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Abstract

Mobile Payment (MP) is considered a technology with enormous potential to change a market's payment landscape. Research has shown that societies with a high degree of MP acceptance are more likely to undergo the digital transformation of payment systems at a fast pace. The present master's thesis examines the relatively slow acceptance of MP in Austria, compared to China, and primarily focuses on payments with the smartphone in the stationary trade. More precisely, it investigates how differences in potential acceptance factors are associated with the differences in MP use in the respective countries. Based on studies from the field acceptance research, a theoretical model was built, according to the Technology Acceptance Model by Davis et al. (1989). From the variables of the final research model, hypotheses were formulated, which subsequently were tested by an online questionnaire survey. The online questionnaire was distributed to potential MP users in both Austria and China. The collected data were evaluated with descriptive statistics and multiple regressions by using the statistical software R and Microsoft Excel. The results of the analysis show that the acceptance factors "perceived MP knowledge" and "perceived risk" are considered fairly significant regarding the intention of MP use in Austria, and that "perceived usefulness" is significant in China. The findings indicate that the lack of knowledge and security concerns regarding MP have a profound influence on the intention to use this technology in Austria.

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“It’s not the strongest of the species that survives, nor the most intelligent, but the one most responsive to change.”

– Charles Darwin

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Abbreviations

AI	Artificial Intelligence
ATM	Automated Teller Machine
BigTech	Large Global Technology Firm
CAGR	Compound Annual Growth Rate
CCP	Chinese Communist Party (or Communist Party of China, CPC)
CGCP	Contactless Gateway Code Protocol
EU	European Union
E-wallet	Electronic Wallet
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
ICT	Information and Communication Technology
IoT	Internet of Things
FinTech	Financial Technology
GDPR	General Data Protection Regulation
MP	Mobile Payment
MPSP	Mobile Payment Service Provider
NFC	Near Field Communication
P2P	Peer-to-peer
PBOC	People's Bank of China
PCAC	Payment and Clearing Association of China
PDA	Personal Digital Assistant
PIN	Personal Identification Number
PPP	Purchasing Power Parity
PSD1	Payment Services Directive I
PSD2	Payment Services Directive II
PSP	Payment Service Provider
POS	Point of Sale
RFID	Radio Frequency Identification
RMB	Renminbi (or Chinese Yuan, CNY)
SEPA	Single Euro Payments Area
SME	Small and medium-sized enterprise
TAN	Transaction Authentication Number
VIF	Variance Inflation Factor
WAP	Wireless Application Protocol
QR code	Quick Response Code

1 Introduction

The global Mobile Payment (MP) market is growing as technology innovations improve, artificial intelligence advances, and smartphones become more and more our daily companions. Mobile Payment in China is expanding at an incredible speed and more than 80% of its population owning a smartphone is using this payment system nowadays. This mobile technology has become extremely prevalent over the last few years in the Chinese society and is becoming almost indispensable for the daily life of its citizens. In respect of the Mobile Payment advancement in China, the question arises, why such remarkable development has not yet taken place in Austria.

The present thesis explores potential factors explaining why the use of MP in Austria is less diffused than in China. It will examine the relatively slow MP development in Austria compared to China and identify possible acceptance factors for the intention to use this payment technology in both countries. As MP is extremely versatile, the focus lies on the analysis of MP with the smartphone as the mobile device in the stationary trade, such as at the point-of-sale (POS) terminals in supermarkets and stores. Further, the topic of the study can be ascribed to the field of technology acceptance and digitisation.

Under the term digitisation shall be understood the increase of information in digital processes, which is related to diffusion of new technologies in private as well as in public sectors, and in private households. Nowadays, digital changes can be perceived in various areas of life, in a large number of different industries, as well as in retail (KMU 2017: 127). As the digital transformation might influence current and future consumption, subsequently it has an impact on payment behaviour and methods. With progressive digitisation of payment transactions, new digital payment systems are penetrating respective markets at a different pace, depending on a society's readiness to accept. By identifying differences in technology acceptance between various countries, a society's willingness to accept a certain innovative system can be evaluated based on different acceptance factors.

Given the widespread MP use in China, it is interesting to compare its rapid development to the less advanced MP landscape in Austria. Although both countries differ fundamentally in size and cultural aspects, a comparison of the framework and existing realities can help identifying distinctive key factors concerning the use of MP. The central focus lies on the examination of how differences in acceptance factors are associated with differences in MP use in Austria and China. Therefore, the chief purpose is not to determine similarities or differences, but rather to find a globally applicable model that illuminates the disparities across these countries.

Apart from that, findings on the main factors influencing the MP advancement in China could also be considered as a potential guide for future MP development in Austria. Hence, an evaluation of the different diffusion levels of MP use in these two countries can be seen as reasonable.

1.1 State of the Art

Mobile Payment has been expected to experience considerable growth in the years around 2003, however, the predicted rapid development has never occurred. This can be attributed to various explanations, such as the situation of the economies and financial markets at that time, the lack of standardization and cooperation in this field (Karlsson/Taga 2006: 73). Besides, MP has several supporters, which especially include cash opponents (Letzgus 2017: 67). Nowadays, innovative MP systems are becoming more and more popular among industrial and developing countries (Hartmann 2006: 15). However, the development of MP differs widely among countries. For instance, the popularity of MP in Asia is relatively high compared to Latin America or the United States (US). Austria was considered as one of the pioneers in the domain of MP, according to a study of Arthur D. Little conducted in 2004 (Punzet 2006: 222). The MP development in Austria is characterized by significant breakthroughs and failures. The ambitious MP project of large MP service providers “Simpay” was introduced in mid-2003 but failed two years later (Pousttchi/Wiedemann 2006: 365). This has been concluded as a fundamental failure in the development of MP in Europe (Gassner 2006: 184). Still, Pousttchi/Wiedemann (2006: 365) believe that potential users are commonly interested in MP.

With regard to the Austrian population, their digital interest is assumed to be less extensive than citizens from other European countries, such as the Scandinavian nations (Gönenç/Guérard 2017). Although a transition in payment culture in Austria could be observed over the last decades, the importance of cash as a payment method is still central (Stix 2006: 43). In Austria, the circulation of cash remained relatively stable over the last years, while a remarkable decline can be perceived in other European countries, such as Sweden (Schäfer 2018). Although cash in circulation increased in China, the value of ATM withdrawals decreased significantly (CashEssentials 2019; Ceicdata 2019d), which might indicate the decline in cash use in, for instance, the stationary trade. In view of the effective implementation and diffusion of digital payments in other countries, it can be claimed that it is carried out more effectively than in Austria. Apart from that, the stable cash use in Austria might hinder other digital payment systems to be fully accepted by its citizens (Schäfer 2018).

Regarding a successful application of MP to a given market, researchers have found that the existence of a uniform MP platform can be described as one of the major drivers for the spread of this system. However, institutional, societal and economic factors can present a barrier for the successful expansion of MP platforms (Ondrus/Lyytinen 2011: 166). Other than that, differences in strategic objectives and interests of MP service providers, such as banks and other third parties, can also pose a major difficulty (de Reuver et al. 2015). This also applies to companies from diverse industries with contrary interests (Ozcan/Santos 2015). Besides, the lack of standardization, beneficial business models and cooperation between interested parties are additional factors for the failure of the implementation of uniform MP platforms (Dahlberg 2015: 207). Apart from that, the factor of timing also plays a crucial role within this context (Staykova/Damsgaard 2015).

In the area of acceptance research, studies have found several factors regarding the acceptance of MP, including “user-friendliness”, “usability”, “trust”, “compatibility”, “convenience”, “social influence”, as well as “perceived risk”, “security” and “cost” according to the literature review by Dahlberg et al. (2008). Similarly, acceptance studies on MP in China have found comparable acceptance factors such as “technology convenience”, “security”, “trust”, “perceived ease of use”, “perceived usefulness”, “cost of use”, etc. (Lu 2015; Shao et al. 2019; Bao 2012; Lu et al. 2011). Regarding acceptance researches on MP in Austria, only one specific study has been found, which focuses on the MP use with smartphones in stores. Ginner (2017) has discovered that the main positive acceptance factors for MP use in Austria are “perceived usefulness”, “perceived personal innovativeness”, “perceived compatibility” and “perceived social influence”, while “perceived risk” has been identified as a negative acceptance factor.

The reviewed studies on MP have identified barriers for the successful implementation of this technology from a broad perspective, including external factors. Other studies on the acceptance of MP have particularly investigated the user’s perspective. These studies have covered several aspects of MP in the area of mobile commerce (m-commerce) or mobile business (m-business) (O’Reilly 2012; Schierz et al. 2010; Duane et al. 2014; Teo et al. 2015a) but only a few have particularly focused on mobile payments in the stationary trade. Other than that, some of the studies have not specified the term MP to the use of a certain mobile device, such as the smartphone or tablet. Moreover, some studies have only targeted a specific kind of group and not the whole population, which also limits their research to a specific scope.

In this respect, the current thesis aims to fill the research gap by explicitly focusing on the acceptance of in-store mobile payments on the Austrian market, by using the smartphone as a mobile device. As none of the reviewed studies included a comparison of different countries, this aspect will be covered in the thesis as well. By taking the leading

Chinese MP market into account, potential MP acceptance factors of the Chinese population should be determined. Findings on the Chinese MP market can help detecting potential acceptance factors for the Austrian MP market. Apart from that, analysing the MP landscape in China could clarify the reasons for their rapid MP transformation, which in turn could also help explaining the relatively slow MP development in Austria.

1.1.1 Relevance of Topic

Through the study of positive and negative factors influencing the acceptance of MP in Austria, especially payment service providers, such as third-party payment companies, financial service operators and banks, will be able to improve their existing business models and strategies. By transforming existing MP systems and developing new ones, the overall MP infrastructure could be improved. This could act as a powerful incentive for potential MP users to engage with this technology. Consequently, with a higher MP acceptance, the whole market could be promoted.

With the examination of the correlation between different acceptance factors and MP use in different countries, a general model for MP acceptance can be built. This can be used as an example for future research on MP acceptance when investigating more than one country. Apart from that, a deeper understanding of the advanced MP development in China compared to Austria should be provided. This understanding can help in explaining the different stages of MP development in both countries.

1.2 Theoretical Framework

The following section aims to clearly define the theoretical framework of the acceptance model used for the present thesis. Firstly, a brief introduction of acceptance research along with adoption and diffusion research will be provided. This provides a general understanding of the later-described technology acceptance models. Then, the main models of technology acceptance will be explained, together with their modifications over time. Subsequently, a final theoretical model will be formulated, which will be the basis for the empirical part of the thesis.

1.2.1 Fundamentals of Acceptance Research

Along with diffusion and adoption research, acceptance research develops an explanatory approach for the behaviour of end-users regarding technological innovations (Ginner 2017: 139). Generally, technology acceptance can be explained as a user's willingness to engage

with new technologies. Over the years, acceptance researchers have become more fascinated by knowledge about factors influencing the adoption of innovation (Teo 2011: 1), which has its origin in adoption and diffusion research (Rogers 2003).

Adoption research refers basically to the process of adoption and takeover of innovations, where the individual goes through different phases: recognition and knowledge of innovation, attitude towards it, the decision of rejection or acceptance, implementation, and evaluation or confirmation (Rogers 2003: 169 ff). In contrast, the focus of diffusion research does not lie on the individual level, but more on the temporal spread and its speed of a particular innovation within a social system (Rogers 2003: 9). Therefore, the variable time as well as the duration of diffusion process of an innovation, plays a crucial role in this research domain. A distinctive characteristic of diffusion research is its differentiation between various groups of adopters: innovators, early adopters, early majority, late majority, leggars (Rogers 2003: 279 ff; Hierl 2017b: 190). As it is suggested by researchers, diffusion research is built upon adoption research, and is often summarised under the single term of diffusion theory (Schierz 2008: 60).

Other than the diffusion theory, the central attribute of acceptance research is its focus on temporal forecasts of innovations and the identification of reasons for the success and failure of new technological features. More precisely, it investigates end-user's willingness for a possible actual use, and thus concentrates on acceptance on an individual level, which is similar to adoption research (Ginner 2017: 144 ff; Hierl 2017b: 190). Especially in the area of business, studies have been conducted to understand the technology acceptance of consumers, including the identification of key technological and psychological variables affecting acceptance. From that, numerous models of acceptance have been developed to explain technology usage. That enabled researchers to predict end-user's acceptance of the potential consumption of technological innovations (Teo 2011: 1).

1.2.2 Technology Acceptance Models

The following section illustrates several key models of acceptance research and their development over time. By pointing out major differences between these models, the main theoretical model chosen for the present thesis will be emphasized. As shown in Table 1, a chronological order of acceptance models is displayed by their publication date.

Model	Author(s)
Theory of Reasoned Action (TRA)	Fishbein and Ajzen (1975); Ajzen and Fishbein (1980)
Technology Acceptance Model (TAM)	Davis (1985); Davis (1989); Davis et al. (1989)
Theory of Planned Behavior (TPB)	Ajzen (1991)
Technology Acceptance Model 2 (TAM2)	Venkatesh and Davis (2000)
Technology Acceptance Model 3 (TAM3)	Venkatesh and Bala (2008)

Table 1 Technology Acceptance Models. Source: Own illustration in accordance with Ginner (2017: 153)

The Theory of Reasoned Action (TRA) can be defined as the starting basis for technology acceptance models and pursues the aim to explain and forecast individual behaviour. Fundamentals of TRA claim that certain behaviour is directly determined by a single factor. It is referred to the intention of an individual to perform an action, which is influenced by the variables "attitude toward behaviour" and "subjective norm". From this assumption, it can be derived that the behaviour is the result of a decision process, which is based on rationality and hence is predictable. The major criticism on TRA is its simplicity and generalizability, which can also be perceived as its key advantage (Ginner 2017: 154-56). A further development of TRA, the Theory of Planned Behavior (TPB) by Ajzen, consists of the additional determinant "perceived behavioural control". By adding this factor to the model, it takes into account that not all behavioural intentions are originated from voluntary decisions made by potential end-users, which represented a point of criticism in the original model of TRA (Ginner 2017: 161-62).

On the basis of the initial idea of TRA, Fred Davis (1985) developed a more advanced model, the Technology Acceptance Model (TAM). It applies to a specific domain and explicitly focuses on behaviours of end-users regarding information technology systems. Davis' TAM is one of the most popular and most cited among all acceptance models. This model is used as the main theoretical framework in this paper. Similar to TRA, the general objective of TAM is to explain individual user behaviour towards computer systems. Otherwise than TRA, Davis' model suggests that external variables, which are determined as independent variables, have an influence on perceived usefulness and perceived ease of use, which subsequently have an impact on the intention to use a particular system (see Figure 1). Briefly summarised, the central message of TAM implies that the stronger individual perception of usefulness and simplicity of a specific technological innovation, the more potential users are willing to actually use it (Ginner 2017: 157-60). Further extensions of TAM are TAM 2 and TAM 3, where other key determinants such as social influence

processes (subjective norm, voluntariness and image) and cognitive instrumental processes (job relevance, output quality, result demonstrability) were added to the second model, and additional factors such as computer self-efficacy, computer anxiety and objective usability were added to the third model (Ginner 2017: 161-71; Hierl 2017b: 194).

Another noteworthy theoretical model in the area of acceptance research, the Unified Theory of Acceptance and Use of Technology (UTAUT), is constructed by Venkatesh and Davis in 2003 and further developed in 2008, where eight different approaches were summarised to one single model.

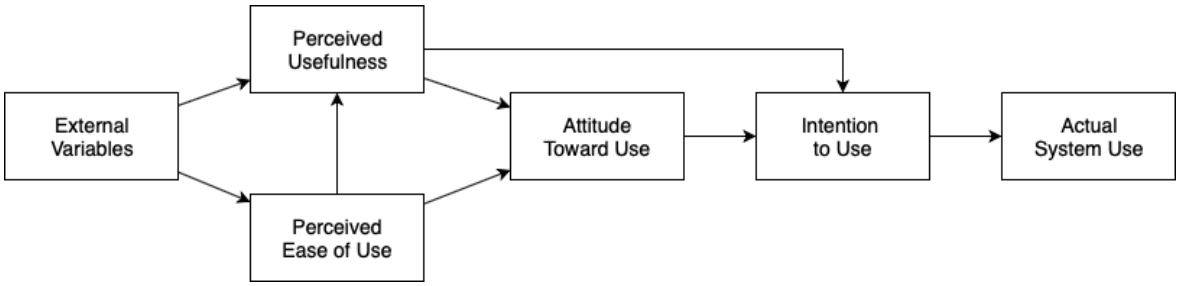

Figure 1 Technology Acceptance Model (TAM). Source: Own illustration, based on Davis et al. (1989)

Building on this fundamental framework of technology acceptance by Davis, an adjusted theoretical model will be formulated for the empirical part in chapter 4, by using findings from the systematic literature analysis.

1.3 Research Question

On the basis of the state of the art of the study topic, the thesis aims to answer the following research question:

> *Which acceptance factors can be identified to help in explaining why digitisation of payment methods in Austria, as measured by the intention of Mobile Payment use with smartphones in the stationary trade, is less advanced than in China?*

As adopted from the literature review, Schäfer (2018) claims that the crucial importance of cash money in Austria has a significant effect on its citizen's level of acceptance of digital payment systems such as MP. Also, the lack of a uniform MP platform with common interests and objectives of affected actors (de Reuver et al. 2015) might be a reason for the slow development of MP in Austria. According to Ginner's (2017) study on MP acceptance in Austria, the factor of "perceived risk" is considered to have a major negative impact on the intention to use this payment system. These assumptions derived from the state of research will be elaborated together with further findings from the literature reviews over the course of the thesis. Subsequently, they will be analysed with the help of the research method as described as follows.

1.4 Research Method

The research method consists of a systematic literature analysis of journal articles, scientific papers, as well as books on Mobile Payment and acceptance factors in Austria and China. Regarding the publication date of the selected literature, no limitations have been made due to the relatively new appearance of this phenomenon. The chosen literature is written in English, German and Chinese language. Based on the systematic literature analysis, hypotheses were generated for further analysis in the empirical part.

For the empirical investigation, a questionnaire survey was used to test the hypotheses and to identify the main acceptance factors of MP in Austria and China. The questionnaire survey was conducted with the online tools Google Forms for Austrian respondents and Wenjuan.com for Chinese respondents. The distribution of the online questionnaire was carried out according to the snowball sampling method. This data collection method should help to facilitate the reach of potential respondents in Austria and especially China. Although it is not possible to control the distribution pattern with snowball sampling, it can provide access to hidden populations, due to the chain referral from one potential participant to another (Dudovskiy).

The collected data from the questionnaire survey was evaluated with the statistical program R and Microsoft Excel. Descriptive statistics and multiple regression analysis were conducted for both samples. By using descriptive statistics, the data should be described based on their fundamental characteristics, which can also serve as an overall summary of the samples. The multiple regression analysis should help drawing conclusions from the research object. In this case, the probability of dependence between the dependent variable “intention of MP use” and relevant acceptance factors should be identified. Based on the results from the analysis, the formulated hypotheses were proven or unproven, which subsequently provided help to answer the research question.

1.5 Structure

The structure of the thesis is divided into an introductory part, two theoretical parts, an empirical part and a concluding part. The first theoretical section gives an overview of the digital development in Austria and China. Starting from a broad perspective, it then narrows the topic down to the digital payment system. Within this scope, the differences of the digital landscapes and payment systems between Austria and China will be identified. The second theoretical section examines the development of MP in Austria and China. It begins with definitions of the term MP, then continues with a description of MP service providers and acceptance factors in both countries. The findings of the review of acceptance factors act as a basis for the subsequent empirical part. The empirical analysis is presented in the

fourth chapter, where the systematic literature analysis is described, and the construction of the final research model is explained. Then, the quantitative questionnaire survey is illustrated, and the results are shown. Based on the findings from the empirical research, some conclusions are drawn in the final section. In the concluding part, a summary of the thesis' key points will be presented, and the research question will be answered. Suggestions for future research on this topic will also be provided in the final section.

