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Research Article

Online Behavior and Loyalty Program Participation-parameters Influencing the Acceptance of Contactless Payment Devices

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Abstract: This study explores the central perceptions of consumers influencing the decision to use contactless payment instruments. Aim is to define a customer core group narrowed down by several variables and to find a basis for a purposeful communication of advantages of the new payment process, as investment into this technology bears the risk of total loss if the customer group is declining acceptance and the image of a company might be excessively damaged. External variables in context with the usage of social online media and participation in customer loyalty programs have been selected to clarify possible impact. These factors offer comprehensive explanation and help interpreting mechanisms within the decision making process for acceptance of the payment technology. Data were collected in a survey with n = 1,294 customers in a major city in Northern Germany. Results are displayed in a technology acceptance model, using structural equation modelling and regression analysis. The study is not limited on mobile payment instruments in the traditional context respectively involving a mobile phone. On the contrary this analysis is made on the belief that any device can be enabled for contactless payment processes, such as traditional items like credit or debit cards. Customers shopping online have a higher perceived usefulness an customers participating in loyalty programs tend to understand the argument of the ease of use of the technology more than their counterparts.

Keywords: Contactless payment, credit card, mobile payment, RFID, TAM, technology acceptance

INTRODUCTION

Contactless payment processes are enabled by devices based on Radio Frequency Identification technology (RFID). RFID technology allows the participating items to communicate over a radio interface without the need for a line of sight. In the case of contactless payment processes the reading range is limited to a few centimetres. The technology is widely used in access control systems, payment for public transport or ticketing for major events. RFID enabled payment devices are presented to a reader without paying attention to position or angle of the payment device as the transmission is contactless and can even pervade non-metallic material easily. One example for a successful RFID implementation is the oyster card in London's public transport system or the octopus card in Hong Kong. In Hong Kong the card can further be used to pay low and midsized items in shops directly from a deposit on the card, being used in 2001 by nearly 70% of Hong Kong's residents. Hong Kong's octopus card can be seen as a successful implementation of contactless payment technology with a high rate of acceptance by their customers and over six million daily transactions already in 2001 (Chau and Poon, 2003).

The neutral term of "contactless payment" has been chosen in this study, as up to today the final appearance of one specific payment device is still not asserted as described in 2008 already by Cimiotti and Martin (2008). Currently there are Near Field Communication (NFC) devices, such as mobile phones, with or without software applications hosting the functionality and cards with appearance of a regular payment card to create a certain familiarity for customers. NFC technology is an element of the Radio Frequency Identification technologies (RFID) and often related to mobile payment (m-payment) processes. New forms of appearance will most likely emerge, such as key chains or stickers, depending on the demand of customers.

External variables offer the possibility to describe and localize the customer core group of contactless payment devices selected by their online behavior and several demographic factors. The influences shown in the model help to understand decision making processes, possible leverages and identify communication channels towards the user group. This study clarifies the influence of information and designated information channels on the acceptance of a contactless payment device.

The development of payment instruments besides notes and coins is bound to the element of trust. As

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such, every customer using a payment instrument of various currencies has to trust in the counter value of that note or coin within the chosen market, either accepting or paying with it. In 1894 the Hotel Credit Letter Company of the United States of America issued the first type of credit identification card, very similar to today's payment cards in size and appearance, even with imprinted name and customer number (Schwintowski and Schäfer, 2004). The imprinted name was stamped on the final bill instead of a payment. The hotel gave each card holder a credit line and issued a monthly bill to its customers. These types of premature credit cards were later on equipped with additional security features, leading finally to graphic methods like holograms and technical solutions like magnetic stripes and EMV-chips as in today's credit or debit cards.

Both connection techniques, smart card or EMV-chips and magnetic card, are liable to the effect of abrasion and corrosion on cards and card-readers. Magnetic stripes are further more vulnerable for the destructive power of strong magnetic fields, like from magnetic catches of wallets and hand bags. Abrasion and magnetic destruction may result in denied reading and subsequently the rejection of a payment. Contact plates of smart cards on the other hand receive scratches even by card readers leading to a damage of the gold plated surface and possibly resulting in corrosion of the exposed metal (Rankl *et al*., 2003). These damages cannot be avoided, as sliding contacts are the essence of low-cost readers used in nearly every credit or debit card terminal.

