2008
- Finland
- Internet banking
- Postal questionnaire
- 390 respondents
- The psychological barriers proofed to be higher than functional barriers.
- The UB significantly influences the adoption of internet banking in a negative way.
- The IB, the VB and TB negatively influence the adoption.
- The RB was statistically insignificant.
<table>
<thead>
<tr>
<th>Author</th>
<th>Country &amp; Context</th>
<th>Method</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laukkanen et al. 2009</td>
<td>Finland, Internet banking</td>
<td>Postal questionnaire, 251 respondents from internet banking non-users</td>
<td>Dissatisfaction with the information and guidance offered by service providers increases the resistance.</td>
</tr>
<tr>
<td>Laukkanen 2016</td>
<td>Finland, Internet and mobile banking</td>
<td>Three datasets with two different data collection methods, 1517 respondents from internet banking: online questionnaire, 624 respondents mobile banking: online questionnaire, 390 respondents internet banking non-users: postal questionnaire</td>
<td>The VB is the strongest inhibitor of internet and mobile banking adoption. The IB prevents mobile banking adoption. The TB negatively influences the adoption of internet banking.</td>
</tr>
<tr>
<td>Oreg 2006</td>
<td>Country not specified, Organizational change in the defense industry</td>
<td>Questionnaire, 236 respondents from the case company</td>
<td>Less information about the organizational change was found to cause less resistance.</td>
</tr>
</tbody>
</table>

**Studies from adoption research**

<table>
<thead>
<tr>
<th>Author</th>
<th>Country &amp; Context</th>
<th>Method</th>
<th>Major findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daştan &amp; Gürler 2016</td>
<td>Turkey, Adoption of mobile payment systems</td>
<td>Online questionnaire, 225 respondents</td>
<td>Relative advantage is positively associated with adoption, especially the aspect of perceived mobility.</td>
</tr>
<tr>
<td>Keramati et al. 2012</td>
<td>Iran, Adoption of mobile payment</td>
<td>Questionnaire, 623 respondents</td>
<td>Ease-of-use and usefulness influence the adoption significantly.</td>
</tr>
<tr>
<td>Kim et al. 2010</td>
<td>Korea, Intention to use mobile payment</td>
<td>Online and postal questionnaire, 269 users of m-payment</td>
<td>Perceived ease-of-use and perceived usefulness have a significant positive effect on the adoption.</td>
</tr>
<tr>
<td>Study</td>
<td>Country</td>
<td>Research Topic</td>
<td>Methodology</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------</td>
<td>---------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Khodawandi et al. 2003</td>
<td>Germany</td>
<td>Acceptance of mobile payment</td>
<td>Online Questionnaire</td>
</tr>
<tr>
<td>Pham &amp; Ho 2015</td>
<td>Taiwan</td>
<td>Adoption of NFC mobile payment</td>
<td>Online questionnaire</td>
</tr>
</tbody>
</table>
| Schierz et al. 2010           | Germany | Acceptance of mobile payment          | Online questionnaire | Ease-of-use positively influences the adoption in a significant manner.  
|                                |         |                                       |              | Perceived usefulness showed a strong positive relationship to the intention to use.  
|                                |         |                                       |              | Perceived compatibility with lifestyle, existing values and experiences strongly influences the intention to use in a positive way. |
Appendix 3: Questionnaire

In the following, the questionnaire before the pilot study and the revised questionnaire are displayed as well as the introduction for the participants taking part in the survey. The questionnaire was translated into English for presenting it in this thesis. However, the original language used for conducting the study was German.

Thank you for taking the time to participate in our survey about Mobile Payment Services in Germany

As this study is conducted in a German context, we kindly thank all participants having their domicile in Germany, for participating.

Before you start with the questionnaire please take a minute to read the following definition of mobile payment:

In general, mobile payment refers to payments which are conducted with help of a mobile device such as a smartphone or tablet by using wireless or other communication technologies. The function of the smartphone in the transaction is to confirm and authorize the payment to be made. However, as the term mobile payment is quite general, you are asked to focus on mobile-proximity payments when answering the questionnaire. Mobile proximity payments are in-store payments for services or products which are conducted at a point-of-sale meaning that you have to be there in person for conducting the payment with your smartphone. With the help of certain technologies integrated in smartphones such as NFC (Near Field Communication) or with help of a QR-code generated on the smartphone, mobile payment in stores is possible.