2 Digitisation of Payment Methods

This chapter begins by defining digital payment systems in general, then examines the Austrian and Chinese digital landscape, including past developments. Further, digital payment methods will be discussed, with a focus on the popularity of alternative payment methods such as bank cards. Besides, the extent and importance of the payment method of cash will be investigated, to clearly understand the payment environment and situation. All of this serves as a solid foundation to comprehend the next chapters of the thesis. It should also give a possible explanation for the past and recent developments of digital payment methods, including Mobile Payment, in Austria as well as in China.

2.1 Definition – Digital Payment System

Digital or electronic payments (e-payments) are used as synonyms to describe financial transactions or digital transactions between sellers and buyers within the electronic business[1] (e-business) (IT 2014). It can also be defined as all payments initiated, processed and received on an electronic basis (Hartmann 2006: 7). This includes, for instance, bank cards, electronic checks, direct transfers between accounts, or online services such as PayPal and Western Union, where all of these types fall under the notion of digital cash[2] (Patil 2011). Digital cash also includes e-payment methods such as prepaid functions (e.g. electronic gift cards, advance payment), pay-now functions (e.g. online transfers) and pay-later functions (e.g. credit cards) (WKO 2018). Digital transactions are carried out without the use of cash and are leading societies to a cashless era. The transformation process often involves financial technology (FinTech) products and services, provided by financial technology companies, which collaborate with several sectors of the economy to meet the increasing demands of tech-savvy end-users (Frankenfield 2018).

Another definition of e-payment systems distinguishes between credit payment systems, including payments with a credit card, e-wallet[3] and smart card[4], and cash payment systems, involving direct debit[5], e-check, e-cash and stored-value card (SecurionPay). In a

1 Electronic Business refers to economic possibilities within the global digital network, using digital information technologies to enable business processes. The scope of application involves not only electronic shops or marketplaces but also the terms electronic procurement, electronic community and electronic company (Kollmann 2018).
2 Digital cash is also known as electronic cash, electronic currency, electronic money, digital money, digital currency and cyber currency (Patil 2011).
3 E-wallet is a form of prepaid account, which includes a user's debit and credit card information to facilitate online transactions (SecurionPay).
4 A smart card (also known as a chip card) is a plastic card equipped with a microprocessor that can be topped up with funds to conduct transactions (SecurionPay).
5 Direct debit is a type of pre-authorized payment which allows banks to access money from the user's account to pay a certain amount of money directly to another bank or company on a regular basis (SecurionPay).

broader sense, e-payment serves as an umbrella term for all non-cash payments carried out electronically. This also involves mobile payments, which is the primary focus of the present thesis.

2.2 Digital Development of Austria

In 1990, when the commercial period of the Internet began, the University of Vienna was the first organization in Austria to be connected to the World Wide Web. Since then, the country's digital progress has been shaped by numerous development stages. For example, the founding of Google in 1996 and the online payment system PayPal two years later, or the launch of various electronic government (e-government) systems have altogether transformed today's digital landscape in Austria and the world. In 2016, the Digital Roadmap Austria was created, aiming to lead the society into a digital future with several strategic measures in all areas of life. One of its main goals is to establish Austria as one of the world's leading digital business locations and as an innovation frontrunner in digitisation by 2025 (Digitalroadmap 2016). To succeed in achieving the overall objectives, the digitisation strategies of governments should be formulated extensively, covering all parts of people's daily life, including the people's behaviour regarding purchasing and their choice of payment methods.

In times of innovations and new technologies, digitisation of payment methods takes on an important role in today's societies. Changes and trends regarding digital payment systems, which can especially be observed in the stationary trade, can influence the entire ecosystem of payment (Dahlberg 2015: 270). As payment processes are usually related to the purchasing of goods or services, it might also bear far-reaching consequences for the purchasing behaviour of the respective societies.

Concerning the Austrian society, its digital receptivity is claimed to be not as pronounced as in the case of populations from other European countries, such as the Scandinavian countries. This makes the digital transition in Austria appear slower compared to other nations with a comparable level of prosperity (see also 2.2.2 Digital Economy and Society Index 2019) (OECD 2017). Generally, differences in digital advancement might have several reasons, which can be either economic, political or societal. Gönenç/Guérard (2017) attach great importance to the latter factor and suggest that effective implementation of any information and communication technology (ICT) depends primarily on a positive receptivity of the society. This could to be achieved through social dialogues on the topic of digital transition, in order to generate a solid trust basis. Furthermore, a more effective form of data protection, cybersecurity, and consumer protection policy would be necessary to raise awareness about dangers and to increase the confidence of customers.

Apart from these difficulties, a significant transition in the payment culture has taken place in Austria over the last decades, which has had an impact on the payment behaviour and the use of cash money (Stix 2006: 43). Already in 2005, about 78% of Austrians over 14 years owned a debit card, which was the most frequently used among cashless payment methods. In more recent years, the value of payment transactions with debit cards in Austria has increased remarkably from EUR 20.35[6] billion in 2015 to EUR 25.28 billion in 2018, by about 19.5% (see Figure 2). In comparison, credit card payments lack far behind with only EUR 2.94 billion in 2018, which presents merely 11.6% of the total debit card transaction value in the same year (ONB a). By adding up the values of payment transactions of debit and credit cards, the total transaction value of bank cards increased from EUR 22.97 billion in 2015 to EUR 28.22 billion in 2018 by about 18.6%.

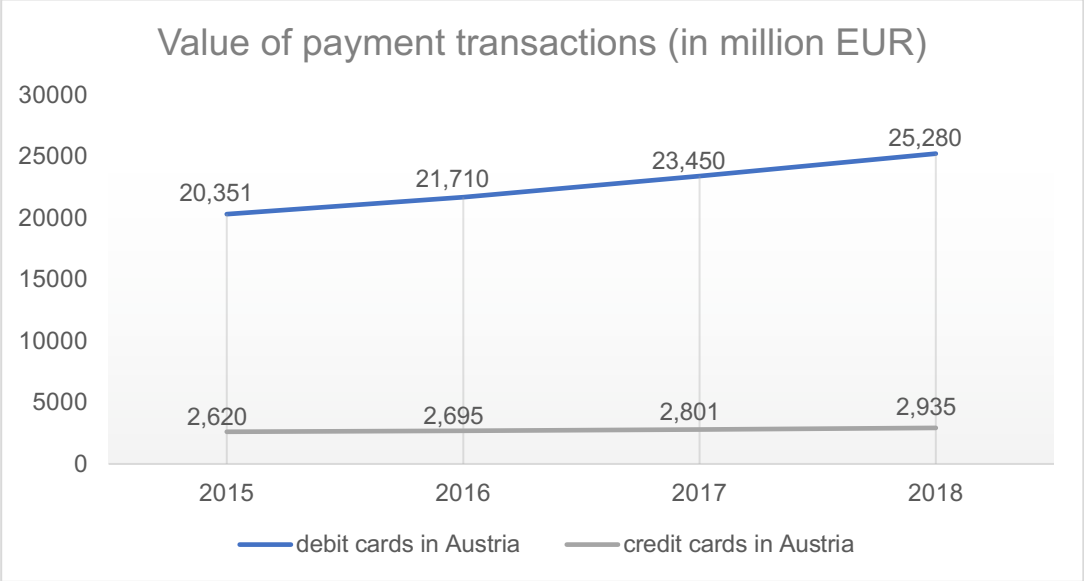

Figure 2 Value of payment transactions involving debit card and credit card holders in Austria. Source: Own illustration. Data: ONB(a)

As a consequence of this increase in card payments, a decline in demand for cash money has been observed. However, as cash only makes up a small share in money transactions and people's payment behaviour does not change fundamentally, it will hardly bear consequences for the monetary policy (Stix 2006: 55). Still, in countries where cash enjoys great popularity among its population, there is a less significant decline in cash, which might be a reason for a more difficult penetration of digital payment systems (Schäfer 2018: 47), as it is the case in Austria.

6 All numeric values given in this paper are displayed in a decimal notation according to the English-speaking language area. Value figures with more than two decimal places are rounded to two decimal digits.

2.2.1 Importance of Cash in Austria

The following section describes the importance of cash in the Austrian society, which might present a possible barrier for the successful implementation of digital payment systems and should partly explain the slow acceptance of new payment technologies by its citizens. This explanation can be used as a reference to another innovative mobile payment technology, which is later discussed in chapter 3.

Austria belongs to the more cash-intensive countries among all European economies, as in 2016 about 80% of all consumer transactions at point-of-sale were conducted in cash (Rusu/Stix 2017). Factors influencing this status quo might simply be financial matters, such as low interest rates or a rise in uncertainty. As especially after 2007 an increase in cash holdings as a store of purchasing power became apparent among Austrian households (Schnautzer/Stix 2019: 109-111), it can be traced back to the outbreak of the global economic and financial crisis. Since then, over 80% of direct payment transactions in Austria have been conducted in cash and have not changed much in the past 20 years (Rusu/Stix 2017: 54; Schnautzer/Stix 2019). This has resulted in an overall stable circulation of cash, whereas it has considerably declined in other European countries, such as in Sweden (Schäfer 2018:3). Reasons regarding these changes in other countries could be the more effective diffusion of digital payment systems, which could be driven by governmental policies, innovative organizations or the overall technology-driven mentality of a respective nations' population.

Considering these relatively far-reaching changes in the people's payment behaviour in other European countries, they seem rather gradual in Austria. However, the behaviour of Austrian citizens towards banking money and payments has generally changed over the last decades. In detail, more than 58% of Austrian citizens aged 14 or above use online banking nowadays, compared to 27% in 2008. 36% already use mobile devices for banking activities. Contactless payment methods, which make use of the Near Field Communication (NFC) function and without using a Personal Identification Number (PIN), are carried out by nearly one-half of the country's population. Other FinTech services and products as well as cryptocurrencies are used by merely 2%. Despite substantial transformations in the use of digital banking and payment products and services, a major share of Austrians does not use FinTech products, prefers cash for their daily purchases and wants cash to remain in their monetary system (Ritzberger-Grünwald/Stix 2018: 52).

When it comes to digitisation of payments, concerns about total elimination of traditional cash might arise. Although the use of digital payments partially substitutes payment with cash, Schäfer (2018: 5) claims that there is no absolute replacement for it due to differences in their functions and customer values. While payments at, for example, point-of-

sale (POS) will be fully digitised in the next few years, digital payments will only take over part-functions of cash in other areas. Therefore, both payment methods will be preserved in our financial system.

As cash and digital payments have attributes, such as convenience, simplicity, rapidity, low cost[7], security, liquidity management, and financial overview, that are rated differently by consumers, the acceptance of digital payment methods might depend on user's individual preferences and incentives. Also, the partially low acceptance and use of payment cards, such as credit cards, in Austria can partially be explained by its high level of cash use, as cash might better meet user's demands as a payment instrument in some respects (Rusu/Stix 2017: 54; Arango-Arango et al. 2018: 38). Cash is considered trustworthy because it is confidential, free to use and available for consumers at any time. Besides these highly appreciated qualities, the fact that cash cannot be hacked and does not run out of battery power (G4S 2019: 4) is at least as valuable when considering payments with battery-powered devices such as smartphones.

The preference for cash is irrevocable and will change over time. However, habit persistence might cause preferences to shift less rapidly. This can be related to the persistence of cash use in Austria and the relatively slow adoption of new digital payment methods. As shown in Figure 3, the total value of cash withdrawals at ATMs in Austria has increased gradually by about 8.25% since 2014, reaching EUR 19.88 million in 2018. In view of this development and the rise of digital payments on a global level, it might indicate a long way for Austria to reach a fully cashless society. In this sense, the network effect plays a significant role: if people continue to prefer cash payments, there is less incentive for merchants to accept cards, and given the low level of card payment offerings, consumers will continue using cash, which suggests that payment behaviour is more likely to change at a slow pace (Huynh et al. 2014).

On a global scale, the development of cash varies substantially, mainly because cash is a mostly domestic affair, driven by country-specific legislation, local non-cash payment initiatives, and in many cases a unique sovereign currency (G4S 2019: 4). On a country-level view, comparisons of the status quo of cash differ widely internationally. As the use of cash payments is influenced by various factors, they will also be considered for other digital payment alternatives discussed in the following sections, covering electronic and mobile payments in Austria and China.

7 Cost of payment methods, including electronic and cash payments, can be distinguished between social and private costs. Social costs of payment instrument refer to the total resource costs met by all parties involved in transactions using that instrument, such as consumers, merchants, banks etc. On the other side, private costs are only paid by individual parties using a payment system, such as transaction fees (G4A 2019: 9-10). In this paper, the cost of payments only refers to the latter one, excluding the social component.

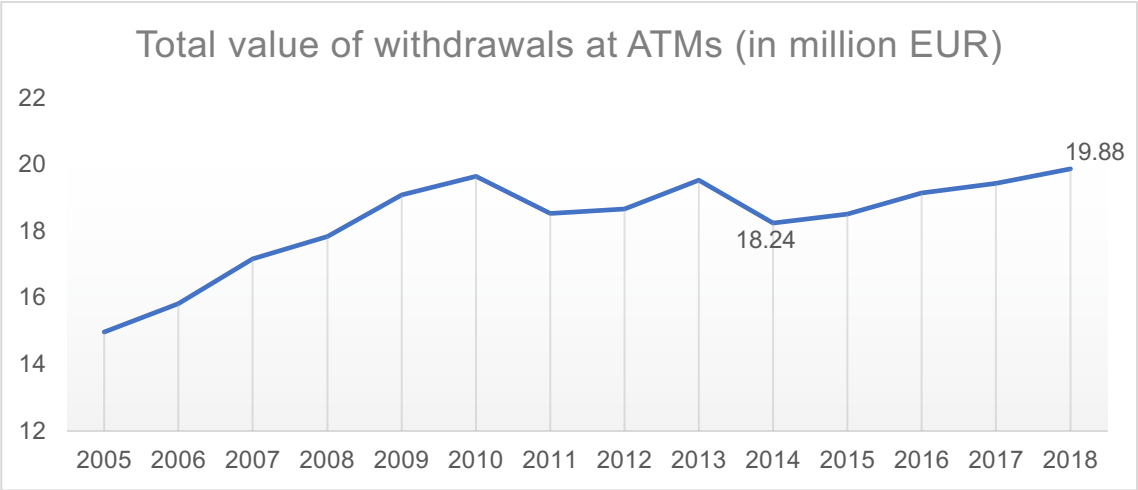

Figure 3 Total value of ATM withdrawals in Austria. Source: Own illustration. Data: ONB(a)

2.2.2 Excursus: Digital Economy and Society Index (DESI) 2019

In order to obtain a clearer perspective of the status quo of Austria's general digital development compared to other countries, the Digital Economy and Society Index (DESI) is described as follows. The DESI takes a country's overall digitisation level into a detailed consideration, and fundamental assumptions regarding digital development in more specific parts of the economy such as about a country's digitisation process of payment systems ca be made.

The DESI was developed by the European Commission and used in 2015 for the first time, by obtaining data from 2014. It measures the digital development and transition of economy and society of the 28 European countries and consists of five elements: connectivity, human capital, use of internet services, integration of digital technology and digital public services (EC 2019a). Each of the variables is composed of different indicators and have been modified over the past years, hence a time-based comparison is made nearly impossible (Peneder et al. 2016: 24). In comparison to previous years, adjustments of variables such as 5G readiness, above basic digital skills, at least basic software skills, female ICT specialists, ICT graduates, big data and electronic prescriptions have been made to DESI 2019. Due to alterations of the above-mentioned indicators, all data were recalculated. This might have changed the ranking compared with previous publications (see Figure 4) (EC 2019b: 2).

	Austria		EU
	rank	score	score
DESI 2019	**13**	**53.9**	**52.5**
DESI 2018	12	51.9	49.8
DESI 2017	12	49.2	46.9

Figure 4 Austria ranking overview 2017-2019. Source: EC (2019b)

In total, Austria occupies the 13th rank in comparison to the other EU Member States and remains slightly above the EU average (see Figure 5) in the DESI from 2019. Although its score increased gradually, the distance to the leading countries, such as Finland, Sweden, and the Netherlands, has increased even more considerably. Austria's performance in human capital and digital public services, as well as in basic and advanced digital skills is above average, yet there is a rising lack of skilled IT workers in the economy. Regarding connectivity, the use of internet services, and integration of digital technologies the country performs below average. Overall, Austrian companies seem to not fully consider the advantage of digital technologies such as cloud services or online sales platforms (EC 2019b: 3).

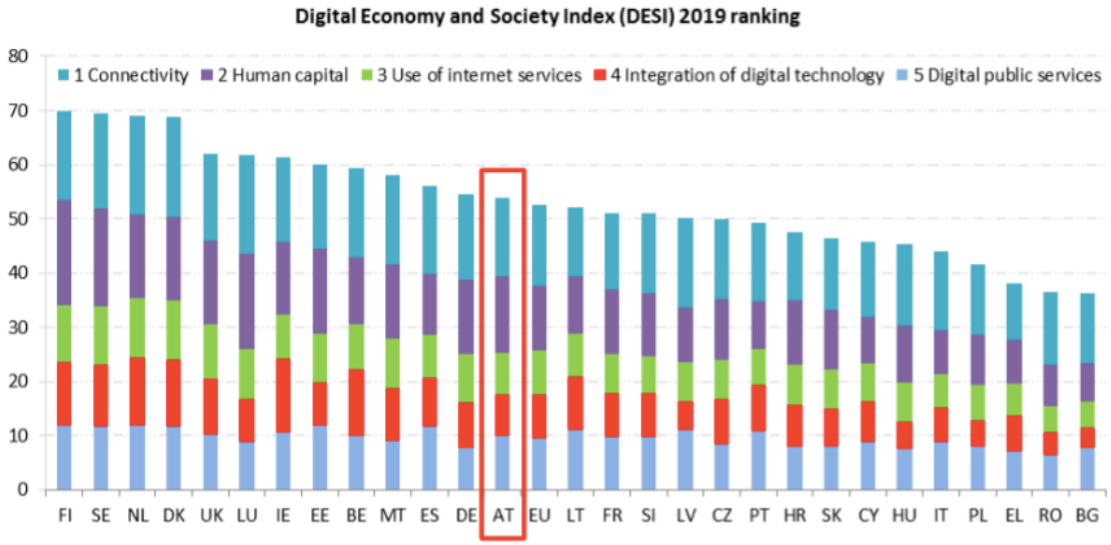

Figure 5 Austria's rank in DESI 2019. Source: EC (2019b)

Given the results of DESI 2019, it can be claimed that the digital transformation process in Austria is less advanced compared to other European countries with similar living standards, such as Sweden, Belgium, and Germany. In terms of Sweden, reasons could be the effective digitisation strategy of the country, which was adopted in 2017. It primarily focuses on primary and secondary schools, as well as on the smart industry. Additionally, the Swedish Association of Local Authorities and Regions has been instructed to enhance the digital skills of politicians, senior officials and other individuals with high-ranking positions in the

administration. Furthermore, Swedish businesses are keener on embracing new technologies such as cloud services, and every third small and medium-sized enterprise (SME) conducts online sales activities (EC 2019c: 3-4). Belgium shows high performance in connectivity. Most of its citizens are using online services, especially for online banking or social networking. In addition, the Belgian firms are successfully adopting digital technologies, which complements their digitisation strategy (EC 2019g). Concerning Germany, it has surpassed Austria in DESI 2019 compared to 2018. This might be due to the increased availability and high implementation rate of basic fixed broadband. Germany ranks 9th in the dimension of "use of internet services" in DESI 2019 and is ahead of Austria's 14th rank. The country's overall digital skills are above average and the integration of digital technologies by enterprises has increased over the last years (EC 2019f: 3).