Besides the negative technical aspect of contact transmission, there is also a negative user aspect within the reading process. Customers have the possibility to insert their payment card against the designated reading direction resulting in a rejection by the terminal. The payment process will be significantly slowed down due to such mishandling (Lacmanovic *et al*., 2010). Contactless payment devices are on the contrary not requiring an insertion of cards at all. They transmit the necessary information via radio interface over a distance within centimetre range.

Therefore another technical aspect is the increasing speed of the payment process (Chen, 2008; Cimiotti and Martin, 2008). State of the art EMV terminals with their contact based interface have a slower reading rate than the new radio interface.

The current state of science on contactless payment processes is mainly focusing on m-payment. A study on the conditions for acceptance of mobile payment (m-payment) procedures draws even a line between m-payment and 'competing payment systems' such as traditional credit and debit cards (Pousttchi, 2003). Necessarily m-payment should only be seen as one element of contactless payment processes. It is undeniable that m-payment is playing a leading role in the future of contactless payment technology, as for the aspect of market penetration the device in form of a mobile phone offers significant benefits in its multiple communication channels towards the user and pervasiveness of the device. A literature review of Dahlberg *et al*. (2008) is stating that there is a possibility that mobile phones are a new channel for traditional payment systems. Further the literature research in Dahlberg's study reveals that none of the articles found is comparing the traditional and mobile payment services. Scientific literature is mixing the terms of 'mobile payment' and 'contactless payment' as for example in the case study of Ondrus and Pigneur (2006). Consolidation of these different terms is necessary to reach a clear result for the acceptance of the technology by users. This study operates with the term of 'contactless payment' to ensure that no bias is involved within the interview process. Customers asking for a demonstration or explanation of the payment device received a neutral explanation that the payment device is presented within short distance up to 10 cm to a reader.

As conclusion in literature research the study of Dahlberg states that 'The social and cultural factors impacting mobile payments, as well as traditional payment services in comparison to mobile payments were discovered as the uncharted black areas of past research' (2008). This study tries to fill some of the dark areas with information on the factors influencing the technology acceptance of a contactless payment system in general. The intention is to reveal influencing factors and identify factors that need to be taken care of in implementation and design phases. The factors chosen here are related to online habits and do not claim to be complete.

Speed of payment is a factor that is frequently mentioned in literature about contactless payments and can be seen as a benefit to both, merchants and customers (Chen, 2008; Smart Card Alliance, 2007). The merchant's advantages are based on faster payment processes resulting in higher efficiency for each cash desk. This might lead to shorter queuing times and more possible sales per cash desk, an interesting factor in areas with high customer frequencies, such as airports, train stations or super markets. Here check-out areas are traditionally limited in space for the benefit of a larger sales area. For the customer, the aspect of speed means an increase in convenience (Chen, 2008; Carter, 2005). Besides the speed within the payment process the reduced amount of cash and coins to be carried is a benefit for customers as well, if payments will be accepted for low cost items as intended.

MATERIALS AND METHODS

The concept behind the chosen analysis technique, the Technology Acceptance Model (TAM), is to predict

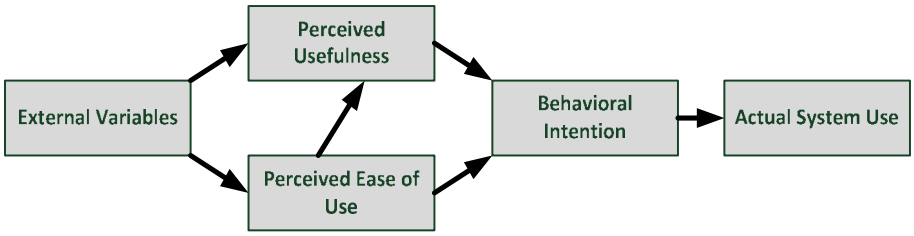


Fig. 1: TAM on the basis of Venkatesh and Davis (1996)

and describe the mechanisms leading to the voluntary use of a technology (Davis, 1986). Other concepts related to Davis's work are the 'Theory of reasoned Action' (Fishbein and Ajzen, 1975) and the 'Theory of planned Behavior' (Ajzen, 1991). Both theories are based on the elements of 'Subjective Norm' and 'Attitude towards Behavior'. Davis in contrast is explaining the influencing elements in the terminology of TAM with Perceived Usefulness (PU), Perceived Ease of Use (PEOU) and Behavioral Intention (BI). These elements are leading into the Actual System Use. External Variables influence the two elements of PEOU and PU. This wording is part of a simplified version of the original TAM from 1989 that got published in 1996 (Venkatesh and Davis, 1996) and is to be seen in Fig. 1. The possibility to test External Variables for their influence to the acceptance of contactless payment procedures was the reason to use the TA model for this study.