When using mobile payment services, your smartphone works like a mobile wallet which helps you to merge your credit cards and bank accounts without carrying them with you.

<table>
<thead>
<tr>
<th>Type of question</th>
<th>Question (before pilot study)</th>
<th>Question (after pilot study)</th>
<th>Scale</th>
<th>Reference (based on)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 Gender</td>
<td>Are you male or female?</td>
<td>Are you male or female?</td>
<td>Multiple choice</td>
<td></td>
</tr>
<tr>
<td>Q2 Age</td>
<td>How old are you?</td>
<td>How old are you?</td>
<td>Multiple choice</td>
<td></td>
</tr>
<tr>
<td>Q3 Smartphone usage</td>
<td>How many hours do you use your smartphone every day?</td>
<td>How many hours do you use your smartphone every day?</td>
<td>Multiple choice</td>
<td></td>
</tr>
<tr>
<td>Q4 Prior experiences</td>
<td>Have you ever paid with your smartphone or tablet in a store?</td>
<td>Have you ever paid with your smartphone or tablet in a store?</td>
<td>Yes/No</td>
<td></td>
</tr>
<tr>
<td>Q5</td>
<td>Usage barrier (UB1)</td>
<td>Mobile payment services are difficult to use.</td>
<td>I think, mobile payment services are easy to use.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Q6</td>
<td>Usage barrier (UB2)</td>
<td>It is difficult to become skillful at using mobile payment services.</td>
<td>I think, it is easy to become skillful at using mobile payment services.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q7</td>
<td>Usage barrier (UB3)</td>
<td>Using mobile payment services is inconvenient.</td>
<td>I think, using mobile payment services is convenient.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q8</td>
<td>Usage barrier (UB4)</td>
<td>Mobile payment services are not time-efficient compared to other payment methods such as e.g. debit card, credit card, cash etc...</td>
<td>I think, mobile payment services are time-efficient compared to other payment methods such as e.g. debit card, credit card, cash etc...*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q9</td>
<td>Value barrier (VB1)</td>
<td>The use of mobile payment services increases my ability to make and manage my payments.</td>
<td>I think, the use of mobile payment services increases my ability to make and manage my payments.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q10</td>
<td>Value barrier (VB2)</td>
<td>Using mobile payment services increases my choices as a consumer (e.g. flexibility, speed).</td>
<td>I think, using mobile payment services increases my choices as a consumer (e.g. flexibility, speed).*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q11</td>
<td>Value barrier (VB3)</td>
<td>Using mobile payment services makes the handling of payments easier.</td>
<td>I think, using mobile payment services makes the handling of payments easier.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q12</td>
<td>Value barrier (VB4)</td>
<td>The added value of mobile payment services is unclear for me.</td>
<td>The added value of mobile payment services is unclear for me.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q13</td>
<td>Risk barrier (RB1)</td>
<td>I fear that while I am using mobile payment services, the internet connection will be lost.</td>
<td>I fear that while I am using mobile payment services, the internet connection will be lost.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q14</td>
<td>Risk barrier (RB2)</td>
<td>I fear that while I am using mobile payment services the battery of my phone will run out of power.</td>
<td>I fear that while I am using mobile payment services the battery of my phone will run out of power.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q15</td>
<td>Risk barrier (RB3)</td>
<td>The risk of abuse of information (e.g. names of business partners, payment amount) is high when using mobile payment services.</td>
<td><strong>I think</strong>, the risk of abuse of information (e.g. names of business partners, payment amount) is high when using mobile payment services.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q16</td>
<td>Risk barrier (RB4)</td>
<td>I feel protected when sending confidential information via the mobile payment system.</td>
<td><strong>I would</strong> feel protected when sending confidential information via the mobile payment system.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q17</td>
<td>Tradition barrier (TB1)</td>
<td>Using mobile payment services fits my lifestyle.</td>
<td>Using mobile payment services fits my lifestyle.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q18</td>
<td>Tradition barrier (TB2)</td>
<td>Mobile payment services are advantageous compared to other payment methods such as e.g. debit card, credit card, cash etc….</td>
<td><strong>I think</strong>, mobile payment services are advantageous compared to other payment methods such as e.g. debit card, credit card, cash etc….*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q19</td>
<td>Tradition barrier (TB3)</td>
<td>I prefer paying with cash.</td>
<td>I prefer paying with cash.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q20</td>
<td>Image barrier (IB1)</td>
<td>Using smartphones for payments is insecure.</td>
<td><strong>I think</strong>, using smartphones for payments is secure.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q21</td>
<td>Image barrier (IB2)</td>
<td>Using mobile payment services for the first time is related to a lot of effort.</td>
<td><strong>I think</strong>, using mobile payment services for the first time is related to a lot of effort.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q22</td>
<td>Image barrier (IB3)</td>
<td>Transferring services to mobile phones is too complicated to be useful.</td>
<td>Transferring services to mobile phones is too complicated to be useful.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q23</td>
<td>Information barrier (InfB1)</td>
<td>It is difficult to get enough information about mobile payment services.</td>
<td><strong>I think</strong>, it is difficult to get enough information about mobile payment services.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q24</td>
<td>Information barrier (InfB2)</td>
<td>The information available about mobile payment services is clear and helpful.</td>
<td>I think, the information available about mobile payment services is clear and helpful.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q25</td>
<td>Information barrier (InfB3)</td>
<td>There is enough guidance from service providers in relation to mobile payment services.</td>
<td>I think, there is enough guidance from service providers in relation to mobile payment services.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q26</td>
<td>Information barrier (InfB4)</td>
<td>The information available concerning technological innovations for mobile phone services is overwhelming.</td>
<td>The information available concerning technological innovations for mobile phone services is overwhelming.</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q27</td>
<td>Adoption intention (AI1)</td>
<td>I will use mobile payment services in the near future.</td>
<td>I will use mobile payment services in the near future.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q28</td>
<td>Adoption intention (AI2)</td>
<td>I will use mobile payment services if the opportunity arises.</td>
<td>I will use mobile payment services if the opportunity arises.*</td>
<td>Likert-scale</td>
</tr>
<tr>
<td>Q29</td>
<td>Adoption intention (AI3)</td>
<td>I am not planning to use mobile payment service.</td>
<td>I am not planning to use mobile payment services.</td>
<td>Likert-scale</td>
</tr>
</tbody>
</table>