As shown by Sweden's leading role in the DESI 2019, Austria's digitisation process could be driven by several factors based on individual, organizational, and political efforts and strategies, which are partly formulated within the objectives of the Digital Roadmap Austria. With the support of governmental measures, low-performing areas of Austria's DESI 2019 should be enhanced, and its higher-performing dimensions strengthened, in order to improve its DESI rank within Europe as well as on a global scale. The advancement of Belgium and Germany in DESI 2019 can be explained by the population's greater engagement in online activities. Further, Belgian and German companies can be described as progressive regarding the use of digital technologies, a trend which Austrian companies could follow.

According to the analysis of the data regarding human capital in DESI 2019, 67% of Austrians have at least basic digital skills and 36% show above-average digital skills (EC 2019b: 7). Although this percentage is only slightly above the EU average, the number has been rising over the last few years and represents a promising and optimistic outlook that people will continue acquiring digital qualifications for future tech-based developments.

2.2.3 Excursus: Cryptocurrency in Europe

Apart from the evaluation of DESI 2019, further information about Austria's digitisation level can be provided by looking into Europe's cryptocurrency landscape. According to an ING International Survey from June 2018, the awareness of cryptocurrency is highest in Austria (79%), followed by Germany (71%) and Belgium (38%) (Exton 2018: 7). Similarly, the report from Bitpanda and GlobalWebIndex, published in July 2019, shows that Austria and Switzerland have the highest rate of cryptocurrency holders in Europe. They rank among the highest in a worldwide comparison as well, and about 7% of all internet users in both countries possess cryptocurrency. In respect of cryptocurrency, Austria ranks far ahead of Sweden, Germany, and Belgium (Bitpanda 2019: 7).

This comparison demonstrates that Austria can be perceived as more advanced in particular aspects of digital development, compared to other European countries. It also indicates that Austria is keen to participate in certain areas of digital development. Therefore, its citizens can be described as adaptive concerning the digitisation process to some extent.

2.3 Digital Development of China

The rapid growth of China's economy not only enhances social development but also improves people's living standards. The explosive growth of smartphone users, electronic commerce (e-commerce), and online content consumption and creation resulted in a digital revolution in almost all industries and business sectors (Ma 2017: xxiii). The country has become home to dynamic digital innovators and is a leading investor of the latest technologies worldwide. In terms of digital progress, China is already more advanced than observing parties believe. Only about a decade ago, the Chinese e-commerce industry reported less than 1% of the worldwide transaction value. This share has increased to more than 40% today, as suggested by a McKinsey report from 2017. Relevant factors related to the substantial rise of digital China include, among others, its huge and relatively young market as well as vast population, which enables rapid commercialization of digital business models on a large scale. Furthermore, three major Chinese Internet giants – Baidu, Alibaba and Tencent (also known as "BAT"), who are creating a comprehensive digital ecosystem, play a key role in this rapid digitisation process. Also, governmental actions supporting digital players to test the market are stimulating a technology-driven development in China (Wang et al. 2017).

Especially in the field of artificial intelligence (AI), the country has secured remarkable improvements. Automated government offices, run only by AI and without any employees, are only one of many innovative technologies that are implemented into the Chinese society. In the last few years, the government has made an effort to promote the development of the digital economy in China by numerous ambitious economic initiatives formulated in 2015 and 2016. These include the 13th Five Year Plan, Made in China 2025, the Robotics Industry Development Plan, and the Three-year Guidance for Internet Plus Artificial Intelligence Plan (Cicenia 2018). These long-term digitisation plans demonstrate the extent of governmental support for the digital development of the nation. It also shows the astonishing speed at which a whole society of more than 1.4 billion people can digitally transform.

Along with the growth of China's digital economy, the necessity of customized financial services continues to grow rapidly, which is especially noticeable for payment services. With respect to an evolving industry of modern information technology products and services, digital payment services are playing an increasingly vital role in e-business (Zhenghao et al. 2010). Also, in traditional commerce such as in stationary retail, it might boost consumption, which is reflected in the country's economic development.

2.3.1 Digital Payment Industry – The Role of Alternatives and Cash

The payment industry in China and other emerging markets, such as India, Brazil, and Kenya, is adopting non-cash development strategies and following digital payment trends (Green 2019). Payment companies in other countries should learn and imitate these industries, taking into consideration their actual market conditions. The large degree of digital development of payment systems in developing countries can be clearly perceived, especially in India and China. This is one of the possible reasons why it might play an increasingly crucial role in developed countries.

Although China belongs to one of the first countries using paper money[8], it also takes on a leading role in the domain of electronic payment methods in today's global economy. The rapid adoption of electronic payment systems enabled its population to gain instant access to digital products and services. It also played an important part in the development of the offline as well as the online retail industry. In traditional retail, cash payment is one of the oldest payment methods in Chinese society, which is being replaced more and more by electronic and mobile substitutes (Lou-Alt/Polfuss 2017: 145).

According to an ATM Industry report of China (R&M 2019), the first ATM was installed in 1985 and the number of ATMs has been on the rise ever since. By the end of 2018, the amount has reached over 1,110,800 units in China and increased by about 15.03% compared to 2017. A decrease in circulation of cash was first recognized in 2016 when cash withdrawal with bank cards dropped by more than 10% compared to the previous year (Lou-Alt/Polfuss 2017: 145-146). Along with the first negative growth in cash withdrawal with bank cards in 2016, the growth of ATM installation also sunk to 6.6% in the same year (R&M 2019). The transaction volume of ATM withdrawals in China has been decreasing ever since (Ceicdata 2019b), which might reveal that consumers increasingly use alternative payment methods such as electronic-based payments.

Other payment methods in stationary retail are based on credit cards, debit cards and prepaid cards. Additionally, the issuance of cards is increasing considerably every year,

8 Paper money first introduced during the Song Dynasty (960-1279) in China. It was temporarily implemented as a replacement for coins at that time (Lou-Alt/Polfuss 2017: 145).

however, the growth of card payments in retail slowed down and transaction volume decreased in recent years, which can be attributed to a growing cashless and cardless payment trend in China (Lou-Alt/Polfuss 2017: 147-148). According to the Payment System Report from the third quarter of 2018, China's value of non-cash payment transactions, including negotiable instruments, bank cards and other settlement transactions, reached RMB 925.46 billion (EUR 118.37 billion)[9], a year-on-year increase of over 33%. While issuances of bank cards continued to increase and transactions grew steadily, however, credit transfers and other settlement transactions, including direct debit collection with acceptance, declined. The transaction volume of electronic payment conducted through online banking, telephone banking, mobile banking, ATM and POS rose rapidly up to RMB 592.43 billion (EUR 75.76 billion) (PBOC 2018). According to statistical data of bank cards drawn from Ceicdata (2019a), the total value of bank card transactions increased by more than 22.3% from 2015 to 2018, reaching RMB 862.1 billion (see Figure 6), showing the growing popularity of digital payment systems.

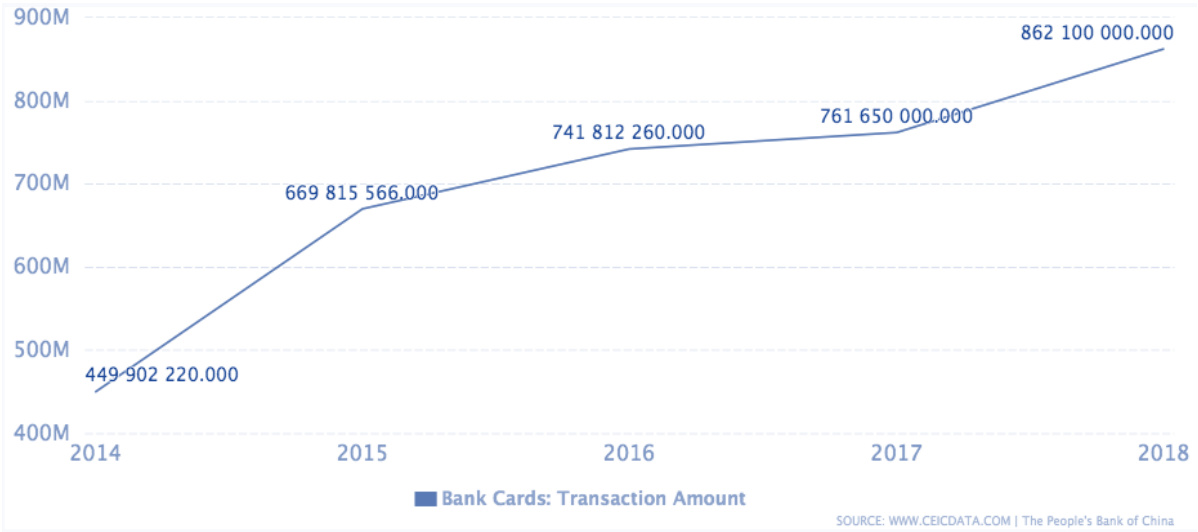

Figure 6 Transaction amount of Chinese bank cards. Source: Ceicdata (2019a)

Research on the Chinese payment ecosystem suggests that it used to be mainly based on cash in an underdeveloped banking system and infrastructure, where additionally a demand for credit cards never actually existed. When the technology industry began to produce cheap mobile phones at a time when technology-based payments were thriving, credit cards basically were skipped and replaced by mobile payments. In 2018, over 85% of purchases in China were conducted through mobile payment systems (Champion 2019). Its popularity is growing at unprecedented speed, partly due to the convincing price-performance ratio of mobile devices with payment function compared to costly credit cards.

9 The exchange rate for EUR and RMB (Chinese Yuan, CNY) is 1 EUR = 7.8199 CNY, as measured for July 2019 (EC 2019d).

About a decade ago, the prospering development of electronic business (e-business) along with online payment was linked to the growing credit card industry in China (Zhenghao et al. 2010). However, debit cards are owned by more than 90% of all active bank card holders nowadays and are far more popular than credit cards (CBNEditor 2019). Also, the even faster-growing electronic payment system, namely Mobile Payment, has gained massive popularity among Chinese consumers in recent years and is leading the Chinese population directly into a mobile-first mobile-only era (Ma 2017: 15). As a forerunner in payment innovations in the emerging world, China not only serves as a blueprint for developing markets to transform common smartphone applications into multi-purpose payment tools (Green 2019) but can also guide developed countries to a more modern and dynamic digital age.

2.4 Summary and Discussion

The following tables display the digital transition in payment methods in Austria and China. They show the profound shift from cash to digital payments in China, as well as the slower change that can be observed in Austria. Taking into consideration the population of both countries from 2018[10] and the number of bank cards issued in the same year, the results show a value of 0.81 bank cards per holder in Austria, and 5.26 bank cards per Chinese holder.

2.4.1 Tables: Austria

Period of time	Value of payment transactions: bank cards[11] (in billion EUR)	No. of debit and credit cards issued[12] (in million)	No. of POS terminals[13] (in units)
2015	22.97	6.30	146,998
2018	28.22	7.10	141,983
2015-2018 (in %)	+18.60	+11.10	-3.53

Table 2 Austria: Bank card and POS terminals statistics. Source: Own illustration. Data: EZB

10 Population in 2018: Austria: 8,751,820 = ~8.75 million; China: 1,415,045,928 = ~1,415 million. (see https://www.worldometers.info/world-population)
11 Including debit and credit cards.
12 Including credit cards with credit/delayed debit function and with cash function issued.
13 EZB.

Period of time	Number of ATMs[14]	Total value of ATM withdrawals (in million EUR)	Direct payment transactions in cash (today)	Cash in circulation[15] (in billion EUR)
2014	8,720	18.24	> 80%	-
2018	8,773	19.88		1.26
2014-2018 (in %)	+0.6	+8.25		-

Table 3 Austria: Cash statistics. Source: Own illustration. Data: ONB (a, b)

2.4.2 Tables: China

Period of time	Value of payment trans-actions: bank cards[16] (in billion RMB)	No. of debit and credit cards issued (in billion)	No. of POS terminals (in million units)
2015	669.82	5.20[17]	22.82[18]
2018	862.10	7.60[19]	58.20[20]
2015-2018 (in %)	+22.3	+31.58	+60.0

Table 4 China: Bank card and POS terminals statistics. Source: Own illustration. Data: Ceicdata (2019c; 2019e), ResearchInChina (2016), CBNEditor (2019), iResearch (2016)

Period of time	Number of ATMs	Total value of ATM with-drawals (in billion RMB)	Cash in circulation (in billion RMB)
2014	614,880	18.84	6.03
2018	1,110,800	58.90	7.32
2014-2018 (in %)	+44.65	+68.01	+17.49
2017-2018 (in %)	+15.03	-	-
2015-2016 (in %)	-	-10.0	+17.6

Table 5 China: Cash statistics. Source: Own illustration. Data: Lou-Alt/Polfuss (2017), CBNEditor (2019), Statista (2019)

14 (ONBa)
15 (ONBb)
16 Including debit and credit cards.
17 Ceicdata (2019e)
18 ResearchInChina (2016)
19 CBNEditor (13.03.2019)
20 iResearch (11.08.2016)

To sum up the digital development of payment methods in Austria and China by selected statistics, the illustrations in Table 2 to Table 5 show differences of the countries over the course of the last years. Data on the value of payment transactions of bank cards, involving debit and credit cards, the number of bank cards issued and the number of point-of-sale (POS) terminals were chosen to present the progress of digital payments. As the extent of digital payment methods is related to the popularity of non-electronic alternatives such as cash, other cash-related data, for instance, the number of ATMs, the total value of ATM withdrawals and cash in circulation, have been taken into consideration as well.

The most significant results show that although the value of payment transactions and the number of bank cards issued increased in both countries, the number of POS terminals decreased in Austria. While it increased enormously in China by about 60% from 2015 to 2018. This shows the huge growth and demand for digital payment technologies at point-of-sale on the Chinese market, for example in retail stores. Besides, it can be observed that considerable efforts are made to build a digital payment infrastructure throughout the whole country. Regarding Austria, the decrease in POS terminals might be due to declining demand in the stationary trade, as people insist to use other payment methods such as cash.

Another substantial numeric value shows that the amount of ATM withdrawals increased steadily in Austria, while it decreased considerably in China, despite the increasing number of cards issued. This might indicate that cash as a payment method in stationary trade might be more popular in Austria than in China. Given the rising number of cards issued in China and the decreasing value of ATM withdrawals, this might imply that digital payments in China are more prevalent than cash payments (CashEssentials 2019; Ceicdata 2019d).

From the perspective of payment behaviour, the increase in the use of digital payments and decrease in the use of cash in China might indicate that its citizens are more agile to adopt payment innovations, such as bank cards and are assumed to be more open to other electronic payment systems such as mobile payments. However, as only a few factors have been taken into account, this can only be perceived as a speculative assumption, which needs significantly more aspects to be considered and reflected on. The rapid adoption of digital payments in China and the slow adoption in Austria might not only depend on the supply of alternative payment methods, nor the users' preferences or payment infrastructure, but also on political and legal aspects. These, along with other factors will be discussed in the following chapters.

3 Mobile Payment

Mobile Payment (MP), as a further development of electronic payment, is discussed in the following chapter. Starting with a clear definition of MP, this section continues with background information about the general MP development, the MP development in Austria, and subsequently in China. Afterwards, positive as well as negative acceptance factors of MP in both countries will be examined. Building on this foundation, further hypotheses on the intention of MP use will be drawn, which helps in creating a theoretical model used in the subsequent empirical part of the thesis.

3.1 Definition

A broad definition made by Teo et al. (2015b: 311) refers Mobile Payment (MP) to individual or business activities that utilize mobile internet enabled electronic devices to perform any economic transactions. MP can also be categorized as a special form of electronic payment (e-payment) (Ginner 2017: 8). Dahlberg et al. (2008: 165; 2015: 265) describes MP as the payment for products and services, and bills with wireless or other communication technologies. The payment process is carried out through a MP instrument, such as a mobile credit card or a mobile wallet.

Similarly, Pousttchi/Wiedemann (2006: 363) define MP as the payment process with aid of electronic communication technology along with mobile devices, whereby it is distinguished between two primary tasks: (1) MP within mobile commerce (m-commerce) is defined as the payment of mobile offers, such as payments of bills, online shopping on a mobile device, whereas (2) MP outside m-commerce include transactions on the stationary internet (electronic commerce, e-commerce), at machines, in traditional commerce and between individuals (Customer-to-Customer, C2C). A further extension of this term adds the payment with personal digital assistant (PDA[21]) devices, radio frequency identification (RFID[22]) technology and devices with near field communication (NFC[23]) function (Peng et al. 2011: 1). Also, MP can be carried out via a wireless application protocol (WAP[24]) and mobile applications (apps) (Zhou 2013: 1086).

21 Personal Digital Assistant (PDA) is a mobile calculator in a size of a notebook, consisting of a single display on the front side of the device (Lackes/Siepermann 2018).

22 Apart from magnetic stripe cards and barcodes, Radio Frequency Identification (RFID) rank among the more widespread identification technologies. It is popular for identify objects in logistic processes and an integral component of Internet of Things (IoT) (Krieger 2018).

23 Near Field Communication (NFC) is a wireless technology that enables payments via e.g. smartphones or payment cards by putting it within few centimeters of another compatible device, such as a terminal, tablet or another smartphone (Kagan 2018).

24 Wireless Application Protocol (WAP) is an industry standard for data transmission, enabling mobile devices, such as mobile phones, gain access to services and applications (e.g. calling up websites) (Sjurts 2018).

Hartmann (2006: 13-17) describes MP as payments initiated through mobile phones, such as to pay for digital goods delivered over the mobile phone, for goods ordered via the internet, and for goods or services bought in the physical world. To extend the term, MPs are explained as a group with various conceptual, technical and organizational options. In many cases, MP is built “on top of” existing payment services, which means that their processing is carried out via established payment instruments of the banking industry. A more specific definition by Duane et al. (2014) limits MP to the payment with the use of the smartphone as a mobile device only. Based on several literatures, Ginner (2017: 70-71) created a definition where he describes MP as a possibility of electronic and monetary transaction, including the exchange of money and money substitutes between involved transaction parties, such as customers and stationary merchants, for products and services of all kind, and with the use of smartphones.

The exact definition of Mobile Payment in the following sections limits the term to the payment process with smartphones as a mobile device in the stationary trade, such as at point-of-sale (POS) terminals in supermarkets or stores. As payments with smartphones can be executed through payment applications based on various technologies, such as NFC, QR code or barcode scan, no distinction between these functions will be covered in the analysis of MP development and its current state of advancement in the subsequent chapters.

3.2 Development of MP

As early as in 2003 a rapid development in the Mobile Payment (MP) market was anticipated, but the predicted explosive growth never occurred. This can be ascribed to the gradual economic development and situation of the financial markets at that time, or rather the lack of marketing activities to clearly communicate the customer value of MP, missing standardized systems and cooperation among MP service providers (Karlsson/Taga 2006: 73). However, MP is supported by many parties nowadays, especially by cash opponents (Letzgus 2017: 67) and new types of MP services are becoming increasingly popular in specific parts of the world, especially in Asia. For instance, mobile phones are being used for effecting money transfers between industrial and developing countries (Hartmann 2006: 15), enjoying popularity in Africa as well. Some African countries serve as pioneers in mobile banking and mobile network operators such as M-Pesa, Orange Money and MTN Money. They are taking on a dominant role in providing mobile money services. As a result of the implementation of new innovative schemes in mobile money and digital payments by financial technology (FinTech) companies entering the African market, the MP sector could

also profit from this development, and consequently improve economic operations and regional businesses (WPR 2018: 10).

Mobile Payment goes through different maturity phases in different countries. In Asia, MP is partly widespread, whereas in Latin America it is still in the early stage. The MP market in the US is small, because of the strong fragmentation of its banking industry and mobile communication sector (Karlsson/Taga 2006: 86). The MP market in Europe differs considerably among northern and southern countries. For example, Sweden already moved ahead of the US as a global leader in per inhabitant non-cash transactions. With more than 6 million of the country's total population of 10 million are using Swish, a MP service provided by all main Swedish banks (WPR 2018: 8), which makes Sweden an exemplary country within Europe. By comparing Austria also to other European countries, such as Belgium, the Netherlands and Switzerland, MP is also used more frequently in those countries than in Austria, although the share of their cash use only differs by about 2% from each other (PWC 2019: 7).