The places chosen for the survey accept contactless payments, whereas the current number of merchants accepting contactless payments in the German market is currently still low. The payment product is relatively unknown to most of the customers at the time of the interview (September 2011). Therefore this study skipped the element of Actual System Use and designed the model out of External Variables, PEOU, PU and BI, binding the acceptance of contactless payment technology on the Behavioral Intention to use it. The knowledge and acceptance will increase as with increasing numbers of issued contactless payment embedded debit or credit cards by the end of the first half of 2012 (FTD, 2012).

A survey at two petrol stations in Hamburg, Germany, was conducted on a Sunday and Monday in September 2011. The petrol stations are located alongside arterial roads on the outskirts of the city. One station is between an industrial and a living area to guarantee a continuing flow of customers during the day, the other one close to the airport but at the same time in a distance where employees of the airport will stop by on their way to or from work. The station is located in a living area, so that residential customers are frequenting the shop as well. Both stations have a 24 h service time frame. Sunday is the day of the week with the strongest shop turnover. At this day of the week the bakery products and newspapers offer substantial sales volume as most of the other shops are closed around. Mondays are traditionally strong in sales of petrol products with low petrol prices attracting customers. Both petrol stations have further a car washing facility and service area with vacuum cleaners open on both days. These areas offer the chance to interview customers during waiting times and provided excellent rates of willingly answering customers. Both days give the opportunity to explore two customer segments and their attitude towards the acceptance of contactless payment instruments within these days by reaching large numbers of customers at the same time. The petrol chain has been selected as for being one of the first to adopt contactless payment technology in their shops, so that customers-even if diffusion of payment devices is currently low-had the chance to get in contact with that technology. The accepted payment device here was the Pay Pass product of Master Card.

A total of n = 1,294 customers has been interviewed by a team of minimum two and maximum four interviewers per shift and petrol station in three shifts of eight hours per day. With two petrol stations out of 16, the number of selected stations reaches 12.5% of the total number of the brand in Hamburg. The questions have been selected out of a meta-analysis on TAM of Legris *et al*. (2003) and represent the typical question set of four questions on PEOU and PU as well as two questions on BI. A five point Likert-scale has been chosen for the scaling of answers. Additional questions on the information about external variables and demographic factors were designed as binary questions, observation with binary answers in terms of gender and numeric answers for the year of birth. During the survey process answers for the year of birth or education have been sometimes rejected. The answers on the TAM questions and the following variables have been analysed for structural equation modelling with a regression analysis.

Hypotheses: The study focuses on eight hypotheses in order to clarify customer's behavioral intention to use contactless payment devices by analyzing their Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).

External variables possibly influencing the acceptance of contactless payments have been chosen in relation to online activities of the main population.

The following six variables have been selected. External variables were checked for their influence on the model by asking if the interviewee is a holder of-or participant in the influencing variable.

Hypothesis 1: The possession of a smart phone influences the acceptance positively.

The possession of a smart phone (pos_smartphone) is a possible influencing variable for the technology acceptance, related to one of the sectors of contactless payments aiming for mobile payment or m-payment. M-payment is designed for customers with mobile devices as these instruments offer cheap and easy access for various applications on to customer's devices. A critical mass can be reached easily and additional content-like news or advertisements-can be transmitted. This extra content allows the issuers of payment instruments to communicate with 'card-holders' as one can name the customers in a traditional context. The momentary market share of smart phones in Germany is 23% with an annual growth rate of 65% in the year 2011 (comScore_Inc., 2011), making this segment a prosperous element of contactless payments. The field of m-payment is widely researched, but will customers with mobile phone have a higher affinity to contactless payment processes and accept the technology more easily than users without such device?

Hypothesis 2: Experience in online shopping influences the acceptance positively.

