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Research Article

Cash in the Trash? An Austrian Perspective on Mobile Payment Adoption

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Abstract.
Despite offering many benefits to consumers, merchants, banks, and other providers, mobile payment still has not found widespread acceptance in Austria, for example, in 2015, 15% of Austrian consumers used the Internet or a mobile device for payments and 16% made contactless payments at least once a week. This study sheds light on this issue by taking a consumer perspective and investigating the factors that foster or hinder mobile payment adoption. Three popular user acceptance models were compared and in the end, a unified theory of acceptance and use of technology-based model (UTAUT2) was chosen. The developed model was composed of 12 factors (behavioral intention, utilitarian performance expectancy, hedonic performance expectancy, effort expectancy, social influence, facilitating conditions, perceived risk, perceived security, privacy concerns, trust, cost, personal innovativeness) and three moderators (age, gender, experience). The proposed model was tested using data from 158 Austrian consumers and analyzed with partial least squares structural equation modeling (PLS-SEM). The results showed that 68% of consumers' intention to use mobile payments could be explained, making it a promising model in the mobile payment research area based on the baseline data. Perceived risk and hedonic performance expectancy are the greatest drivers with psychological risk (a lack of fit with one's self-image) as the most important risk dimension. The results suggest that mobile payment possesses lifestyle characteristics and its usage needs to be fun in order for consumers to prefer it to cash and cards.

Keywords: mobile payment adoption, unified theory of acceptance and use of technology, user acceptance models, partial least squares structural equation modeling

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1. Introduction

The first mobile payment (MP) transaction was already conducted two decades ago, when Coca Cola allowed Finnish consumers to pay via short message service (SMS) at vending machines [1]. Since then, MP has developed a lot and new technologies have emerged [2].

If new technologies are accepted, the use of previously used ones decreases relatively or absolutely. In the payment services market, new innovations compete against several traditional payment methods, of which many are being steadily improved. Consumers naturally use various forms of payments for diverse payment needs. And it is not only a few days ago that a trend towards more electronic and mobile forms of payment can be observed. This process has been facilitated through the wide distribution of mobile devices and the Internet [3].

Today's consumers demand financial services that are easy to use. The increasing ubiquity of smartphones and their multifunctional capabilities provide great opportunities to answer this demand with MP being a convenient option for on-the-go-consumers [4].

But despite optimistic forecasts, when this study was conducted (pre-COVID), MP does not account for a major share in the payment mix in most countries [5]. One of those countries is Austria, where in 2016 only 21% of consumers have ever used an MP app [6]. The success and failure of new MP solutions depend on a variety of circumstances, e.g. competition, business models, available technologies [7], and satisfying regulative, normative, and cognitive country-specific constraints [8]. Ondrus and Pigneur [9] noted that the two important success factors are merchants and consumers who offer/use MP and the transaction volume. If high numbers are achieved in both areas, MP adoption (MPA) is more likely to take place. But without a great number of consumers interested in MP, merchants will not invest in the MP infrastructure [10]. Certainly, having consumers who are familiar with and willing to use MP is not the only criterion for widespread adoption – but it surely is necessary and maybe also the pivotal element for success or failure.The objective of this paper is to explore consumer acceptance of MP in Austria in order to identify factors that foster and hinder widespread adoption.

2. Mobile Payment

One of the most frequently used definition states that MP "are payments for goods, services, and bills with a mobile device (such as a mobile phone, smartphone, or personal digital assistant (PDA)) by taking advantage of wireless and other communication technologies" [11]. Another definition of MP was given by Ghezzi et al. [12] who defined it as "a process in which at least one phase of the transaction is conducted using a mobile device (such as mobile phone, smartphone, PDA, or any wireless enabled device) capable of securely processing a financial transaction over a mobile network, or via various wireless technologies (Bluetooth, radio frequency identification (RFID), near field communication (NFC), etc.)." This definition is used in the present study as it as broad enough to encompass all types of MP, acknowledges the utilization of a mobile device and a mobile network, and emphasizes the security aspect.

Mallat [13] noted that mobile phones possess several features that make them suitable for conducting payments. First, the dissemination of mobile communication technology has made mobile devices popular among and accessible to the general public. Second, mobile phones accompany consumers wherever they go (as opposed to fixed-line computers) and therefore are suitable for storing personal information and being used as a payment instrument. Third, many consumers are used to pay with their mobile phone anyway, as low-cost mobile products (e.g. ring tones) enjoyed great popularity in the early days of MP.