Regarding the MP facts in numbers, the worldwide MP market was already valued at about USD 897 billion in 2018 and is expected to increase up to USD 3,695 billion by 2024 (Mordor 2018). The advancement is animated by the growing adoption of mobile payments, particularly in India (33.2%), China (25.8%) and South Africa (15.1%). Stores and services across the globe are adopting and integrating the MP technology at a rapid pace, leading to changes in lifestyle and daily commerce, and an even faster growth of online purchases. In the expectation of continuance of this trend, there is sufficient market potential for the large global technology firms, also known as BigTechs, such as Facebook, Apple, Google, Amazon, Tencent and Alibaba, as well as for governments to enter the MP market and to expand their influence. In 2016, BigTechs accounted for about 71% of the global electronic wallet (e-wallet) market and these companies are taking advantage of their large user base platforms to impact the payment landscapes. By providing exhilarating user experience, value-added attributes, and making use of network effects, these companies are achieving more and more market share (WPR 2018: 5). Given the growing success of BigTechs on the MP market, especially government officials and other interesting parties of MP might want to learn from their strategies.

3.2.1 Mobile Payment Service Providers (MPSP)

In the initial years when Mobile Payment (MP) was born, the most important potential Mobile Payment Service Providers (MPSP) were mobile communication providers and banks, including financial service companies such as credit card companies (Siegert 2002). Nowadays, other MPSP such as FinTechs and BigTechs have also entered the MP market, and MP systems such as Google Pay, Apple Pay, Samsung Pay, Alipay and WeChat Pay are

more well-known on the global MP market (Mordor 2018). Unlike the traditional mobile communication providers or banks, FinTech companies are facing greater financial challenges and lack necessary infrastructure as well as customer base (Pousttchi/Wiedemann 2006: 364), however, they have to deal with less complex regulations and less tight regulatory oversights than banks, and are not obliged to enable data access to their systems (WPR 2018: 23). This allows new entrants such as FinTechs to invest their financial resources into more user-friendly technologies to increase customer value and are less restricted to spend it on regulatory compliances. Moreover, FinTechs are able to fill the gap between existing bank offerings and customer expectations with value-added services (WPR 2019: 33), which serve as a major advantage compared to traditional providers such as mobile communication providers.

The value proposition of BigTechs include among others peer-to-peer (P2P) payments in real time, personalization through data, such as bill splitting or automatic bill payments, new revenue stream, where users' data, including payments data, are monetized to be able to offer payment services at a lower cost. Other benefits provided by BigTechs are seamless customer experience, a secure and more convenient platform for payments and transfers, rewards and customer loyalty based on, for example, earning points and an overall comprehensive digital ecosystem, with extension of various financial service supplies in diverse areas, including health care or tourism (WPR 2018: 12-13).

Mobile communication companies hold a favourable position in taking advantage of increasing MP use, since they have a close relationship to the customer and possess the required infrastructure for MP. The main competitive advantage of mobile communication companies is their possibility of differentiation, whereas financial service companies are able to build good relations of merchants and customers. Also, they have comprehensive knowledge in the domain of financial operations and risk management (Karlsson/Taga 2006: 74). Other than that, banks can count on strong relationships with retail and private customers as well, which is based on great trust of longstanding experiences. Another key capability of banks is their easy access to a widespread infrastructure, from which non-traditional players such as FinTechs cannot benefit in a competing environment (WPR 2018: 33).

All participating parties within the MP ecosystem are equipped with distinctive attributes and certain beneficial factors. The aim for all MPSPs is to expand their customer base and gain a majority share among users in respective markets. To achieve this goal individually, each MP provider should identify their unique competitive advantage compared to other actors. Though, as combining different value-added propositions of several MPSPs could lead to the achievement of an even larger share of MP users, collaborations between banks, FinTechs, BigTechs and other MPSPs might be a solution in answering the wide-ranging and complex question of successfully introducing MP in particular countries.

As a matter of fact, banks are already actively collaborating with FinTechs and BigTechs. For instance, WeChat Pay is supported by BNP Paribas in the retailer segment in France, and activities are planned to be extended across the entire continent of Europe (WPR 2018: 51). In the course of collaborations with FinTechs and BigTechs, banks should consider the pros and cons when deciding to choose the right partnership. As it is in the interest of all MP providers, banks intend to foster and secure their position within the MP ecosystem as well. In this respect, it is important to emphasize their valuable role, in order to avoid being replaced by collaborating partners or other competitors.

3.3 Factors of Success and Failure of Mobile Payment

The next subchapter discusses several challenges regarding the effective implementation of Mobile Payment (MP) from different perspectives of service providers and customers. To limit the research area of this study, the focus will predominantly be put on the consumer's and end-user's perspective of MP, excluding the perspective of merchants and other business customers of MPSPs, and the related barriers of MP use and MP acceptance. Moreover, several studies of MP acceptance will be examined in detail, determining acceptance factors regarding the intention to use MP with the smartphone in stationary retail. Resulting from this examination, further hypotheses will be drawn and integrated into the selected theoretical model (see 1.2 Theoretical Framework), which will be modified and formulated specifically for the present study.

In general, innovations regarding payment systems face certain challenges, as payment services belong to a special market with strong network effects, specific roles, niches ,and rules. Since payment services are closely related to money and finance, it is highly regulated. However, as payment services are not purely the domain of banks anymore, organizations outside of the banking industry are also able to offer financial services making use of existing bank infrastructure (Hartmann 2006: 8). With numerous players coming from different industries and penetrating the MP market, it unnecessarily complicates the MP landscape with non-collaborative business models and diverse offerings. This might lead to an even greater fragmented MP platform, whereas a uniform solution for mobile payment systems would clear up confusion and simplify the approach of using this mobile technology.

According to Karlsson/Taga (2006: 83-85), the Mobile Payment market needs a clear distribution of roles and incentives along the value chain, standardized technology to find an open payment solution, the development and formation of a trustworthy brand and the facilitation of MP usage and access. In this sense, many innovative mobile payment

schemes are struggling to define common standards and to address emerging security issues. Because of these challenges, it becomes even more difficult to acquire more active customers and attractive cooperative merchants. At this point, the development of feasible cooperation models between banks and other MPSPs is perceived as a major issue, as mobile payments can rely on different ways of paying, and therefore also on different claims (Hartmann 2006: 14). Not merely the lack of effective collaborations between MPSPs, but also the high number of actors involved transforms the value chain of mobile payment transactions to a more complex undertaking compared to other payment methods (Karlsson/Taga 2006: 73), which can be perceived as an additional barrier for the diffusion and acceptance of Mobile Payment technologies.

By means of using Mobile Payment and enjoying the benefits of this system, citizens voluntarily or involuntarily give up on freedom, anonymity, protection of privacy or the property right of cash in their daily life of consumption. Consequently, a plausible explanation of the gradual disappearance of cash given by authorities is essential, and its abolition should not be carried out against the will and without the democratic decision of citizens (Häring 2016; Hennies 2016). Therefore, MPSPs as well as governments should give convincing and legitimate explanations regarding security and privacy issues, for example, personal information, to tackle and settle trust problems of potential and existing users of MP. In order to earn and create an advanced trust basis, the effective implementation of new technologies requires social dialogues on the respective topic, more effective data protection and consumer protection (Gönenç/Guérard 2017).

Apart from that, Punzet (2006: 229) claims that payments with the mobile phone are considered one of the most secure cashless payment methods, because of modern technology and well-chosen partners. For instance, the Swedish mobile payment system “Swish” makes use of a third-party mobile application, which serves as a personal electronic identification issued by several Swedish banks (Swish). Through new payment security methods, electronic payments via smartphones become safer and more trustworthy than ever before. Based on these innovative technologies, a more reliable basis for trust in MP can be developed, encouraging beginners to use the efficient system.

In view of technological advancements in the domain of MP, the payment behaviour at stationary point-of-sale (POS) terminals has also changed over the last decades. However, a dominant preference of cash among consumers can still be perceived in many countries. Therefore, Hierl (2017a: 77) suggests that an effective establishment of Mobile Pay-

ment can only succeed if it is not merely reduced to its payment functionality, but also accepted as a multi-purpose communication tool within the Customer Journey[25]. Also, Mobile Payment bears several advantages which should be strongly emphasized, such as the advantage of differentiation for merchants and suppliers, which might increase their revenue. The customer value of MP for end-users lies mainly in its high degree of convenience and flexibility, in terms of time and space (Karlsson/Taga 2006: 75).

3.3.1 MP Acceptance Factors

Based on literature on acceptance factors of mobile payment systems, several studies have been selected and analysed in detail. In consideration of all reviewed studies on MP acceptance, the final findings on the key factors influencing the intention to use MP have been summarised in Table 6, including their positive and negative correlation to MP use. In a later section, the number of mentions will be identified and illustrated together with the respective acceptance factor.

A study about Mobile Payment acceptance in mobile commerce (m-commerce) among Irish users, focusing on the use of smartphones as a mobile device, found that "trust", "perceived usefulness" and "perceived ease of use" are the main acceptance factors of MP with the smartphone in the field of m-commerce (Duane et al. 2014). Similar results were found by a Mobile Payment study with South Korean participants, in which "perceived usefulness" and perceived ease of use" were determined as central elements of MP acceptance in m-commerce as well. User-specific factors such as "personal innovativeness", "MP knowledge" and MP-specific factors such as "mobility", "reachability", "compatibility" and "convenience" were also added to the results (Kim et al. 2010). Another study from Germany focusing on MP acceptance with smartphones in m-commerce led to comparable conclusions of the two significant acceptance factors "perceived usefulness" and "perceived ease of use", and also added "attitude toward use" to their findings (Schierz et al. 2010).

Author(s)	Positive factors	Negative factors
Kim et al. (2010)	Perceived usefulness Perceived ease of use User-specific factors: Personal innovativeness MP knowledge MP-specific factors: Mobility Reachability Compatibility Convenience	

25 Customer Journey describes the experience of a consumer of the complete lifecycle of a product or service (Hierl 2017: 134).

Schierz et al. (2010)	Attitude toward use Perceived usefulness Perceived ease of use Perceived compatibility Perceived security Individual mobility Subjective norm	
Duane et al. (2014)	Trust Perceived usefulness Perceived ease of use	
Teo et al. (2015a)	Perceived transaction convenience Perceived transaction speed	

Table 6 Mobile Payment Acceptance Factors (general, summarised by authors). Source: Own illustration

Regarding the above-mentioned studies from different authors, Mallat (2007: 429) suggests that it is not possible to transfer findings on MP acceptance factors of a specific country to other countries due to cultural differences as well as different economic conditions. As discussed by Dahlberg et al. (2008: 170), there are "distinguishable" payment cultures in various countries, which makes a cross-country comparison a difficult task. However, by taking these "distinguishable" variables such as payment culture regarding use of cash, infrastructure for alternative payment methods, MP providers and overall MP development in both countries into account, a link between MP acceptance in Austria and China will be established to enable a basis for descriptive comparison.

3.4 Mobile Payment in Austria

According to a study, conducted by the Austrian market research institute Ipsos, Mobile Payment (MP) with the smartphone has been gaining more and more significance in Austria for the past three years. As compared to 2016, the amount of payments with smartphones increased by 18%, reaching 27% of all respondents, who use MP at least once a month to make purchases. The main reasons for respondents to use MP is the simple use of the service (71%), convenience (69%), and the rapidity and saving of time (67%) (O-TON 2019). In terms of bank transactions, more than 58% of the population use online banking today. Among those online banking users, online payments with mobile devices have gained popularity. Although 38% of online banking users carry out online banking only via a desktop computer or a laptop computer, already 62% of them also use smartphones or tablets to communicate with their bank. While 51% of all Austrians conduct online banking via desktop computer or laptop at least every month, 34% already use smartphones or tablets for online banking (Ritzberger-Grünwald/Stix 2018: 58-59). Although debit cards are still most commonly used for banking businesses among the respondents, already 73% of all respondents carry out online banking via a web browser and 58% of them already use a smartphone

application, which equals a growth of 13% compared to 2016 (O-TON 2019), and the number is expected to rise in the upcoming years.

In the area of point-of-sale (POS) payments, transactions via e.g. mobile phones, tablets, smartwatches and bracelets are likely to diffuse over the next periods. Different methods of mobile payments at POS terminals in Austria include among others NFC payments, payments via text messages, confirmation calls (e.g. paybox austria AG), or via bar code scans (e.g. Bluecode) (Ritzberger-Grünwald/Stix 2018: 66-67), which will be examined more precisely in the following subchapter, along with all MPSPs which are relevant for the Austrian market.

3.4.1 Development and MPSP

In 2003, the ambitious project “Mobile Payments Services Association (MPSA)” was established under the term “Simpay” by four large mobile service providers, Orange, Telefonica Moviles, T-Mobile and Vodafone, to standardize Mobile Payment (MP) across Europe. However, two years later activities were stopped due to little economic success and low penetration rate (Pousttchi/Wiedemann 2006: 365). While Gassner (2006: 184) interprets this outcome as a major setback for the Mobile Payment development in Europe, others believe that consumers are generally truly interested in Mobile Payment Pousttchi/Wiedemann (2006: 365) and that this technology will be used more widely in future days.

As recent studies show, a significant percentage of payments in Austria is already conducted via mobile devices such as mobile phones. However, the popularity has still not reached a significant share among the Austrian population compared to other countries, such as in Sweden, Belgium or China (see 2.2.2, 3.2 and 3.5). As a result of investigations of acceptance of digital payment methods in chapter 2, preferences of alternative payment methods such as cash money could have a noteworthy impact on people’s payment behaviour. As cash could have an influence on the use of digital payments such as debit and credit cards, subsequently these alternative payment methods could affect the intention to use Mobile Payment. Furthermore, alternative payment methods are responsible for how the payment ecosystem of a country is constructed, and its development can be shaped by new technologies offered by several MPSPs (Mobile Payment Service Providers) (Rusu/Stix 2017: 54; Arango-Arango et al. 2018: 38; Huynh et al. 2014).

The pioneering MPSP paybox austria AG, later transformed into paybox austria GmbH in 2011, had a great impact on the development of MP in Europe in the early years. Paybox was founded in 2000, as a subsidiary company of A1 Telekom Austria AG, enabling as one of the first systems the conduction of payments via mobile phones. The mobile payment system requires a contract-based or a value card-based mobile phone, as well as an

Austrian bank account and a registered account on the paybox website (Punzet 2006: 221), in order to make use of this MP platform. Since 2011, the paybox Bank AG, which is the result of a fusion between paybox austria GmbH and A1 Bank AG, provides private and business customers Mobile Payment solutions in many areas of life on the Austrian market. For example, “HANDY Parken” and “HANDY Fahrschein” offer parking tickets in Vienna as well as tickets for public transportation with the Vienna Lines (Wiener Linien) and in other Austrian cities, such as Linz, Salzburg, Graz and Klagenfurt. Paybox is also known for payments at vending machines, which can be easily carried out e.g. via Short Message Service (SMS), and “HANDY Maut” in cooperation with ASFINAG, an Austrian corporation in charge of the highway infrastructure, which facilitates payments of tolls via the smartphone. The product range of paybox Bank AG consists of three main pillars: (1) the paybox service, transforming the mobile phone into a mobile wallet, where payments are made with aid of mobile providers and purchases are confirmed by a PIN code beforehand, (2) the A1 Visa card, and (3) e-money, providing electronic money and voucher solutions for, for instance, food retailing firms (paybox). As much as paybox plays a pioneering role in MP in Austria, however, the company does not specifically provide MP at POS terminals in stationary trade, which is the primary focus of the present study. Therefore, the following MPSPs will be taking into consideration more precisely.

Other MPSPs in Austria are local banks, such as Erste Bank und Sparkasse, Raiffeisen, Bawag and Bank Austria etc., which provide individual mobile applications to enable contactless payments with the smartphone by making use of NFC technology. The procedure of mobile payments in stores is often similar: the customers use the bank’s mobile application on their smartphone and hold it close to an NFC-enabled terminal in order to carry out the transaction. As in the case of bank cards, all amounts below 25 Euros do not require a PIN (Mey 2018). Since the number of Mobile Payment is growing among Austrian users, banks have been established themselves as the most trustworthy providers of this system according to a study conducted by PwC, a multinational professional services firm. Although Austrian banks already seek close cooperation with other MPSPs such as Apple Pay, users put more confidence in MP solutions provided by local banks themselves (Trending 2019).

Another Austrian MP solution, which is on the way to build a profound trust basis among users, is provided by the Austrian-Swiss FinTech named Bluecode, which was initially established as VeroPay in 2012. Its payment function also operates with a mobile application, which has to be connected with the user’s bank card, but its technology is dissimilar to local banks. Bluecode makes use of an individual single-use barcode technology, with which MP users pay at POS terminals by scanning the unique barcode (Mey 2018). The development of Bluecode has been remarkable in the past few years and the pursuit

of further success can be reflected in recent developments. Together with other European mobile payment providers (the Spanish Momo Pocket, the Portuguese Pagaqui, the Norwegian Vipps, and the Finish ePassi and Pivo), Bluecode and Alipay, a Chinese MPSP, have presented the "Mobile Wallet Collaboration" in June 2019. The goal of this collaboration is to create a uniform QR code format based on Contactless Gateway Code Protocol (CGCP), facilitating smartphone-based payments between participating service providers and merchants across various countries. As Bluecode would be legally and technically able to provide these CGCP codes, all data of European bank partners and that of private users would remain within Europe. At the same time, the constructed QR code would also be compatible with Alipay and therefore accessible for its users from China (Kleine Zeitung 2019), attracting even more Chinese tourists with high purchasing power to boost Europe's tourism.

Bluecode's CEO, Christian Pirkner, aims to provide a MP solution for banks, merchants and end-users with European rules of technology and data protection. He ensures, that no user data can be stored or transferred to third parties due to a procedure based on transaction authentication number (TAN) with a barcode scan. Pirkner also puts focus on the new EU policy "Payment Services Directive II" (PSD2), which will become effective in September 2019, stressing banks to provide access to selected user payment data for national as well as international third-party financial service providers, but only with customers' agreement. In this case, other MP providers such as Google and Apple would be able to gain access to users' bank account and data, which bears high risks concerning privacy issues (Pirkner 2019). Especially in matters regarding data and privacy protection, Bluecode might fill a significant risk and trust gap between end-users and MP service providers with its advanced approach based on trustworthy EU regulations.

In consideration of above-mentioned MPSPs, the Austrian Mobile Payment market seems more fragmented than unified, as each local bank offers their own MP solution in form of an individual app, rather than providing a uniform MP platform where all banks are involved, which can lead to greater success as demonstrated by the Swedish MP system *Swish*. However, the third-party financial service provider Bluecode, together with other European MP providers and a Chinese provider, has come up with a uniform MP solution for the European market, aiming to operate upon EU regulations, which could solve both the data and privacy protection problems, as well as the lack of trust problem not only in Austria, but also across other European countries.

3.4.2 Factors of Success and Failure of MP in Austria

As discussed in chapter 2.2.1, the importance of the traditional payment method of cash in Austria might have a significant influence on people's acceptance of digital payments, including mobile payments. Other than that, political and legal frameworks, and the given MP infrastructure might also have an effect on the success of MP implementation. Considering the range of MPSPs in Austria, MP solutions are rather fragmented than unified, although the third-party MP provider Bluecode is collaborating with other MPSPs to create a uniform cross-country plan. However, one barrier for the successful implementation of MP use can be described as the lack of standardization on the MP market. Another possible concern that prevents people from using MP could be due to privacy issues and personal data protection, which is also reflected by the following study on MP use in Austria.