Online shopping behavior (online_buy) of the customers might be related to their acceptance of contactless payment processes. A study on the German E-Personalausweis, an electronic ID card with embedded contactless interface-authenticating and identifying the holder contactless for internet transactions and official services-comes to the conclusion that acceptance of this technology is the consequence of a calculation between personal added value and subjective scepticism (Grote *et al*., 2010). As a consequence the online shopping customer overcame the trust issue against internet sales via one or more online sales platforms and one or several successful purchases online. This variable has the potential to depict a decreased level of security needs against alternative forms of transaction and business of which a contactless payment application could benefit from.

Hypothesis 3: Experience in the use of social online networks influences the acceptance positively.

Users participating in social online networks (social_online) release regularly a high amount of personal data to these platforms. Nosko *et al*. (2010) state in their study on internet platform behavior that 'overall 25% of all possible information that could potentially be disclosed by users was disclosed'. The amount of data revealed seems to be considerably higher than the subject's privacy attitude would normally allow to be disclosed. This tendency has been entitled 'Privacy Paradox' of the online world by Awad and Krishnan (2006). A consequence of this social network behavior could be that people using social online media may possibly accept the new payment method more willingly than the customer group that has not been in contact with social online platforms before. Customers denying the use of that type of media-maybe out of privacy concerns, or a lack of knowledge on the enabling technology-could also deny the use of contactless payment devices for similar reasons.

Hypothesis 4: Membership in a customer loyalty program influences the acceptance positively.

Corresponding with the willingness to release personal data in social online networks is the membership in a customer loyalty program (pos_loyalty). Customers are willingly giving their personal data related to their shopping behavior, address, age and even more details away. The intention is not communication as for the social online networks; instead it is the receiving of various materials or service benefits from these memberships. Holvast describes the mechanisms behind customer loyalty programs in his work about the history of privacy as follows. "The philosophy behind this approach is that customers are willing to release personal information if they can profit by doing so, as seen with loyalty cards." (Holvast, 2009). Complying with this statement might be the diffusion of the payment market by contactless payment devices, offering additional services besides the main task of payment to its customers. However, the question is if customers participating in loyalty programs will have a higher acceptance of contactless payment instruments than customers without such membership. This could prove the fact that customers are accepting contactless technology for further benefits.

Hypothesis 5: The level of education has an impact on the acceptance of contactless payment technology.

Another variable possibly influencing behavioral intention has been identified as the level of education (education) of the customer segment. This variable has been chosen as for the possibly increasing personal data protection with an increasing level of education of customers. It might be related to the fact that customers with higher level of education are more aware of the threads that involves revealing of data to third parties. A study from Jones and Soltren (2005) at the MIT describes the increasing level of personal data protection with a higher level of education under university students in 2005. Undergraduate students in the sample group had a more detailed Facebook profile than graduates-according to Jones related to either a lower level of data protection or a higher need for communication. There might be a tendency among

customers to reject the contactless technology by increasing level of education. Correlating the results of the MIT study with the process of contactless payment, it could be linked with a perceived threat of privacy or data security. The variable of education is recorded by a five level scale, starting from 'no education' and reaching to the highest level of 'university degree'. The three items in between are 'Hauptschulabschluss', 'Mittlere Reife' und 'Abitur'. 'Hauptschulabschluss' is reached after 9 years of school or a training on the job with degree, 'Mittlere Reife' indicating 10 years of school and 'Abitur' being the general qualification for university entrance after 12 or 13 years of school, depending on the federal state in Germany.

Hypothesis 6: The level of information about contactless payment technology influences the acceptance positively.

Besides the level of education, there might be a link to the general level of information about contactless payment technology (information). The theory behind this hypothesis is that the level of knowledge about the contactless payment technology is influencing the acceptance in a payment process. There could be either a positive effect due to the understanding of benefits or, vice versa, a negative one. Both effects are either based on personal experience or one's personal level of information. The question aiming for this variable is answered on a five point Likert-scale as well as the question for the level of information, whereas the other questions were aiming for a yes or no answer or the year of birth.

Hypothesis 7: Higher age of the customers affects the acceptance negatively.

The external variable of age (age) has been addressed in this model, as with an increasing age the fear of technology might increase. A study of Hogan (2009) revealed an increasing 'technophobia' with increasing age of the test subjects. There might also be an analogy between the acceptance or rejection of contactless payment devices in accordance to age complying with Hogan's conclusion.