*The marked questions have been reversed coded (reversed scale).*
Appendix 4.1: SPSS output – Further analysis age

In the following table the complete SPSS output of the analysis of the differences between the generations is shown.

Table 16: Analysis – Age

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>() Generations</th>
<th>() Generations</th>
<th>Mean Difference (I-I)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval</th>
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<td>Generation X</td>
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<td>.33928</td>
<td>.592</td>
<td>-4.455 to 1.2468</td>
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<td>Generation Y</td>
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<td>.25795</td>
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<td>.1313 to 1.5042</td>
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<td>.592</td>
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<td>Generation X</td>
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<td>.27273</td>
<td>.910</td>
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<td>.38844</td>
<td>.557</td>
<td>-.5138 to 1.4489</td>
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<td>-.10346 to .3346</td>
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<td>.30699</td>
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<td>-.0063 to 1.2688</td>
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<td>.158</td>
<td>-.17068 to .2021</td>
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<td>Generation X</td>
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<td>.27608</td>
<td>.018</td>
<td>-.15976 to -.1345</td>
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<td>.19559</td>
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<td>Generation X</td>
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<td>-.9298 to .9098</td>
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<td>-.9098 to .9298</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.
Appendix 4.2: SPSS output – Further analysis smartphone usage

Table 17, shows the complete SPSS output for the differences in the barriers concerning the smartphone usage.

Table 17: Analysis – Smartphone usage
Appendix 5: Illustration of answers from the questionnaire

In this section, the answers to the questions referred to in the discussion part are illustrated by pie charts.

Figure 10: Answers to question 11 – simplification of the payment process
Figure 11: Answers to question 12 – added value

"The added value of mobile payment services is unclear for me."

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree

Figure 12: Answers to question 15 – abuse of data

"I think, the risk of abuse of information (e.g. names of business partners, payment amount) is high when using mobile payment services."

- strongly agree
- agree
- neither agree nor disagree
- disagree
- strongly disagree
Figure 13: Answers to question 16 – security of personal data

Figure 14: Answers to question 19 – preferred cash payments
Figure 15: Answers to question 20 – image: insecurity of m-payments

Figure 16: Answers to question 26 – information overload