3.4.2.1 MP Acceptance Factors in Austria

The study conducted by Ginner (2017) particularly examines the use of Mobile Payment with smartphones in the stationary trade in Austria and aims to develop a Mobile Payment acceptance model with empirical investigations. According to Ginner (2017: 357), the main drivers for MP acceptance in the stationary trade in Austria are "perceived usefulness, "perceived personal innovativeness", "perceived compatibility", "perceived social influence", whereas the most significant barrier is "perceived risk". The last factor could involve risks of data protection and security concerns. As it is claimed in the study, cultural features such as the preference for cash money as a payment method and other legal aspects, which indicate a high significance of protection of personal data within monetary transactions, differ across nations, however, these are key characteristics of money and finance in Austria (Ginner 2017: 22).

Author(s)	**Positive factors**	**Negative factors**
Ginner (2017)	Perceived usefulness Perceived personal innovativeness Perceived compatibility Perceived social influence	Perceived risk

Table 7 Mobile Payment Acceptance Factors (Austria). Source: Own illustration

3.4.2.2 Excursus: Political and Regulatory Framework of MP in Austria

Along with the growing mobile commerce and the increasing number of cashless payments in Europe, the mobile payment market is facing enormous technological as well as security-related issues. Particularly, challenges regarding consumer protection, such as personal

data protection, digital identity fraud, hidden payment obligations and lack of payment-related information prevent MP to be accepted by the greater user community (Valant 2015). As it is suggested, the main regulatory framework for the success of MP lies in the prevention of fraudulent use of personal data, especially dealing with sensitive transaction data (Bitkom 2014).

Within the European Union, the legislation set up common rules for payments with the implementation of the first payment services directive (PSD1) in 2007. This regulation to strengthen consumer rights and protection in domains of credit transfers, direct debits, card payments, mobile and online payments, which could be offered by banks as well as by other third-party payment services. In 2015, the Payment Services Directive II (PSD2) replaced PSD1 and was introduced to enhance the existing rules, with a clearer focus on new digital payment services. The new directive includes regulations for more simplified and safer use of internet payment services, stronger consumer protection and rights (EC 2019e). However, the new EU policy PSD2, which has been effective since September 2019, requires European banks to enable access to customers' transaction and account data for third-party providers, hence it might not solely elevate fraud risks, but also make end-users sceptical about related security issues and hinder their intention to use MP (Tengur 2017).

By contrast, another initiative driven by SEPA Instant Credit Transfer (SCT) promotes transactions in real-time among users, which is already used in countries like Sweden, Denmark and the United Kingdoms. Due to its high transfer speed, it might seem beneficial and particularly convenient to use this technology, however, fraudulent practices can be seen as a risk here as well (Tengur 2017).

3.4.2.3 Data Use of MP

As on a regulatory basis, data protection takes on a crucial role in MP's success, end-users certainly want to be aware of the application area of their personal data. Within the EU, policies such as the General Data Protection Regulation (GDPR) and the Data Protection Act 2018, which came into force in May 2018, cover principles to protect personal data of its citizens. The GDPR requires personal data to be transparent and processed lawfully, collected for specified and legitimate purposes, and to be stored for no longer than necessary for the initial purposes (PSR 2018: 60).

According to a discussion paper on data in the payments industry in the UK, published in June 2018 by Payment Systems Regulator (PSR), data collected by e.g. payment service providers (PSP) could bear positive aspects for end-users and could have significant impact on the evolution of the payment industry, depending on how data is shared and used. The

findings show that payment service providers collect payment data, in compliance with national or EU regulations, mainly to provide, develop, improve and cross-sell services and personalized products, to prevent and detect fraud, and to receive commercial value (e.g. through the selling of statistical reports) (PSR 2018).

In view of the importance of data protection within Europe, it also becomes a highly sensitive topic for the MP industry and its products. This might be another barrier to the successful implementation and expansion of MP systems within Austria. The political and legal aspects of MP are discussed in the subsequent part, and the differences compared to China are summarised in section 3.6.

3.5 Mobile Payment in China

Since the early 21st century, a vast share of China's population abandoned the use of landline phones and replaced them with mobile phones. With larger advancements in technological capabilities, smartphones also began to replace personal computers. For a high number of Chinese people, the first online experience was made through a smartphone, which influences more and more areas of daily life (Ma 2017: 15), including the use of a smartphone as a payment device, which has not only drastically changed China's payment landscape but also the user's consumption behaviour (Bai 2015).

Therefore, the growing popularity of mobile payments in China can be linked to the thriving smartphone industry. Already more than 81% of all Chinese smartphone owners use mobile payments in stores (Merchant Savvy) and more than 92% of people in the largest cities use WeChat Pay or Alipay, both Chinese mobile payment solutions, as their main payment method. The popularity is similar in rural areas of the country, where about 47% of its rural population use mobile payments regularly. In 2018, about 83% of total payments were conducted via mobile payment applications (Daxue 2019a), reaching a transaction volume of RMB 190.5 trillion with a growth of 58.4% compared to the previous year (see Figure 7) (iResearch 2019). The nearly explosive use of Mobile Payment in China is partially related to the growth of electronic commerce and mobile commerce, and its success can be granted to the simple use of QR code technology, which spreads in an increasing speed among the Chinese citizens, from e.g. street musicians to vendors at food markets, due to its easy application process.

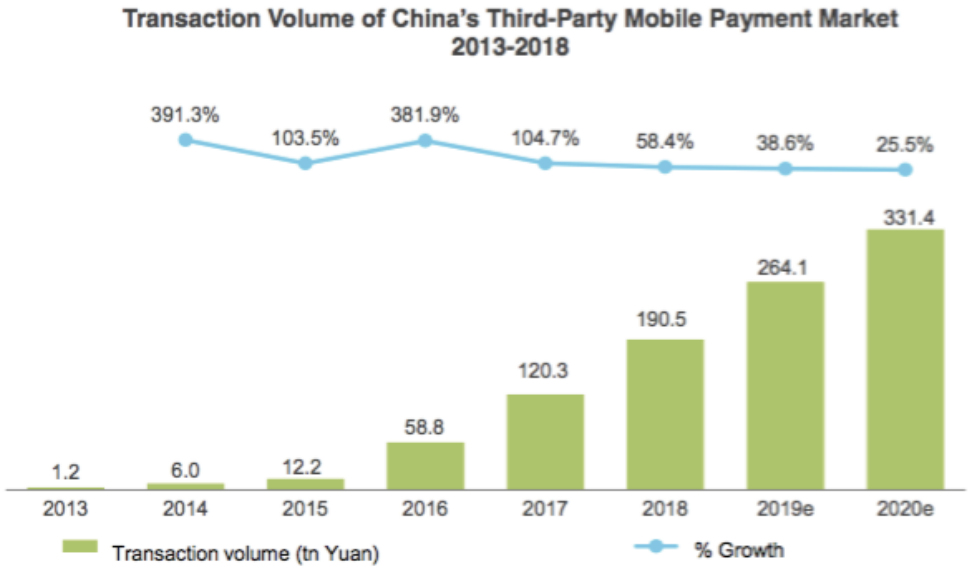

Figure 7 Transaction Volume of China's Third-Party Mobile Payment Market 2013-2018. Source: iResearch (2019)

While the development of payment methods proceeded quite differently in most developed countries, where people switched from cash to credit cards and then to smartphones, China mainly skipped the alternative of credit card use (Daxue 2019a). The fast-transforming mobile payment industry is highly influenced especially by strong third-party MP players in China, which will be discussed in the following section.

3.5.1 Development and MPSP

Since Mobile Payment was born in China in the late 1990s, it went through a slow development in early stages, due to immature technology and payment security. However, since the financial Mobile Payment standard was officially introduced in 2012, MP achieved rapid growth across the Chinese country. According to the "China Payment System Development Report" from 2012 to 2017, published by the People's Bank of China, the country's mobile payment business has achieved significant development, with the number of MP transactions increasing from RMB 535 million to RMB 37.55 billion, with an average annual compound growth rate (CAGR) of 234.02%; the transaction amount increased from RMB 2.31 trillion to RMB 202.93 trillion, with a CAGR of 244.76% (Zhang 2019: 54), and the MP use in China has been on the rise ever since, also with a growing number of mobile payment providers.

Among Asian countries, Tencent belongs to one of the most popular Mobile Payment Service Provider (MPSP) companies with its application WeChat Pay that operates with QR code technology at POS terminals (Schäfer 2018: 59). The system behind WeChat Pay and QQ Wallet, another mobile payment product of Tencent, is called Tenpay, which holds the third-party payment license for the entire company (Tencent). WeChat Pay was launched

in 2013 as a payment service for the social media app WeChat, which already possessed a huge customer base at that time (Shao 2018), and therefore has the biggest market share by penetration rate in China. The company's strategy regarding WeChat is to extend financial services and products from e.g. investment funds to insurance, which should allow its users to pay for them directly within the app (Daxue 2019a). With several sub-applications such as music streaming, taxi ordering (via Didi app), money transfer between users, donations to associations, bill payments, food ordering (via Dianping app), and online shopping, WeChat has created a comprehensive ecosystem for its users (Daxue 2019b).

Besides, the MP system Alipay, which was launched in 2004 by Alibaba (Shao 2018), also plays a significant role on the Chinese online payment market (Schäfer 2018: 59), including payments at POS terminals. It has the second biggest MP market share in China and is mainly used as an online payment method in electronic commerce, such as on Taobao, the leading online shop website in China, as well as on Amazon, JD.com, and others (Daxue 2019a). Since 2014, Alipay operates under the parent company Ant Financial Services Group and surpassed PayPal as the most widespread digital payment platform (McClay 2019). Both Alipay and Tencent claim to have reached more than 1 billion daily active users in 2019 (Merchants Savvy), taking on a major role in the MP industry not only on Asian markets but also increasing their reach on a global scale. Other third-party providers on the Chinese online payment market include 99Bill, Baofu, YeePay, JD Pay, Suning Pay and Hebao Payment (iResearch 2019), which are also contributing to the growing MP market in China.

Despite the large share of users covered by MPSPs, the MP sector in China is mainly characterized by small-volume high-frequency use, however, the large-volume payments are increasing according to the Payment and Clearing Association of China (PCAC) (Zhang 2019: 55). This development can be related to the big MP players' strategies, which achieved a global expansion of their payment systems to foreign countries, encouraging overseas merchants to implement WeChat Pay and Alipay and to promote Chinese tourism (Shao 2018).

Other characteristics of MP in China are that the number of male MP users is higher than female users. While the number of users above 30 years has increased overall, undergraduate students and other people with less educational background are still the main users of Mobile Payment. Although the user proportion in cities and provincial cities is higher, the proportion in the counties and villages has increased. Further, MP users are mainly spread across economically developed and more populated regions, such as in North, South and East China (PCAC 2018).

3.5.2 Factors of Success and Failure of MP in China

Considering the high-frequency MP use and large share of several MPSPs in China, there are significant differences compared to the MP situation in Austria. However, by taking factors of success and failure of MP into account, certain similarities can be revealed.

The most central reasons for Chinese consumers to use MP is due to its convenient service, the simple operation and the non-need of carrying cash or bank cards. Although the number of MP skyrocketed in the past few years and some merchants started to reject cash, most users believe that MP will coexist with the traditional payment method (PCAC 2018). Following cases of cash rejection, the People's Bank of China (PBOC) has announced that this undertaking is illegal and could be punished by deduction of credit points[26]. The PBOC justified their reaction that these rejections could lead to a lack of confidence in cash, which is unfair to consumers who are not familiar with MP (Duxes Finance 2019).

In view of how the Chinese payment landscape is shaped by regulations of the PBOC, MP is partially driven by governmental authorities, who suggest that it should not only serve as a simple payment method but also make considerable contributions to society. By making MP more advanced and universal, it should narrow the gap between urban and rural consumers. The financial credit rating system[27] will be improved by MP systems such as WeChat Pay, as it is connected to people's daily consumption. Due to collaborations between MPSPs and administrative departments, MP could contribute to a comprehensive credit rating system, that could effectively monitor criminal behaviours such as money laundering and tax evasion. This aspect of MP as a control mechanism has major importance, especially for the government. Further, MP will lower entry barriers to financial services and help to build a more inclusive financial system. It can benefit citizens who lack collateral or credit records to gain creditworthiness via actions in daily life, which are recorded on MP systems Ipsos (2017: 24-26).

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26 See also Social Credit System (SCS).

27 The Social Credit System (SCS) (Chinese: shèhuì xìnyòng tǐxì 社会信用体系), also known as the financial credit rating system, is a policy introduced by China's State Council in 2014 in order to "promote the traditional value of integrity", increase social trustworthiness and record social misbehavior. The main targets of the SCS are not solely individuals, but also businesses and the government itself. The policy primarily aims to control the behavior of domestic and foreign companies, to evaluate individuals' creditworthiness from a financial and behavioral perspective, and to reinforce party control over the state. This policy is planned to be standardized by 2020 throughout the country and consists of three major components: a master database, a blacklisting system, and a punishment and rewards system (SCW 2019). From the perspective of Mobile Payment, MP service providers (MPSP) such as Alipay and WeChat Pay assume a central role in collecting financial and individual data from its users. They connect daily consumption with the financial credit rating system (Ipsos 2017: 24-26), which can be accessed by the government for the use of the SCS. Due to the wide reach of MP, MP platforms can contribute to a comprehensive credit rating and perform as a crucial tool for the SCS mechanism, together with other mobile applications for social behavior tracking, such as Chengxin Chunyun 诚信春运, a reporting app for disruptive behavior on public transportations (Schaefer 2019).

Besides convincing motives and drivers of MP use, the main security issue for most Mobile Payment users is the leak of personal information (PCAC 2018) and payment risk (Zhang 2019: 56). Especially since the PBOC's new mobile payment regulation of 2018 (see also 3.5.2.2), concerns about security of personal data might be expressed more frequently. With this regulation, all MP transactions conducted via third-party MPSPs such as Alipay and WeChat Pay have to be cleared through the PBOC, giving them access to the enormous amount of transaction data of individuals. The main loss resulted from this regulation is sustained by the big MP players Alipay and WeChat Pay, who were the only proprietors of the vast amount of user data before the implementation of this MP policy. It is suggested that with this new mobile payment regulation, these MP giants will lose the incentive to continue pioneering MP networks, hence affecting the drive of innovation (Liu 2019). Therefore, it is difficult to determine whether the government's regulation has a positive or negative effect on the development of Mobile Payment in China.

3.5.2.1 MP Acceptance Factors in China

The following part presents MP acceptance factors in China, not especially focusing on MP with smartphones in the stationary trade, but rather analysing several variables influencing the use of MP on a general level.

Researches on MP acceptance factors of consumers, who used the Technology Acceptance Model (TAM) by Davis (1985), have found that "technology convenience", "security", "use environment", "perceived usefulness", "perceived ease of use", "trust", "innovativeness" and "use atmosphere" have a significant positive impact (Lu 2015). Similarly, other researches have also found that "trust" is an important factor with positive influence on continuance intention of MP use (Shao et al. 2019: 1; Lu et al. 2011).

Guan (2014) adds that performance expectation, achievement expectation and social influence are key factors with a significant positive impact on users' acceptance of MP, whereas perceived risk has a significant negative impact. He found that there are significant differences in the actual use of MP at different ages, and the highest use frequency of MP is among people with 31 to 40 years. Different educational levels also have a significant impact on perceived risks, such as people with higher academic education are more sensitive to risk.

Studies of MP use among college students show that the main factors affecting their willingness to use MP are external and environmental, such as personalization, which means that MP is customized to individual needs, cost of use, safety and social impact, where social impact is ranked the highest, followed by safety, cost of use, personalization and convenience (Bao 2012: 91-92). Also, the degree of cognitive effort made by college students in learning and using mobile payment has a significant impact on the degree of

trust and acknowledgment, in the sense of acceptance, of college students' mobile payment use behaviour, whereas the degree of acknowledgement has the greatest impact on the intention to use MP (Lu/Liu 2017).

Likewise, Chen/Tang (2006) have found that social impact has a significant positive impact on the willingness to use MP, whereas expected utility, cost and effort expectation and convenience have no significant impact. Risk perception has a significant positive impact on the intention to use MP. In contrast, other studies argue that customers' perceptions of cost and especially risk reduce their intention to use MP, whereas perceived risk is more predominant, and the negative impact of those two variables is greater for students than for workers (Lu et at. 2011: 399-401; Yang et al. 2015). Also, security issues are the most crucial factors for users not to use MP, such as viruses that can be implemented on the mobile phone by scanning fraudulent QR codes Chen/Huang (2018).

As shown in Table 8, all MP acceptance factors which were found in reviewed Chinese literature have been summarised and listed, including their positive or negative impact on intention to use MP.

Author(s)	**Positive factors**	**Negative factors**
Lu (2015)	Technology convenience Security Use environment Perceived usefulness Perceived ease of use Trust Innovativeness Use atmosphere	
Shao et al. (2019)	Trust	
Guan (2014)	Performance expectation Achievement expectation Social influence factors	Perceived risk
Bao (2012)	Personalization Cost of use Safety Social impact Convenience	
Chen/Tang (2006)	Social impact Risk perception	
Lu et al. (2011)	Relative advantage Compatibility Image Perceived cost Perceived risk Internet payment trust	Perceptions of cost Risk

	Initial trust"	
Lu/Liu (2017)	Trust Degree of acknowledgement	
Chen/Huang (2018)		Security issues (viruses)
Yang et al. (2015		Perceived risk
Liu et al. (2011)	Interface usability: Interaction behaviour Content Ease of use Promotion Made for the medium Emotion	

Table 8 Mobile Payment Acceptance Factors (China). Source: Own illustration

3.5.2.2 Excursus: Political and Regulatory Framework of MP in China

For a long time, MP was hardly regulated in China, due to its little impact on the economy. Also, China did not put much emphasis on privacy in the past, as otherwise, the payment industry would not have developed at such high speed (Wang 2018). Third-party mobile payment providers such as Alipay and WeChat Pay were the only parties receiving MP data from users, where not even local banks had access to. However, since MP had experienced an explosive growth in the past few years, the People's Bank of China (PBOC) introduced a new MP regulation in June 2018. With the aid of this regulation, all mobile payment transactions have to be verified by the PBOC, hence granting access to the enormous transaction data to the Chinese government. This new regulation is claimed not to improve MP security but makes personal MP transaction data more accessible for other parties than the MPSPs and is therefore more insecure.

Although the government argues with the improvement of transaction security and investigations of fraudulent and illegal activities, such as tax evasion, there are further control-driven motives behind this regulation. By using the data received from MP systems, it helps officials to track down political opponents, and to implement and strengthen the new social credit system[28], and thus help the Chinese Communist Party (CCP) maintain overall political, social and economic power (Liu 2019). Following this MP data regulation, it shows that more control on individual activities is granted to the Chinese government, gaining access to urban as well as rural life of its citizens. In addition, data protection awareness will gain publicity and regulations will tighten up (Wang 2018), which might increase the cost of data collection for MP companies and slow down the rapid MP development.

28 See also Social Credit System (SCS) in 3.5.2.

3.6 Summary and Discussion

This chapter mainly focused on a specific definition of the term Mobile Payment for the present thesis, which is the payment with the smartphone in the stationary trade, and its general development from the early days. From a global perspective, numerous actors have already entered the MP market, including BigTechs, FinTechs, banks and other financial service providers. The popularity of MP varies substantially between different geographical world regions. Even within Europe, large differences can be identified, such as the high MP use rate in Sweden and Belgium, and the relatively low acceptance of MP in Austria. Although the number of MP users in Austria has been on the rise for the past few years, its MP development still remains far behind other nations, such as China. As shown by the above-illustrated statistics and research results, MP in China, conducted with smartphones in the stationary trade at POS terminals, is considerably more popular than in Austria.

In comparison to general factors of success and failure of MP, the assumption of lack of standardization as a barrier cannot be confirmed by the MP landscape in China. There are two major MP service providers (MPSP), Alipay and WeChat Pay, who primarily dominate the MP industry with high market share and a huge number of daily active users and making use of the same standardized QR code technology. In Austria, the landscape of MPSP is rather fragmented, as MPSP there are among others paybox austria AG, with a major focus on the transportation area, Bluecode, a MP method designed for the stationary trade, but also several local banks with separate MP solutions. Other third-party providers, such as Apple Pay, are also seeking to expand market share in Austria, which often requires cooperation with local banks. The different MP solutions on the Austrian market might lead to confusion of consumers, hence presenting a barrier for potential MP use. In addition, the fragmented MP market can also be explained by the low demand for MP, which in turn does not provide enough incentives for MPSPs to cooperate with each other, and to create a uniform system.