Hypothesis 8: The gender has an influence on the acceptance of contactless payment devices.

As Hogan's (2009) study further reveals, different levels of technophobia exist and they are divided by gender (gender). Gender was therefore observed in the interview session to keep record of this external variable and allow conclusions of different attitudes towards the technology acceptance influenced by this element.

All together, the hypotheses will be answered from the data collected and processed by the TAM. The following chapter analyses the data collected.

Table 1: Model fit χ^2 and χ^2/df

Model	NPAR	χ^2	df	p	χ^2/df
Default model	65	1188.709	124	0.000	9.586
Saturated model	189	0.000	0		
Independence model	18	7460.811	171	0.000	43.630

Table 2: Model fit-root mean square error of approximation

Model	RMSEA	LO 90	HI 90	PCLOSE
Default model	0.081	0.077	0.086	0.000
Independence model	0.182	0.178	0.185	0.000

RESULTS AND DISCUSSION

A Cronbach's alpha was calculated to test for internal consistency of each of the depending elements, PEOU, PU and BI. Each of the endogenous elements, PU (0.846), PEOU (0.846) and BI (0.721) reaches appropriate levels, as according to Nunnally (1978) and Cohen *et al*. (2003), the value for Cronbach's alpha should be above 0.70. They were calculated on four questions for PEOU and PU and two questions for BI.

The analysis of n = 1,294 produced the following regression weights, to be seen in Table 1. The calculation was done in SPSS, p-values marked as '***' indicate excellent significance with values <0.001.

Results for the χ^2 test can be seen in Table 1. As for the saturated model the χ^2 values are high as for the relatively high number of parameters involved. (124°) of freedom indicate further a demanding level of complexity within the model. Judging on the high ratio of χ^2/df the model fit has to be seen as unsatisfying, but as this model is calculated on a large number of 1,294 samples the impact of the χ^2 test should not be overrated. With increasing sample sizes the results of χ^2 calculations increases disproportionally and nearly rejects every model (Jöreskog and Sörbom, 1982; Bagozzi, 1981).

Root Mean Square Error of Approximation (RMSEA) as to be seen from Table 2, helps to leverage the indication of χ^2 for the model fit. With an RMSEA of 0.081 (90% CI = (0.077; 086)), (Table 2) the model fit can be described as marginally significant even as Brown and Cudeck as well as Steiger (1990) suggest a value ≤0.08 as fair model fit (Browne and Cudeck, 1993). The RMSEA is also quite constant within the high and the low 90% of the sample, in having a difference of only 0.009 for the default and 0.007 for the independence model.

These regression weights (Appendix A) have been brought together in a graphical presentation, as to be seen from Appendix B. The influence of PEOU on PU is noticeable with a regression weight of 0.681 and a very high p-value of 0.001. This relation indicates that

usefulness of the new payment technology is strongly affected by ease of use in the perception of its users. The easier the contactless payment process is to be handled, the higher is the perceived usefulness for the customer and the more likely the technology will be adapted. The direct influence of PEOU on BI is on the other hand low with p = 0.165 compared to the other paths. A possible conclusion is that easy handling on its own will not lead to acceptation. A user must understand the personal benefits in this technology to intend the usage.

Hypothesis 1: Possession of a smart phone is showing a tendency to affect both, PEOU and PU equally with 0.05. p-values for both regression weights indicate a medium to low significance, but stronger for PU with o.053 than for PEOU with o.135. The variable is affecting BI more via the argument of usefulness than the element of ease of use and via the indirect path V->PEOU->PU. This result points to a better understanding of smart phone holders for the complementing aspects of contactless payments and smart phones than the other group. A smart phone user might realize the extra benefit of contactless payments in context with the concept of applications and online services that he is using on a daily basis with his advanced mobile phone. There might be a connection to the variable of information, as the term of mobile payment or m-payment is already present in the media, pointing on additional services for NFC enabled mobile phones or provider based solutions deducting liabilities via the monthly phone bill. Ease of use as argument for the acceptance by a smart phone user is of minor importance. This might be related to the customer group already using a quite complex technical device, not identifying contactless payments as a challenge or demanding increase in the process.