Besides, the comparatively weak MP infrastructure in Austria, the political and legal framework regarding MP might also be a barrier for a successful MP implementation. For example, consumer protection is also much tighter in Austria than in China, which could hinder effective MP systems to be established on the market. As data protection is a highly discussed topic in the European Union, political measures such as the Payment Services Directive II (PSD2) and the General Data Protection Regulation (GDPR) have been implemented since September 2019 and in May 2018. The PSD2 particularly addresses the financial sector, covering the use of Mobile Payment, which might complicate the access for MP service providers such as banks. With this regulation, financial institutions such as banks are no longer the sole owners of payment transaction data but have to provide this

information to third parties, such as third-party MP service providers. Although this regulation is meant to drive competition and support FinTech companies, it might make MP seem more insecure to potential users.

As in the case of China, Mobile Payment was mostly unregulated due to its minor importance for the economy in the early days. However, a new MP regulation has been introduced in June 2018 by the Chinese government, where all transaction data from MP providers have to be checked out by the People's Bank of China (PBOC), thus enabling access to the vast data storage of Alipay and WeChat Pay for the government. Although strings on MP were set relatively loose at the beginning by the Chinese government, the new regulation might hinder further rapid development of MP.

Considering researches on MP acceptance factors, only one study from Ginner (2017), who specifically focused on MP in Austria, has been found. His findings show that "perceived usefulness, "perceived personal innovativeness", "perceived compatibility", "perceived social influence", and "perceived risk" are the most significant factors concerning MP use. These factors are also reflected in several Chinese studies on MP acceptance factors and display similarities, such as "convenience" or "perceived risk".

As shown above, several factors of success and failure of MP in Austria and China have been discussed, including political and legal aspects, infrastructure and payment behaviour. However, the focus lies on acceptance factors of MP, which have been selected from researches on MP acceptance. These factors will be tested in the following empirical section, in order to identify the most significant ones for the respective countries.

4 Empirical Analysis

The central focal point of this chapter is to describe each step performed for the formation of the empirical part of the present study, which consists of the following subchapters: (1) Systematic literature analysis (see 4.1), (2) Conceptualizing of final research model (see 4.2), and (3) Quantitative empirical research with a questionnaire survey (see 4.3).

4.1 Systematic Literature Analysis

In the course of this section, a systematic literature analysis is conducted, aiming to provide a detailed description of the methodological approach. More precisely, this section presents the results of the literature review on Mobile Payment (MP) acceptance, on the topic development of digital payment methods (see 2.2 and 2.3) and factors of success and failure of MP (see 3.3, 3.4.2 and 3.5.2). Findings of the systematic literature analysis include among others the most frequently used MP acceptance factors in reviewed studies, which directly influence the use of MP. The results of the conducted literature reviews serve as a foundation for the final research model and are used as a basis for the quantitative questionnaire survey in the subsequent step.

4.1.1 Methodological Approach

To begin with, the first step of the systematic literature analysis comprises the review of scientific papers and books, as well as journal articles and reports on the topic of the thesis, which includes the development of digital payment methods, Mobile Payment in general, and Mobile Payment in Austria and China in specific. Furthermore, mainly scientific papers and books have been chosen as a source for MP acceptance factors.

As a search tool for relevant scientific literature, valuable information from “usearch.uaccess.univie.ac.at”, the online database of the University of Vienna, and other sources such as “Google Scholar”, and “CNKI.net”, a Chinese database website for academic journals, were collected. The website CNKI.net was solely used for investigations of Chinese literature on Mobile Payment and acceptance factors. Other than that, online search engines such as Google were used to gather further data and related material about Mobile Payment and acceptance. As Mobile Payment has been discovered as a relatively recent phenomenon in society, and due to a modest number of available scientific papers on the topic, no limitation regarding the publication period has been set. However, a restriction has been made regarding the focus on consumers and end-users only, excluding the merchants’ perspective on Mobile Payment.

4.1.2 Findings of the Systematic Literature Analysis

Findings on the development of digital payment methods and Mobile Payment acceptance (see chapters 2 and 3) show that regular use of alternative payment methods such as cash or bank cards vary significantly between Austria and China. This can be related to the individual preferences of its citizens, which could hinder the acceptance of mobile payments. Especially in Austria, traditional cash takes on a major role in people's payment behaviour and is much more predominant in the country compared to China. Given this assumption, the factor preference for cash as an alternative payment has been taken into account as a barrier with a direct negative influence on Mobile Payment use. This factor of failure will be mentioned in the later-described research model as "perceived cash preference".

On the basis of reviewed literature on acceptance factors of MP in general, including a thorough look on Austria and China, a summarised list of acceptance factors in general, and of Austria and China in specific, with their positive and negative correlation to MP usage has been created, and the number of mentions in the respective publications has been examined. Table 9 shows all selected acceptance factors listed by the number of mentions from high to low. In total, 15 studies on MP acceptance factors have been reviewed on their most significant acceptance factors, where some terms have been clustered into a single term due to their similarity of meaning, e.g. "subjective norm", "social influence", and "social impact" are summarised under the term "perceived social influence".

Acceptance factors	**Correlation**	**Number of mentions**
Perceived trust (initial trust, internet payment trust)	positive	5
Perceived usefulness	positive	5
Perceived ease of use	positive	5
Perceived social influence (subjective norm, social impact)	positive	5
Perceived risk (security issues, viruses, safety)	negative positive	5 4
Perceived convenience (technology convenience)	positive	4
Personal innovativeness	positive	3
Personalization (medium suitability, content)	positive	3
Compatibility	positive	3
Mobility/ individual mobility	positive	2
Use environment (use atmosphere)	positive	2
Performance expectation (interaction behaviour, achievement expectation)	positive	3

Perceived cost Cost of use	negative positive	2 1
Image (degree of acknowledgement)	positive	2
MP knowledge	positive	1
Reachability	positive	1
Attitude toward use	positive negative	1
Perceived transaction speed	positive	1
Relative advantage	positive	1
Promotion	positive	1
Emotion	positive	1

Table 9 Mobile Payment Acceptance Factors (general, Austria, China). Source: Own illustration.

Following the highest numbers of mentions of acceptance factors, 9 variables have been chosen from Table 9 to be integrated into the final research model, together with the above-mentioned factor of "perceived cash preference". From these selected variables, 10 hypotheses have been formulated, from which it is claimed that H1 to H7 have a direct positive, and H8 and H10 have a direct negative influence on the intention to use Mobile Payment.

Control variables such as age, gender, educational level, employment status, income and place of residence were determined to regulate the dependent variable (DV) as well as the independent variables (IV), as some acceptance factors in Austria might not be relevant in China and vice versa, due to cultural differences.

Intention to use Mobile Payment	
Positive factors	**Negative factors**
H1: Perceived usefulness	H8: Perceived risk
H2: Perceived innovativeness	H9: Perceived cost
H3: Perceived MP knowledge	H10: Perceived cash preference
H4: Perceived ease of use	
H5: Perceived convenience	
H6: Perceived social influence	
H7: Perceived trust	

Table 10 Final acceptance factors. Source: Own illustration.

Control variables		
Age	Education	Income
Gender	Employment status	Place of residence

Table 11 Control variables. Source: Own illustration

4.1.3 Limitations

The analysis of several studies on acceptance factors resulted in 1 dependent variable, 10 independent variables, and 6 control variables. Regarding the independent variables, all factors drawn from the literature were weighted equally, and no difference was made in their level of importance. As those factors are retrieved from different studies on different cultural groups, their significance was weighted on an equal basis for the present survey, which aims to investigate Austrian and Chinese citizens. Although different levels of significance of the acceptance factors have not been taken into consideration, still, these factors were used appropriately to build a transparent research model for the present investigation. Future studies could build a more complex MP acceptance model by including different levels of significance regarding the acceptance factors and hence receive more insightful results.

It has also to be noted that similar terms of acceptance factors from several selected studies were clustered based on their general meaning. It might have resulted in different terms if specific methods were used, such as greater involvement of expert opinions. However, as this is a study of a relatively small scale, no attempt has been made to consider complicated clustering methods. For future and more complex studies on MP acceptance factors, researchers should consider taking at least a second opinion into account when putting together different terms with similar meanings, in order to receive more transparent results.

The final note on the limitations of the systematic literature analysis is the relatively low number of reviewed studies on the topic. Besides, several geographical regions were not covered by the selected studies, such as countries of Africa and South America, as the focus of the current research lies specifically on MP in Austria and China. Further studies on acceptance factors of MP in the stationary trade could integrate a broader set of results from other countries. Studies on MP in, for example, Africa or South America could find some interesting results and significant variables, which could be proven as valuable regarding to MP in Austria and China as well.

4.2 Construction of Final Research Model

The following subchapter aims to clearly define the selected acceptance factors, which are used for the final research model, and to describe the derived hypotheses. The results will help with the development of the questionnaire survey, which will be conducted in the course of the subsequent step to test the respective factors of success and failure.

Based on the findings of the systematic literature analysis, the final research model for the present thesis has been formulated and is illustrated in Figure 8. In total, 10 acceptance factors have been selected, from which the same number of hypotheses have been formulated. The signs (+) and (-) facilitate the identification of a factor's positive or negative correlation with the dependent variable (DV), which in this case is the intention to use MP.

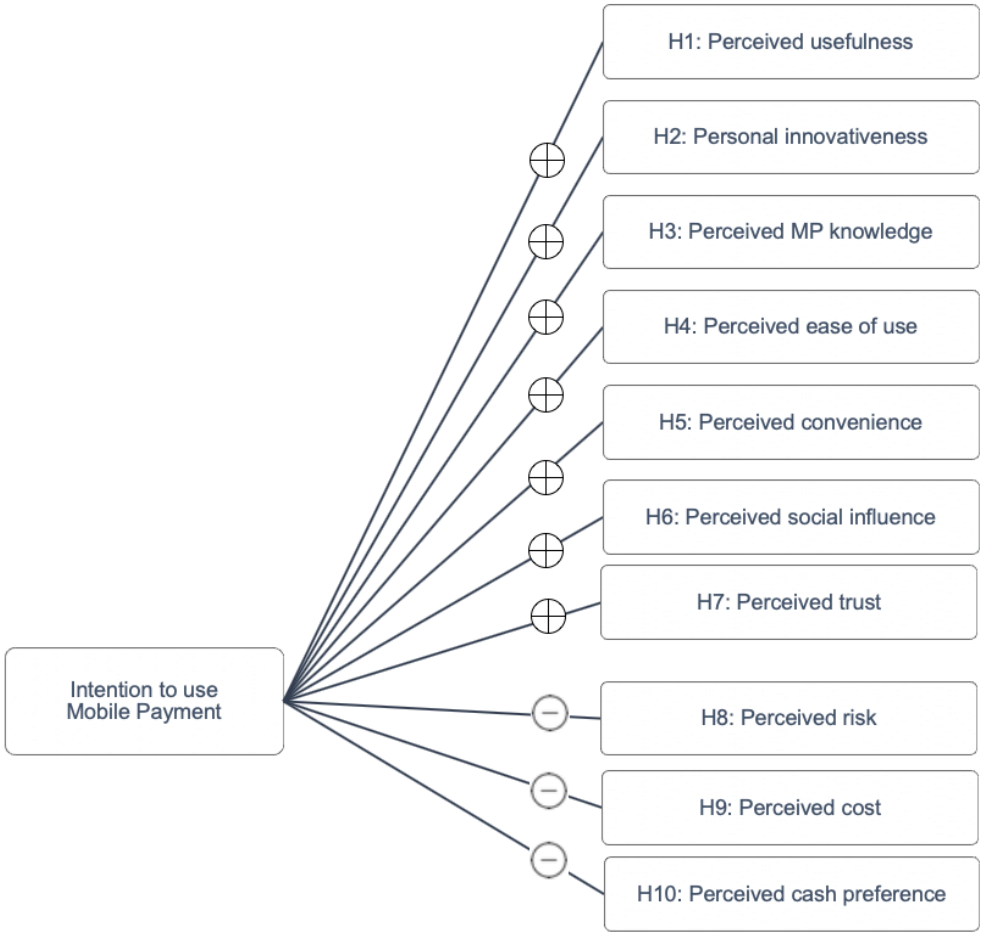

Figure 8 Final research mode. Source: Own illustration.

4.2.1 Hypotheses

Table 12 shows a summary of selected acceptance factors of the final research model along with the respective hypotheses. H1 to H7 suggest that there is a significantly positive correlation between these factors and the dependent variable (DV), which means that there is a higher probability of MP use, if the value is positive (e.g. if MP is perceived as useful). On the other side, H8 to H10 indicate a significantly negative correlation with the DV, which means that e.g. the less risky MP is perceived by respondents, the higher is the probability of the intention to use MP. The null hypothesis of this model states that there does not exist any statistically significant correlation between these 10 acceptance factors and the DV.

Variable	Hn	Hypotheses
Intention to use Mobile Payment (MP)		Dependent variable (DV)
Perceived usefulness	H1	The more MP is perceived as useful, the higher is the probability of the intention to use MP.
Perceived innovativeness	H2	The more users perceive MP as innovative, the higher is the probability of the intention to use MP.
Perceived MP knowledge	H3	The more MP knowledge users have, the higher is the probability of the intention to use MP.
Perceived ease of use	H4	The easier the MP use is perceived, the higher is the probability of the intention to use MP.
Perceived convenience	H5	The more MP is perceived as convenient, the higher is the probability of the intention to use MP.
Perceived social influence	H6	The more users are influenced by peers using MP, the higher is the probability of the intention to use MP.
Perceived trust	H7	The more MP is perceived as trustful, the higher is the probability of the intention to use MP.
Perceived risk	H8	The less MP is perceived as risky, the higher is the probability of the intention to use MP
Perceived cost	H9	The less MP is perceived as costly, the higher is the probability of the intention to use MP
Perceived cash preference	H10	The weaker the users' cash preference is, the higher is the probability of the intention to use MP

Table 12 Formulation of hypotheses. Source: Own illustration.

As analysed in chapter 2.2.1, the alternative payment method cash enjoys great popularity in Austria and is assumed to be a possible barrier for the intention to use MP among its citizens. Therefore, the factor "perceived cash preference" has been included in the final research model, in order to test the hypothesis, which is drawn from the literature review.

4.3 Quantitative Empirical Research – Questionnaire Survey

Following the findings of the systematic literature analysis and the final research model, selected factors of success and failure for the intention to use Mobile Payment will be tested by a questionnaire survey. The goal of this quantitative research is not to provide a representative survey with a high number of questionnaire data regarding MP with the smartphone in the stationary trade, but more to test the findings of the systematic literature analysis on a basic level.

Within the scope of this chapter, the methodological approach of the questionnaire survey, which includes the development of the questionnaire draft, the final questionnaire

and the questionnaire design, will be precisely described. After that, the process of analysis will be explained, and the choice of the multiple regression analysis as an analysis method will be justified.

The results of the survey will cover a description of the questionnaire sample concerning the socio-demographic characteristics of the respondents, and a descriptive analysis. Afterwards, the findings of the multiple regression analysis will be presented and interpreted, and the confirmed as well as not confirmed hypotheses will be discussed. This serves as a basis to answer the research question of the present thesis.

4.3.1 Description of Methodological Approach – Survey Phase

The quantitative survey begins with the development of the questionnaire, which is based on the factors of success and failure from the final research model, and selected socio-demographic control variables.

As shown in Table 13, the goal of the questionnaire survey is to identify significant acceptance factors regarding the intention to use MP in Austria and China. In order to achieve this aim, users and non-users of MP aged 14 or above have been targeted with an online questionnaire. The questionnaire survey is conducted via the online tools Google Forms[29] in Austria and the website Wenjuan.com[30] in China. The final questionnaire consists of a total of 27 questions, which includes 6 demographic questions, 5 filter questions, and 16 MP questions. Respondents were provided multiple answer options for the demographic and filter questions, whereas for the MP questions a 5-point Likert scale has been used. The distribution process of the online questionnaire was based on snowball sampling, where a link to the questionnaire forms was generated and sent to friends and colleagues, who subsequently forwarded it to members of their communities.

At the beginning of the questionnaire, the topic and purpose of the survey was explained to the respondents. Along with the overall intention of this survey, privacy information regarding their data was clarified. The data were processed fully anonymously and without the use of identities, such as the names or e-mail addresses. Demographic questions regarding age, gender, education, employment, income and place of residence were asked thereafter, in order to gain a deeper insight into the target groups' attitude towards Mobile Payment.

The subsequent section includes filter questions, which aim to distinguish between actual users and non-users of Mobile Payment in the respective countries. The first filter question "Do you use Mobile Payment (MP)" has the purpose to measure the dependent

29 See: www.google.com/forms/
30 See: www.wenjuan.com

variable “Intention to use MP”, and could be answered with either “Yes”, “No” or “I don’t know what Mobile Payment is”. Respondents who use MP were transferred to further questions regarding their MP use behaviour, such as frequency, purpose and usual spending amount with MP. Non-users of MP were directly transferred to the MP questions, whereas respondents who selected “I don’t know what Mobile Payment is” were given a brief MP explanation before directing them to the MP questions. As people who do not have any knowledge about MP are assumed not to use the payment system either, they will be assigned to the group of non-users of MP. Although the first filter question makes the assumption that people with no MP knowledge have less or no intention to use MP, the factor “perceived MP knowledge” has still been taken into account to test whether this factor is also significant regarding the intention to use MP in combination with other acceptance factors. The questions of the following part MP are drawn from the findings of the systematic literature analysis on acceptance factors of Mobile Payment. In total, 7 positive and 5 negative factors have been selected, based on the highest numbers of mentions in the reviewed literature.

Questionnaire survey design	
Goal	Identification of significant factors of success and failure of the intention to use MP with the smartphone in the stationary trade in Austria as well as in China.
Target group	Users and non-users of MP in Austria and China aged 14 or above
Sample size	49 Austrian responses (45 complete questionnaires) 38 Chinese responses (38 complete questionnaires) 86 total responses (83 total questionnaires)
Questionnaire type	Online questionnaire: Google Forms (Austria) and Wenjuan.com (China)
Survey period	23.08.2019 – 05.09.2019 (14 days)
Number of questions	6 Demographic questions 5 Filter questions 16 MP questions 27 Total number of questions
Scale	5-point Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree, (5) strongly agree

Table 13 Questionnaire design. Source: Own illustration.

The final questions have been formulated based on the MP acceptance factors and the 5-point Likert scale has been chosen to determine respondents’ attitudes towards each question. The scale ranges from (1) strongly disagree, (2) disagree, (3) neutral, (4) agree to (5) strongly agree. As a result of the MP questions, the most significant acceptance factors of

both MP users and non-users should be determined. All collected questionnaire data have been prepared for the statistical analysis with Microsoft Excel and the program R (see 4.3.3).

4.3.2 Description of Methodological Approach – Evaluation Phase

For the evaluation phase, the statistical program R and Microsoft Excel have been used to conduct descriptive statistics and a multiple regression analysis of the collected data samples. As the research model consists of one dependent variable (DV) (i.e. intention of MP use) and various independent variables (IV), the multiple regression analysis is more appropriate than a simple linear regression. More specifically, a multiple *logistic* regression has been performed, as the DV is coded as a binary or dichotomous variable with only two different characteristics, which are the "use" (coded as 1) and "non-use" (coded as 2) of MP (Wollschläger 2017: 307-309). As the "non-use" is coded with a larger value than "use" within the scope DV, this will have an effect on the results of the regression analysis, where the positive or negative correlation of the respective factors with the DV will have the opposite meaning. This will be later explained along with the final findings.

4.3.3 Interpretation of Results

As part of the result evaluation of the descriptive analysis, the collected data will be described on basis of socio-demographic characteristics and frequency distribution. Firstly, the actual MP use of Austrian and Chinese respondents will be investigated. Then, the acceptance factors used in the questionnaire survey will be evaluated with a multiple logistic regression analysis. The approach and the results of the multiple logistic regression are presented along with the most significant acceptance factors in the later section. On the basis of these results, an attempt is being made to answer the research question

4.3.3.1 Results of Descriptive Statistics

From a total of 49 questionnaires from Austrian respondents, 4 questionnaires were filled out incompletely, which leads to a total of 45 usable questionnaires for the final statistical analysis. Regarding the MP use of Austrian respondents, Table 14 shows that 71.2% out of 45 respondents do not use MP at all, from which 11.1% do not even know what MP is. If respondents selected "I don't know what MP is" as their answer, it is assumed that they lack MP knowledge, and thus do not use MP. Therefore, this group of respondents was clustered together under "non-users of MP". However, 28.8% of all respondents have at least tried MP once, where only 6.7% use MP on a regular basis.

MP use	Frequency	Responses (in %)	Total responses (in %)
No, I don't use MP	27	60.1	71.2
I don't know what MP is	5	11.1	
I tried MP once	2	4.4	28.8
A few times a year	5	11.1	
A few times per month	1	2.2	
A few times per week	2	4.4	
I use MP regularly (e.g. for daily purchases)	3	6.7	
Sum	**45**	**100**	

Table 14 Descriptive statistics – Actual MP use in Austria. Source: Own illustration.

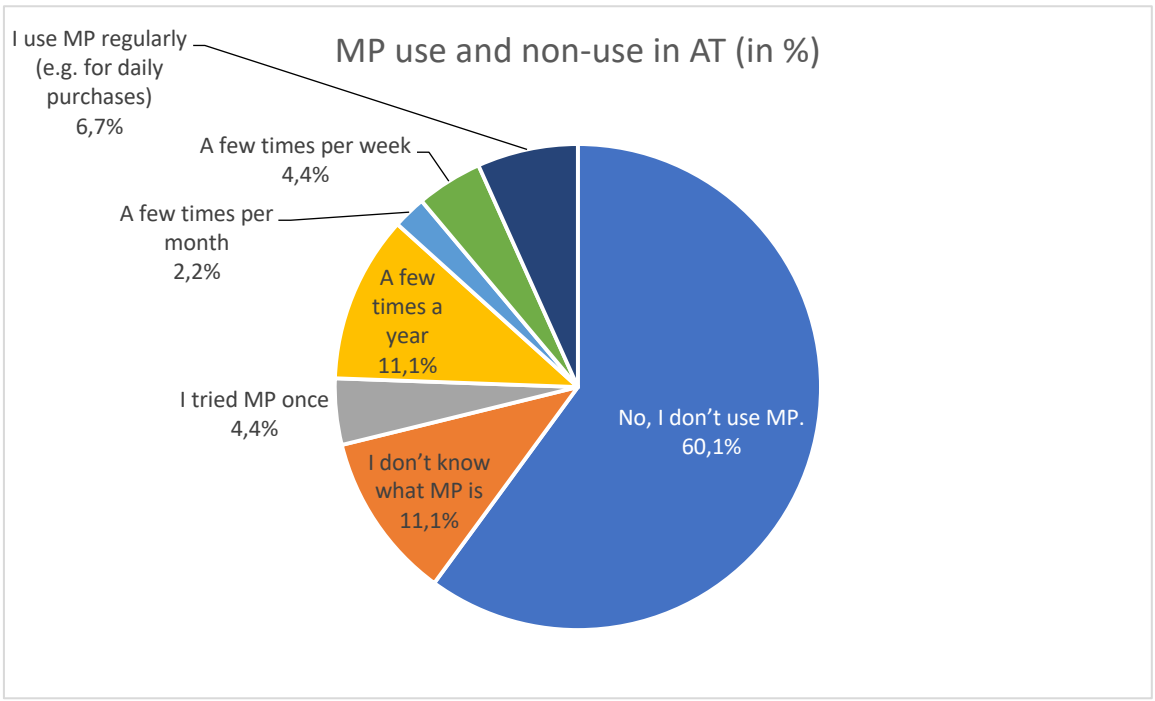

Figure 9 Chart: MP use and non-use in Austria. Source: Own illustration.

In comparison to the Austrian respondents, the results of the total 38 questionnaires from Chinese respondents show that a significant 81.6% do use MP (see Table 15), from which 76.3% use MP regularly. However, there is a mentionable percentage of 18.4% of the total respondents who do not use MP, where 10.5% do not know what MP is. Regarding the percentage of MP users and non-users in both countries, the proportions are exactly the other way around. While there is a larger percentage of MP users than non-users in China, the survey shows exactly the opposite in Austria.

MP use	Frequency	Responses (in %)	Total responses (in %)
No, I don't use MP	3	7.9	18.4
I don't know what MP is	4	10.5	
I tried MP once	-	-	81.6
A few times a year	-	-	
A few times per month	1	2.6	
A few times per week	1	2.6	
I use MP regularly (e.g. for daily purchases)	29	76.4	
Sum	**38**	**100**	

Table 15 Descriptive statistics – Actual MP use in China. Source: Own illustration.

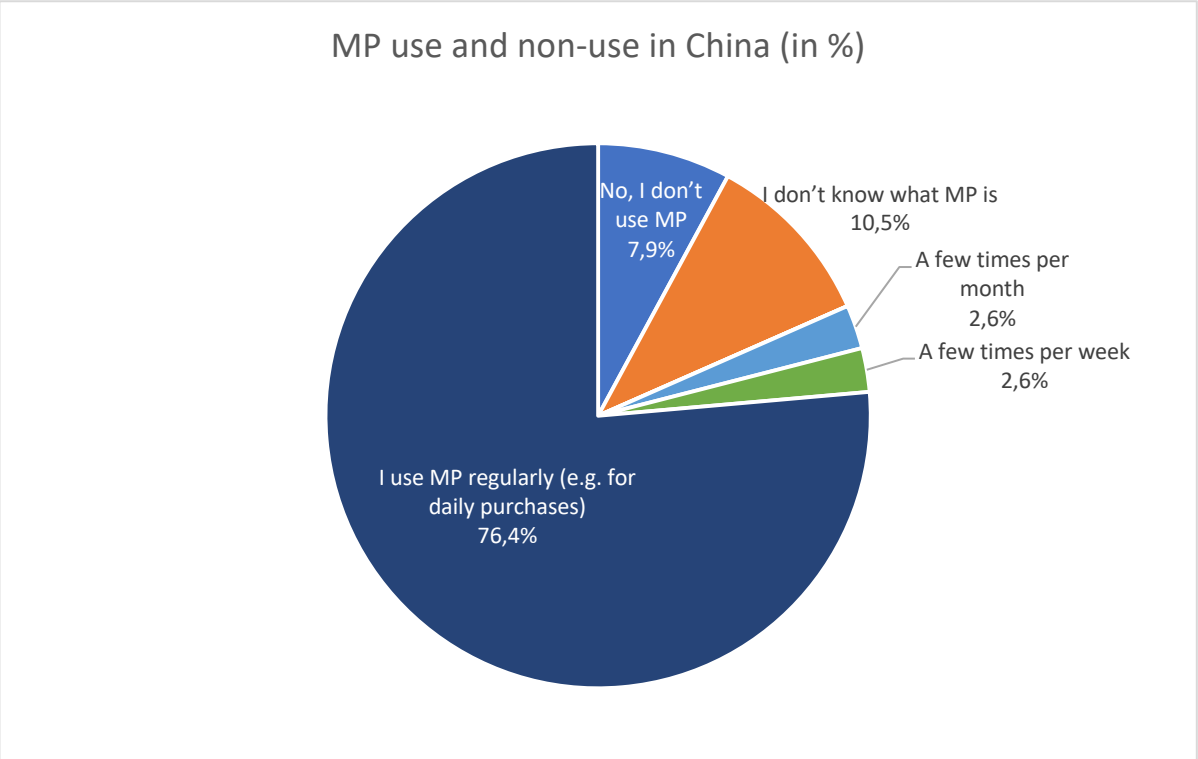

Figure 10 Chart: MP use and non-use in China. Source: Own illustration.

The following descriptive statistics cover the socio-demographic characteristics of the respondents and includes the variables age, gender, education, employment and income, which will explain the data samples of MP users and non-users in Austria and China. From the data regarding the age of MP users and non-users in both countries, no significant differences between these two groups can be identified. All MP users in both countries are aged between 14 and 40, whereas there are also non-users in larger age groups e.g. non-users of MP aged 41 and above.

Age (Austria)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Under 14	-	-	-	-
14-20	1	7.7	5	15.6
21-30	11	84.6	22	68.8
31-40	1	7.7	3	9.4
41-50	-	-	1	3.1
51-60	-	-	1	3.1
Over 60	-	-	-	-
Sum	**13**	**100**	**32**	**100**

Table 16 Descriptive statistics - Age of MP users and non-users in Austria. Source: Own illustration

Age (China)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Under 14	-	-	-	-
14-20	1	3.2	1	14.3
21-30	25	80.6	4	51.1
31-40	5	16.1	-	-
41-50	-	-	-	-
51-60	-	-	1	14.3
Over 60	-	-	1	14.3
Sum	**31**	**100**	**7**	**100**

Table 17 Descriptive statistics - Age of MP users and non-users in China. Source: Own illustration

The data of Table 18 and Table 19 reveal that there is also no major difference between users and non-users of MP in Austria and China concerning gender distribution. It can be seen from these tables, that there is a higher percentage of female MP users in China than in Austria, and a higher percentage of male users in Austria than in China. The proportional comparison of non-users of MP is exactly the opposite in the respective countries.

Gender (Austria)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Female	7	53.8	22	68.7
Male	6	46.2	10	31.3
Sum	**13**	**100**	**32**	**100**

Table 18 Descriptive statistics - Gender of MP users and non-users in Austria. Source: Own illustration

Gender (China)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Female	18	58.1	4	57.1
Male	13	41.9	3	42.9
Sum	**31**	**100**	**7**	**100**

Table 19 Descriptive statistics - Gender of MP users and non-users in China. Source: Own illustration

Considering the demographic characteristics of education, employment and income of MP users and non-users in Austria and China, the following tables and charts show some interesting differences and similarities.

Both MP users in Austria and China have at least a high school degree or equivalent, whereas the non-users seem also to have a lower education level. It can be seen from the bar charts in Figure 11 and Figure 12 that the main group of MP users in China are people with a Bachelor's degree, who represent 67.7% of the total MP users among the Chinese respondents. Also, a small percentage of MP users in China have a higher level of education. Regarding the education level of MP non-users in Austria, the tables show that it ranges from "Less than a high school degree" up to "Master's degree". This demonstrates that the non-use of MP of the Austrian respondents is independent of their education level and consequently not a key variable in this context.

Education (Austria)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Less than a high school degree	-	-	2	6.3
High school degree or equivalent	4	30.8	18	56.3
Bachelor's degree (e.g. BA, BSc.)	5	38.5	10	31.3
Master's degree (e.g. MA, MSc., M.Ed.)	4	30.8	2	6.3
Doctorate (e.g. PhD, EdD)	-	-	-	-
Other	-	-	-	-
Sum	**13**	**100**	**32**	**100**

Table 20 Descriptive statistics - Education of MP users and non-users in Austria. Source: Own illustration

Education (China)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Less than a high school degree	-	-	3	42.9
High school degree or equivalent	7	22.6	2	28.6
Bachelor's degree (e.g. BA, BSc.)	21	67.7	2	28.6
Master's degree (e.g. MA, MSc., M.Ed.)	1	3.2	-	-
Doctorate (e.g. PhD, EdD)	1	3.2	-	-
Other	1	3.2	-	-
Sum	**31**	**100**	**7**	**100**

Table 21 Descriptive statistics - Education of MP users and non-users in China. Source: Own illustration

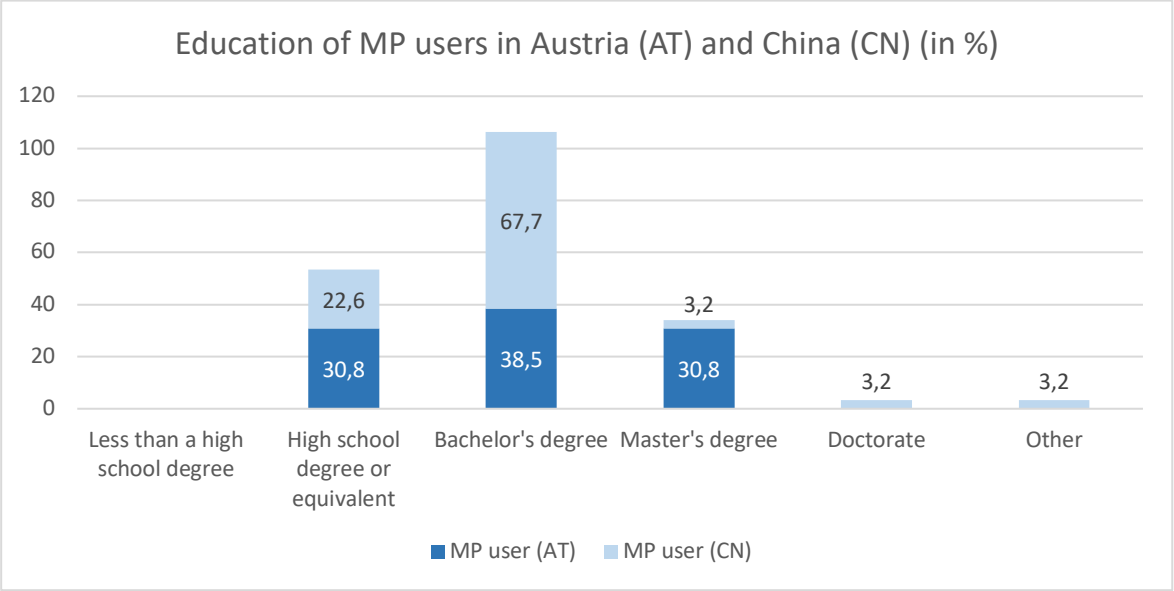

Figure 11 Education of MP users in Austria and China. Source: Own illustration.

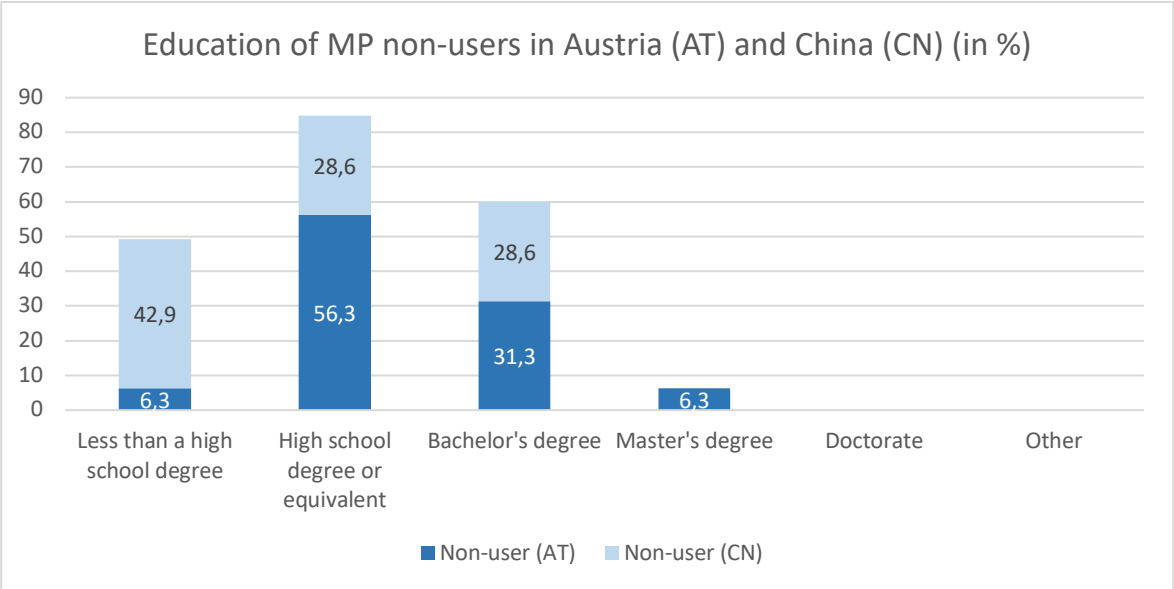

Figure 12 Education of MP non-users in Austria and China. Source: Own illustration.

With regard to the demographic characteristics of employment and income, little difference between the respective countries can be noticed. The largest share of MP users in China with 71% are full-time employed, whereas the smallest share is part-time employed with only 3.2%. Among the Austrian respondents, 46.2% of its MP users are students, followed by part-time employees with 38.5% and full-time employees with 15.4%.

Employment (Austria)	**MP users**		**Non-users of MP**	
	Frequency	**Responses (in %)**	**Frequency**	**Responses (in %)**
Employed full-time (38.5+ hours a week)	2	15.4	9	28.1
Employed part-time (less than 38.5 hours a week)	5	38.5	11	34.4
Unemployed	-	-	1	3.1
Student	6	46.2	9	28.1
Retired	-	-	-	-
Self-employed			1	3.1
Other	-	-	1	3.1
Sum	**13**	**100**	**32**	**100**

Table 22 Descriptive statistics - Employment of MP users and non-users in Austria. Source: Own illustration

Employment (China)	**MP users**		**Non-users of MP**	
	Frequency	**Responses (in %)**	**Frequency**	**Responses (in %)**
Employed full-time (38.5+ hours a week)	22	71.0	3	42.9
Employed part-time (less than 38.5 hours a week)	1	3.2	-	-
Unemployed		-	1	14.3
Student	2	6.5	-	-
Retired	-		2	28.6
Self-employed	6	19.4	-	-
Other	-	-	1	14.3
Sum	**31**	**100**	**7**	**100**

Table 23 Descriptive statistics - Employment of MP users and non-users in China. Source: Own illustration

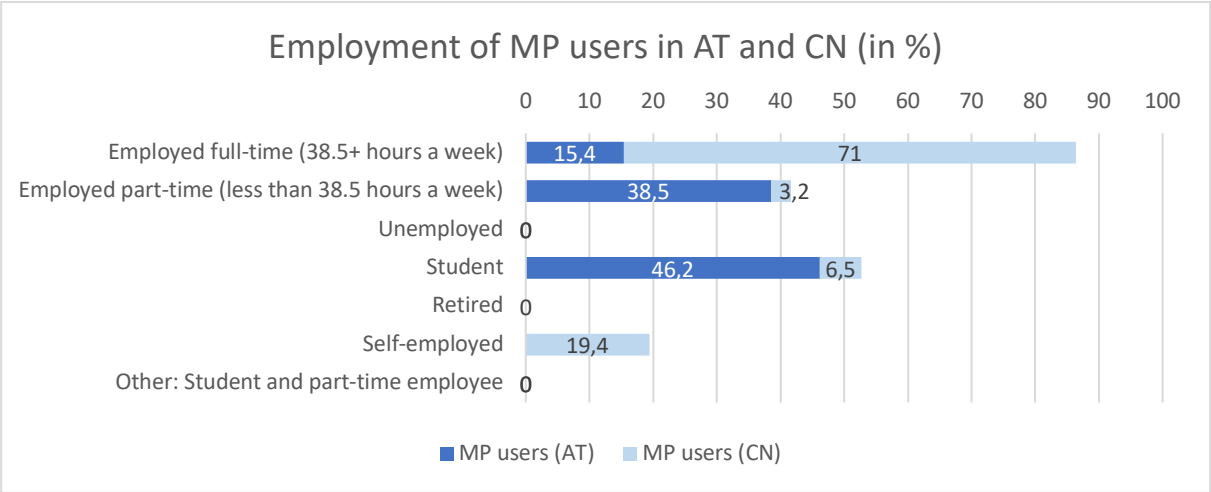

Figure 13 Employment of MP users in AT and CN. Source: Own illustration.