Hypothesis 2: Customers shopping online have a nearly doubled perceived usefulness of the new payment process than a perceived ease of use. The influence of the variable decreases over the indirect path to PU and has only a minor effect. The BI of this customer segment is with 0.053 higher influenced via the path V->PU->BI than via the indirect path V->PEOU->PU->BI. BI is further only influenced on a minor level via V->PEOU->BI. This leads to the assumption that online shoppers understand their personal benefit in the usefulness of the new technology and this usefulness will be relevant for the intention to use contactless payment processes. However customers shopping online have overcome the trust issue against online vendors and have also a higher perceived usefulness in contactless payment technology by assigning their experiences from online shopping to the payment process.

Hypothesis 3: Participation in social online networks exhibits the same ratio of regression weight onto PEOU and PU as the variables of information and age. p-values indicate a fair significance of the variable. Indirect path on PU via PEOU shows a similar picture so that BI is also nearly equally affected by the direct and the indirect path. Significance values are acceptable for the influence of PEOU and mediocre for PU. PEOU increases with the participation in social online networks and even more does the PU of contactless payment instruments so. The indirect path V->PEOU->PU delivers similar values for the influence on PU than the direct path does. Overall, this might be related to the knowledge and imagination about possible operational areas of the more technic related clientele. PEOU on its own is not a satisfactory element of influence on the path of acceptance of a contactless payment process as it influences BI only with 0.17. This conclusion leads to the fact that the argument of usefulness has not been fully discovered or communicated, a factor that can easily be addressed in marketing campaigns. Another possible explanation could be that users of social online networks have already another way of payment in mind, such as online based systems like PayPal, or Click and Buy. This explanation is on the other hand in conflict with the results on online shopping as influencing variable for the technology acceptance of contactless payment instruments.

Hypothesis 4: Regression weights for participation in loyalty programs draw another picture as the weights for the online shopping variable. Defining the loyalty program as a membership number or even an analogy to a credit card sized artefact, customers with such memberships see probably the benefit of the new technology more in the ease of use than directly in its usefulness. The ease of use might therefore be a derivation from usefulness, as usefulness is stronger affected on the path of argumentation via the perceived ease of use element. Significance values for PEOU are with p = 0.001 to be rated as highly significant, values on the usefulness have in contrast high p-values indicating a low significance. However, loyalty customers do understand the simplicity of the new payment process more than their counterpart, but the understanding for the benefit side related to the usefulness is in need of communication.

Hypothesis 5 and 7: The variables of gender and education do not show significant regression weights. This leads to the identification that technology acceptance is not measurably influenced by neither the gender nor the education of the customer. Such assumption is to be seen in the context of low

significance as the p-values for both variables are high and the regression weights having an opposite sign. For the variable of education the p-value is higher than for gender.

Hypothesis 6: Direct regression weights indicate a strong influence of the variable of level of information on PEOU and PU. Knowledge about the new payment process is strongly influencing the perceived usefulness and even stronger influencing the perceived ease of use of the customers. Perceived Usefulness is thereby influenced via the indirect path (Appendix C), over the element of PEOU stronger than via the direct as the regression weights show. The highest regression weights on BI can be reached via the indirect path V->PEOU->PU->BI, pointing to a complex line of argumentation. The results on this variable are of a strong information value as the significance for both regression weights $p<0.001$ implements. Interpreting the regression weights it can be stated that with higher knowledge about the technology the perceived ease of use and the perceived usefulness increase. The BI is nearly equivalently affected by each path using the element of PU for explanation. The argumentation V->PEOU->BI is not as strong as any path via PU. All together this leads to the argumentation that the level of information is affecting the perceived ease of use, but more importantly, the PEOU is influencing the usefulness. Information as influencing variable will lead to the need for understanding the personal usefulness of this technology and finally this consideration will result in the acceptance or rejection of the new payment process.

Hypothesis 8: The external variable of age proves to have empirical impact on PU and PEOU of the TAM. This impact is rated with a negative sign, indicating that with increasing age the PU and PEOU of contactless payment technology declines. Regression values for age are of high significance according to their p-values <0.001. Indirect regression weights on PU lead to the same results as the direct influence of the variable on PU. Argumentation for the relation to the final element, BI, is anyhow stronger influenced via the PU than via the PEOU. Due to mediocre regression weights the strong term of 'technophobia' cannot be supported. With increasing age, more a technological trouble someness or tiredness of new technology seems to be a suitable expression for contactless payment instruments. Especially the higher negative value for ease of use-whereas usefulness is assessed slightly better-indicates the apprehension that the complexity of the payment process will increase. Finally the argumentation can be drawn that usefulness gains importance for acceptance of the new payment process with increasing age.