According to the income data of MP users and non-users in Austria and China, the highest proportion of MP users in both countries have a middle to lower income, whereas 12.9% of Chinese MP users have also a higher income. It is noticeable that people with a lower income in Austria are rather not using MP, while in China also people with lower income do use MP.

In order to create a comparable basis for the factor income in both countries, the income thresholds have been adjusted regarding to cultural differences and their purchasing power parities (PPP). The average monthly gross salary in Austria in 2017 was calculated with 2,400 EUR (AK OE), which is about 1,695 EUR net. Based on this value, the income limits in Table 24 were formulated. As the average monthly salary in urban China in 2017 was measured with about 6,000 RMB (approx. EUR 767.27)[31] (Statista 2018), the income limits in Table 25 were set based on this value (OECD 2017).

By using the currency conversion rate of PPP, the purchasing power of different currencies is equalized and the differences in price levels between nations are removed. Given this assumption, the theory of PPP suggests that a “basket” of goods should have the same price in two different countries, taking into account the balanced exchange rates. The PPP from 2018, as measured by the national currency per US dollar (USD), shows an exchange rate of 0.786 for Austria, and a value of 3.565 for China (OECD 2019). By converting the average monthly income of 2,400 EUR into USD, it results in 3,053.44 USD[32]. This indicates that a particular amount of goods and services purchased with 2,400 EUR in Austria would cost 3,053 USD in the US. In contrast, an average monthly income of 6,000 RMB results in 1,683.03 USD[33]. This implies that a common basket of goods purchased with 6,000 RMB

31 Exchange rate: 1 EUR = 7.8199 CNY (July 2019) (EC 2019d).
32 2,400 EUR /0.786 = 3,053.44 USD
33 6,000 RMB/3.565 = 1,683.03 USD

in China would cost 1,683.03 USD in the US. The demonstration of the average income with the PPP underlines the much higher purchasing power of Austria compared to China.

Income (monthly, in EUR) (Austria)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Below 1,000	6	46.2	14	43.8
1,000 - 1,999	4	30.8	13	40.6
2,000 - 2,999	1	7.7	5	15.6
3,000 - 3,999	1	7.7	1	3.1
Over 4,000	-	-	-	-
No response	1	7.7	-	-
Sum	**13**	**100**	**32**	**100**

Table 24 Descriptive statistics - Income of MP users and non-users in Austria. Source: Own illustration

Income (monthly, in RMB) (China)	MP users		Non-users of MP	
	Frequency	Responses (in %)	Frequency	Responses (in %)
Below 3,000	6	19.4	3	42.9
3,000 - 5,000	11	35.5	3	42.9
5,001 - 7,000	5	16.1	-	-
7,001 - 10,000	5	16.1	1	14.3
Over 10,000	4	12.9	-	-
Sum	**31**	**100**	**7**	**100**

Table 25 Descriptive statistics - Income of MP users and non-users in China. Source: Own illustration

4.3.3.2 Results of Multiple Regression Analysis

For the multiple logistic regression analysis, the final research models have been tested for suitability with the Akaike Information Criterion (AIC) (Moffatt 2019). AIC is a statistical selection method, which checks the complexity of variable compositions of given models and their "goodness of fit", i.e. the degree of how well a model "fits" the respective data sample. The smaller the AIC value, the better is the model fit in terms of the data observations and the higher is its information value. By using the "step"-function in R, a "forward stepwise", "backward stepwise" and "bidirectional" regression[34] have been conducted with the final research models and the results with the smallest AIC value have been selected.

34 In the course of the model selection process, the stepwise method includes a forward, backward and bidirectional regression. Within the framework of "forward-stepwise" regression, multiple variables are added one by one, starting with the strongest and ending when the next factor's significance does not improve prediction.

Based on this criterion, the final regression model from the Austrian sample covers a total of 4 variables as illustrated in Figure 14. The regression model shows two significant factors with a p-value < 0.05, which are highlighted with a (*) after the respective value. Further, the mean values of the answer options of MP users and non-users regarding the factors from the regression have been revealed in Table 26, in order to complement the regression analysis.

Given the 5-point Likert scale used for the analysis, which ranges from “strongly disagree (1)” to “strongly agree (5)”, the following assumptions can be made on basis of the mean values of the significant acceptance factors. MP users in Austria are more likely to have more MP knowledge, as the mean value of 3.54 approximates the answer option “strongly agree (5)”, whereas non-users are less likely to have MP knowledge (mean of 2.22 more approaches “strongly disagree (1)”). Concerning the factor “perceived risk”, MP users tend to find it less risky to use, while non-users consider MP use as riskier and more unsafe. In terms of “perceived trust, MP users agree more on the trustworthiness of MP systems, whereas non-users perceive it as less trustful. The means of “perceived cost” show that MP users find MP use less costly compared to non-users, who tend to find the payment method more costly.

Mean values of: (Austria)	**MP users**	**MP non-users**
Perceived MP knowledge	3.54	2.22
Perceived risk	2.31	3.19
Perceived trust	3.15	2.60
Perceived cost	1.92	2.34

Table 26 Mean values of significant acceptance factors in Austria. Source: Own illustration.

The analysis in Figure 14 has found a significant negative correlation between the factor “perceived MP knowledge” with p=0.01 and the dependent variable (DV) “Intention of MP use”. The negative correlation of “perceived MP knowledge” suggests that people with less MP use are also more likely to possess less MP knowledge. In other words, people with less intention to use MP, have also less knowledge about MP. By including this factor into the regression, it can be indicated that MP knowledge can be perceived as a significant acceptance factor within the framework of the research model as well.

Another important factor obtained from the results is the significant positive correlation between “perceived risk” with p=0.04 and the DV. This outcome implies that people who tend to use this payment system more frequently, also find MP less risky to use. The other

The “backward” approach initially includes all factors and withdraws one by one afterwards. The “bidirectional” method is a mixture of the first two approaches (Ranganathan 2017).

factors “perceived trust” and “perceived cost” do not present a significant value and are not further described within this context.

The pseudo r-squared value of the regression model in Figure 14 displays a value of 0.65 (Cragg-Uhler) and 0.50 (McFadden), and implies that the dependent variable “Intention of MP use” can be explained with an accuracy of 65% (according to Cragg-Uhler’s r-squared) or rather 50% (according to McFadden’s r-squared) by the model’s variable composition, which is a fairly good value.

```
MODEL FIT:
χ²(4) = 27.21, p = 0.00
Pseudo-R² (Cragg-Uhler) = 0.65
Pseudo-R² (McFadden) = 0.50
AIC = 36.89, BIC = 45.92
-----------------------------------------------
                     Est.   S.E.    z val.  p-val.
---------------- ------- ------ -------- ------
(Intercept)         10.50   4.81     2.18   0.03
Per. MP Knowledge   -2.32   0.83    -2.78   0.01 **
Per. trust          -1.37   0.76    -1.80   0.07 .
Per. risk            1.41   0.70     2.02   0.04 *
Per. cost           -1.29   0.87    -1.49   0.14
-----------------------------------------------
Signif. codes:
0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Figure 14 Results: Multiple Logistic Regression (Acceptance factors in AT). Source: Own illustration.

The regression analysis of the Chinese sample has identified high multicollinearity between the independent variables. Therefore, highly correlated variables have been removed from the regression model according to the variance inflation factor (VIF). The model has been modified as far as all independent variables delivered a VIF smaller than 5, which only indicates a moderate correlation (Statistics 2015). Then, the regression has been analysed with the “step” function in R, to find the most accurate model based on the AIC value. As displayed in Figure 15, the final model includes a total of three variables, which are “perceived usefulness”, “perceived risk” and “perceived convenience”.

By taking into consideration of the mean values of these factors of MP users and non-users (see Table 27), the following notions can be stated. For both, MP users and non-users, MP use is perceived as rather useful, as both values (4.97 and 4.33) are closely

approaching the answer option “strongly agree (5)”. The mean values of “perceived risk” imply that MP users find the use of MP less risky, whereas non-users find it rather unsafe to use. Regarding the variable “perceived convenience”, it can be claimed that the Chinese MP users rather agree on its convenient operation, while non-users tend to find it less convenient to use.

Mean values of: (China)	**MP users**	**MP non-users**
Perceived usefulness	4.97	4.33
Perceived risk	2.52	4.67
Perceived convenience	4.84	2.0

Table 27 Mean values of significant acceptance factors in China. Source: Own illustration.

The regression results show that only “perceived usefulness” is considered significant, with a p-value of 0.03. The negative correlation suggests that the less MP is used, the less this payment system is considered as useful. The other acceptance factors “perceived risk”, and “perceived convenience” are not considered as significant within this regression model, as their p-values are greater than the significance level of 0.05. The regression model has an overall fit of 66% (Cragg-Uhler) or rather 55% (McFadden), by looking at its pseudo r-squared value. This can be considered as an acceptably good number for a regression model of this scope.

```
MODEL FIT:
χ²(3) = 19.80, p = 0.00
Pseudo-R² (Cragg-Uhler) = 0.66
Pseudo-R² (McFadden) = 0.55
AIC = 24.51, BIC = 31.06
------------------------------------------------
                    Est.   S.E.    z val.  p-val.
---------------- ------- ------ -------- ------
(Intercept)        12.32   6.34     1.94   0.05
Per. usefulness    -2.55   1.15    -2.21   0.03 *
Per. risk           0.82   0.57     1.45   0.15
Per. convenience   -1.05   0.62    -1.68   0.09 .
------------------------------------------------
Signif. codes:
0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Figure 15 Results: Multiple Logistic Regression (Acceptance factors in CN). Source: Own illustration.

4.3.4 Limitations

The main limitation of the questionnaire survey is the relatively small data sample of Austrian and Chinese MP users and non-users, which lack the scope for a representative study. However, within the framework of this master's study, the sample size is adequate. Usually, questionnaires that are conducted online have a broader reach compared to traditional questionnaires, however it is assumed from the respondents that they have access to a device with internet connection. The combination of small sample size and the distribution of the online questionnaire according to snowball sampling might have restricted the data set in its diversity. Apart from that, an unbalanced frequency regarding the variable of age can be observed in both data samples. This can be traced back to the disadvantages of the chosen sampling method. As snowball sampling does not allow you to control the distribution pattern, therefore the representativeness of the data can hardly be guaranteed. For studies of a greater extent, the aim should be set for a higher number of observations. The choice of other sampling methods might ensure a more balanced frequency regarding the demographic variables and could result in a more representative sample.

The choice of a multiple logistic regression might also bear several limitations, such as the identification of relevant independent variables and the requirement of independent observations for the regression model. If data points are highly related to each other, the logistic regression is not an appropriate method for conducting empirical studies. Besides, if the independent variables are highly correlated to one another, the effect of these variables on the regression model might be inaccurate (Ranganathan 2017). Another weak point of logistic regressions is its vulnerability to overconfidence (Robinson 2018), which means that the predictors might overstate their significance and hence overfit the model. Although the attempt was made to solve these problems by using the AIC in combination with the stepwise approach, other methods might have provided different and more comprehensive results in this context.

Although the r-squared value of both models ranges between 50% and 66% and their model fit seems acceptably good, there is still a remaining percentage of potential predictors for the dependent variable "intention of MP use", which have not been discovered within this survey scope. In this sense, further surveys are required to study MP with the smartphone in the stationary trade, in order to determine more significant predictors. The improvement of the survey model can lead to a higher probability of the correlation between the respective acceptance factors and the dependent variable. Hence, the model could receive an overall greater validity in the context of this research.

4.4 Summary and Discussion

The following summary of the empirical part includes the survey approach as well as a discussion of the findings from the descriptive statistics and the multiple regression analysis, which were evaluated with the program R and in Microsoft Excel.

At the beginning of the empirical part, a systematic literature analysis of MP acceptance factors has been conducted, which identified a total of 7 positive and 3 negative acceptance factors for the final research model. From the factors of the research model, 10 hypotheses have been formulated. Then the relations between the independent variables (IV) and the dependent variable (DV) “intention of MP use” have been described. While H1 to H7 are claimed to have a significantly positive correlation, H8 to H10 should show a significantly negative correlation with the DV. These 10 hypotheses have been later tested with an online questionnaire survey, which has been distributed, according to snowball sampling, via a link to potential respondents in Austria and China. The questionnaire covered a total of 27 questions, including demographic questions, filter questions and MP questions. The survey has reached a total of 86 (49 Austrian and 38 Chinese) respondents, from which 83 final questionnaires were filled out completed.

For the empirical analysis, descriptive statistics and multiple regressions have been carried out. The descriptive analysis of the questionnaire survey shows that there is a significantly larger share of MP users in China (81.6%) than in Austria (28.8). This result is also reflected in the reviewed literature, which suggests that MP is much more popular in China compared to Austria (see also 3.6).

Regarding the demographic characteristics of MP users and non-users, such as age, gender and education, no major differences can be emphasized between the selected countries. MP users in both countries are aged between 14 and 40 years, where especially non-users can be assigned to a broader age group. In terms of gender, there is a larger proportion of female MP users in China, but more male MP users in Austria. In both countries, there are more female MP users and non-users than male users and non-users. Regarding the education level, all MP users have at least a high school degree, whereas non-users have also a lower education level.

In consideration of the characteristics of employment and income, MP users in Austria are mainly students (46.2%), while they are mostly full-employed in China. All non-users and users in both countries have comparable employment characteristics, while the income data differs slightly. People with a lower income in Austria are rather not using MP, while people with a smaller wage in China also us MP. This can be explained by the high penetration rate of MP in China and the simple access to this payment system, also for the low-income population. Given the relatively small reach of other digital payment methods, such

as credit cards, especially in rural areas, and the fairly high fix costs compared to MP, this mobile payment system seems quite favorable especially for people with little income.

The second part of the empirical survey covered a multiple logistic regression analysis of the collected data by making use of the statistical model selection method Akaike Information Criterion (AIC) and the “step”-function in R. According to this approach, the best models regarding the data samples have been constructed. The regression model of the Austrian sample can explain the dependent variable (DV) “intention of MP use” with an accuracy of 50% (McFadden) to 65% (Cragg-Uhler) and shows two significant factors: “perceived MP knowledge” and “perceived risk. The regression model of the Chinese data has an accuracy of 55% (McFadden) to 66% (Cragg-Uhler) and has delivered “perceived usefulness” as a significant acceptance factor.

As a result of the regressions, the null hypothesis, which suggests that there is no statistically significant correlation between the 10 acceptance factors and the “intention of MP use”, can be rejected for the Austrian and Chinese model. With regard to the regression results, the hypotheses H3 for “perceived MP knowledge” and H8 for “perceived risk” can be confirmed for the Austrian sample. H3 suggests that the more MP knowledge users have, the more they tend to use MP, and H8 implies that the Austrian people are more likely to use MP if MP is perceived as less risky. Considering the Chinese model, H1 for “perceived usefulness” can be confirmed. H1 indicates that the more MP is perceived as useful, the higher is the probability of the intention to use MP.

By taking into consideration the mean values of the acceptance factors from the Austrian and the Chinese regression models, some similarities can be emphasized. While MP users of both countries find MP use rather less risky, MP users in China seem to find it riskier than Austrian users. Regarding all MP non-users, the Chinese respondents tend to find MP use more unsafe (with a mean of 4.67) than Austrians (with a mean of 3.19).

In view of the mean values of “perceived risk”, it seems to be a barrier for the intention to use MP for both parties, although there exist completely different legal frameworks for MP. Therefore, it can be derived that risks concerning MP, such as data protection, viruses, security problems, is an issue for respondents of both countries. However, the Chinese respondents might have a different understanding of security issues or data protection than the Austrians, which can lead to ambiguous comparisons. This problem could be solved by providing both parties with the same information and knowledge about data security and personal data protection, to create a comparable basis. However, for the scope of the present study, the findings can be generally accepted.

5 Conclusion

The present research aimed to identify acceptance factors, which can help explaining why the use of Mobile Payment (MP) with the smartphone in the stationary trade in Austria is less advanced than in China. Based on a quantitative analysis of acceptance factors regarding the intention to use MP, it can be concluded that “perceived MP knowledge” and “perceived risk” are significant factors concerning MP in Austria. The findings indicate that potential users of MP in Austria are more likely to use this payment system, the less they find it unsafe and risky. Also, they are less likely to use MP, the less knowledge they have about this payment technology. The results of the Chinese sample show that “perceived usefulness” is considered significant. This implies that the less they find MP useful, the less intention of MP use they have.

In terms of Austria, the Mobile Payment development could be promoted by more sustainable government support. By formulating comprehensive solutions for the MP industry and encouraging MP market entities, the overall infrastructure for MP technologies could be modernized. Considering the significant factors “perceived MP knowledge” and “perceived risk”, efforts in knowledge transfer regarding the use of MP can be made by the support of the government. Concerns about security and privacy issues can also be targeted with clear statements by MP providers, as well as with technological solutions. As the legal framework for MP in Austria is much tighter than in China, the development of MP in Austria could be stimulated by more supportive regulations for potential MP providers. Given the significant acceptance factor “perceived usefulness” in China, the MP development in Austria could be enhanced by promoting the beneficial and valuable features of this payment system. Especially MP service providers could particularly focus on creating a MP product with a promising value proposition, designed for the Austrian market.

Since Mobile Payment becomes more and more important in developed countries and the digitisation process is driven by further innovations and new technologies, it is just a matter of time for these developments to reach Austria. Therefore, a thorough preparation is necessary to keep pace with the world’s digital development. In this respect, the successful growth of the Mobile Payment industry in China can be considered as an example for the Austrian market. Some aspects could be applied to the Austrian market and might have a positive effect on its MP development.

Especially for future work on Mobile Payment acceptance in Austria, success factors of MP in other countries could be taken into account. In the case of China, the MP industry could be investigated from the government’s perspective, which could lead to more insightful explanations for the rapid growth.

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Appendix 1

Abstract (in German)

Mobile Payment (MP) wird als eine Anwendung mit enormen Potenzial betrachtet, die die Landschaft des Zahlungsverkehrs am Markt verändert. Untersuchungen haben ergeben, dass es für Gesellschaften mit einem hohen Grad an MP-Akzeptanz wahrscheinlicher ist, die digitale Transformation von Zahlungssystemen mit hoher Geschwindigkeit zu durchlaufen. Die vorliegende Masterarbeit untersucht die relativ langsame Akzeptanz von MP in Österreich im Vergleich zu China, und geht im Speziellen auf das mobile Bezahlen mit dem Smartphone im stationären Handel ein. Dabei wird erforscht wie die Unterschiede in potenzielle Akzeptanzfaktoren mit den Unterschieden in der MP-Nutzung in den betreffenden Ländern verbunden sind. Basierend auf Studien aus der Akzeptanzforschung wurde ein theoretisches Untersuchungsmodell, in Anlehnung an das Technologieakzeptanzmodell von Davis et al. (1989), erstellt. Aus den Variablen des finalen Untersuchungsmodells wurden Hypothesen formuliert, die in weiterer Folge mit einem Online-Fragebogen getestet wurden. Der Online-Fragebogen wurde anschließend an potenzielle MP NutzerInnen in sowohl Österreich als auch China versandt. Die gesammelten Daten wurden mithilfe von deskriptiver Statistik sowie multipler Regressionen in der Statistiksoftware R und Microsoft Excel ausgewertet. Die Untersuchungen haben ergeben, dass sich die Akzeptanzfaktoren „perceived MP knowledge“ (wahrgenommenes MP-Wissen) sowie „perceived risk“ (wahrgenommene Risiken) bezüglich der MP-Nutzung in Österreich als besonders signifikant erweisen. Für MP-NutzerInnen in China erwies sich die Variable „perceived usefulness“ (wahrgenommene Nützlichkeit) als signifikant. Diese Erkenntnisse deuten darauf hin, dass fehlendes Wissen sowie Sicherheitsbedenken in Bezug auf MP einen grundlegenden Einfluss auf die Nutzungsabsicht der ÖsterreicherInnen haben.