Results of this study showed further need in exploring the elements of perceived trust and perceived security from a social sciences point of view. This study revealed only a limited set of variables and their influence on the BI to use contactless payment systems and makes no claim to be complete. The acceptance of RFID in identification processes might further be of influence in the elements of trust and security as the results from this study suggest.

CONCLUSION

Users will understand the benefits of this technology and more willingly accept the new payment process with a higher personal level of information. To achieve a significant market share of contactless payment technology it is necessary to enforce an information policy that helps customers to understand the process and evaluates their personal impacts. One possible activity could be the installation of demonstration terminals in banks where customers can test the abilities and get an outlook of payment technologies in the future, like the effect of mobile payment by smart phone applications or Near Field Communication (NFC). Another possibility could be the analogue treatment of loyalty members and contactless paying customers in shops, whereby these customer groups could have the privilege of separate check-out areas. Supposable these areas will be 'non-cash payment only' to keep the queues short and reduce waiting times for customers. Such benefits will attract other customers to participate in one of the customer segments either loyalty or contactless payment.

Customers spreading the word about the technology via social online platforms will combine the influence of the affecting variables of information and participation in these platforms. They will therefore summarize the importance of both independent variables. A negatively adjusted information campaign against contactless payments-either because of possible fraud, privacy concerns or other personal resentments-will have the potential to be disastrous for acceptance. One element starting such negative commentator ship-online or in other media-might be the situation of a card holder finding out that one's payment card is already having a contactless function without being informed about it.

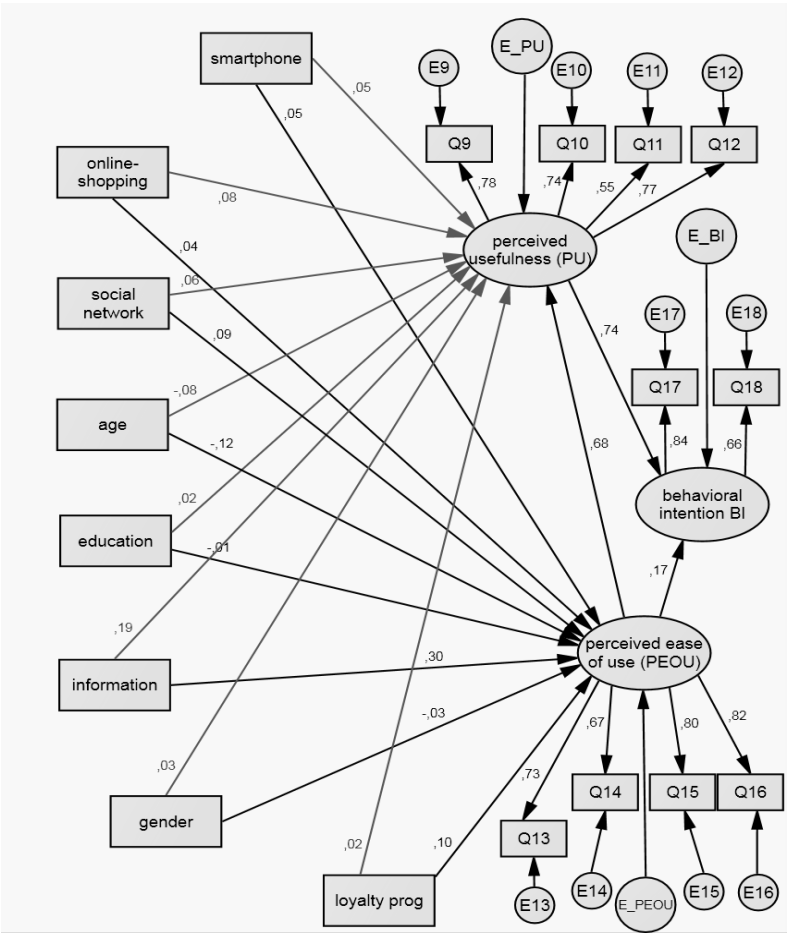
The most important part will remain the fact that customers must have the opportunity to decide themselves if to use or to decline the contactless element of a payment device. This strategy will pay off as the advantages will speak for themselves and might create a momentum attracting customers at a certain point of diffusion to reconsider their previously negative approach to contactless payment technology.

Appendix A: Regression weights

			Standardized estimate	Estimate	S.E.	Critical ratio	p
PEOU	<---	Gender	-0.030	-0.044	0.044	-1.006	0.314
PEOU	<---	Online_buy	0.037	0.054	0.044	1.230	0.219
PEOU	<---	Pos_smartphone	0.047	0.069	0.046	1.495	0.135
PEOU	<---	Information	0.299	0.217	0.022	9.729	***
PEOU	<---	Education	-0.008	-0.005	0.019	-0.273	0.785
PEOU	<---	Age	-0.121	-0.006	0.002	-3.567	***
PEOU	<---	Social_online	0.090	0.131	0.049	2.704	0.007
PEOU	<---	Pos_loyalty	0.097	0.141	0.043	3.264	0.001
PU	<---	PEOU	0.681	0.714	0.036	19.655	***
PU	<---	Education	0.020	0.014	0.016	0.885	0.376
PU	<---	Age	-0.081	-0.004	0.001	-3.056	0.002
PU	<---	Social_online	0.062	0.094	0.040	2.362	0.018
PU	<---	Online_buy	0.078	0.118	0.036	3.273	0.001
PU	<---	Pos_smartphone	0.048	0.073	0.038	1.937	0.053
PU	<---	Information	0.195	0.148	0.019	7.810	***
PU	<---	Gender	0.033	0.051	0.036	1.408	0.159
PU	<---	Pos_loyalty	0.020	0.030	0.035	0.852	0.394
BI	<---	PU	0.741	0.807	0.056	14.377	***
BI	<---	PEOU	0.165	0.189	0.055	3.461	***
Q9	<---	PU	0.776	1.000			
Q10	<---	PU	0.739	0.954	0.034	27.994	***
Q11	<---	PU	0.549	0.716	0.036	19.823	***
Q12	<---	PU	0.773	0.995	0.035	28.106	***
Q13	<---	PEOU	0.730	1.000			
Q14	<---	PEOU	0.668	0.916	0.040	22.840	***
Q15	<---	PEOU	0.804	1.099	0.040	27.307	***
Q16	<---	PEOU	0.818	1.118	0.042	26.919	***
Q17	<---	BI	0.843	1.000			
Q18	<---	BI	0.660	0.788	0.034	23.199	***

S.E.: Standard error

Appendix B: Technology acceptance model



Appendix C: Indirect regression weights

Variable	V->PU	V->PEOU->->PU	V->PU->BI	V->PEOU->->PU->BI	V->PEOU->BI
Gender	0.033	-0.020	0.024	-0.015	-0.005
Online_buy	0.078	0.025	0.053	0.019	0.006
Pos_smartphone	0.048	0.032	0.036	0.024	0.008
Information	0.195	0.203	0.144	0.150	0.051
Education	0.020	-0.005	0.015	-0.004	-0.001
Age	-0.081	-0.082	-0.060	-0.061	-0.021
Social_online	0.062	0.061	0.046	0.045	0.015
Pos_loyalty	0.020	0.066	0.015	0.049	0.016

Appendix D: Questionnaire

Model element	Question
	Question set I, PU
Q9	Using contactless payment increases my productivity
Q10	Using contactless payment increases my job performance
Q11	Using contactless payment enhances my effectiveness on the job
Q12	Overall I find contactless payment useful in my job
	Question set II, PEOU
Q13	My interaction with a contactless payment instrument is clear and understandable
Q14	Interacting with a contactless payment instrument does not require a lot of mental effort
Q15	I find contactless payment instruments easy to use
Q16	I find it easy to get contactless payment instruments to do what I want it to do
	Question set III, BI
Q17	Whenever possible, I intend to use contactless payment
Q18	I intend to use contactless payment as often as needed
	Additional variables
Starter-question	Do you have a credit/debit card?
Online_buy	Do you buy in online stores?
Pos_smartphone	Do you have a Smartphone?
Information	I am well informed about contactless payment technology
Social_online	Do you use social online media like Xing or Facebook?
Pos_loyalty	Do you have a customer loyalty card (payback, miles and more, or similar ones)?
	Socio demographic variables
Age	What is your year of birth?
Education	What is your highest educational degree?
Gender	Gender of respondent

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