Chen [14] mentioned two major forms of MP: cellular and contactless. Cellular MP utilizes mobile devices to pay online or at a point of sale (PoS), e.g. via SMS. On the contrary, contactless MP is only used at the latter by waving the mobile device over a reader. As such, it is a proximity payment method. Gerpott and Meinert [15] distinguished between remote payment systems (RPS) and proximity payment systems (PPS). This classification is based on the underlying communication technology and can be seen in Figure 1. RPS allow consumers to conduct transactions via SMS, phone calls, or the mobile Internet, whereas PPS utilize technologies like barcodes or beacons.

With RPS consumers have to connect to remote servers to conduct the transaction [16], e.g. in case of mobile banking [17]. An advantage is that RPS are device-independent, i.e. they do not require a certain operating system or device type [15].

PPS enable a contactless transference of payment data through various short-range communication technologies, e.g. NFC. Most solutions are device-dependent and cannot be used with all types of mobile devices [15].

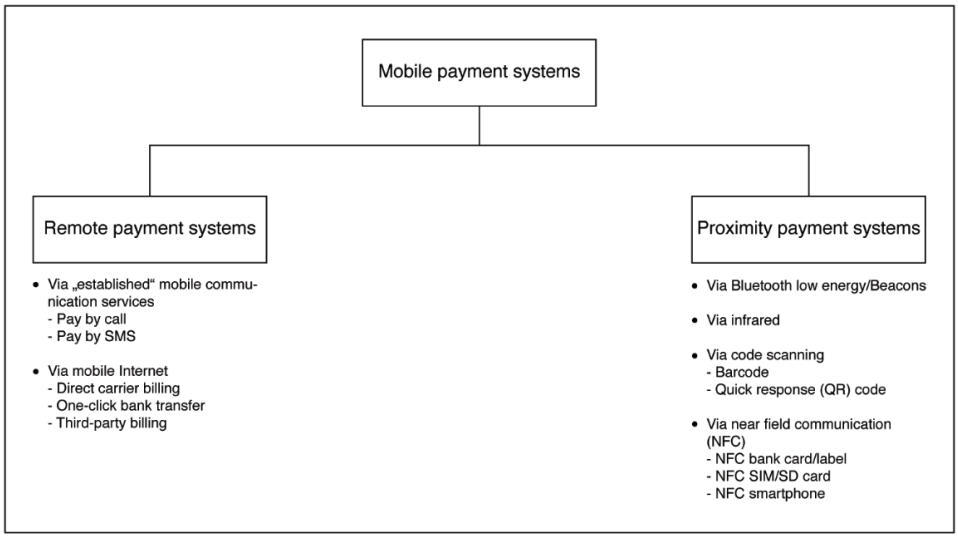

Figure 1: Structuring of Mobile Payment Systems. Secure digital memory (SD), subscriber identity module (SIM), short message service (SMS). Adapted from “Who signs up for NFC mobile payment services? Mobile network operator subscribers in Germany” [15].

Relating the classification by Gerpott and Meinert [15] to the one given by Chen [14], one can observe similarities between cellular MP and RPS on the one hand and between contactless MP and PPS on the other hand. Although the names are different, the essential distinguishing characteristics (the utilized technology and contact vs. contactless) are the same.

3. Mobile Payment in Austria

As of 2015, 15% of Austrian consumers used the Internet or mobile device for payments and 16% paid contactless at least once per week. The latter includes purchases with smartphones and cards. Age differences can be observed, as people under 30 more frequently purchased contactless and a higher proportion of them were aware of this possibility [18].

In 2016, only 1.7% of Austrians said that they could imagine very well using MP in the future and 37% stated they could not imagine it at all [19]. There may be different reasons for this rather negative attitude towards MP, e.g. the lack of knowledge about concrete solutions and points of acceptance or Austrians’ love for cash [20].

3.1. Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) was created by Venkatesh et al. [21] and can be seen in Figure 2. The researchers integrated eight well-known technology acceptance models, among them TAM and the diffusion of innovation theory (DOI), into a new model, primarily designed for organizational contexts.

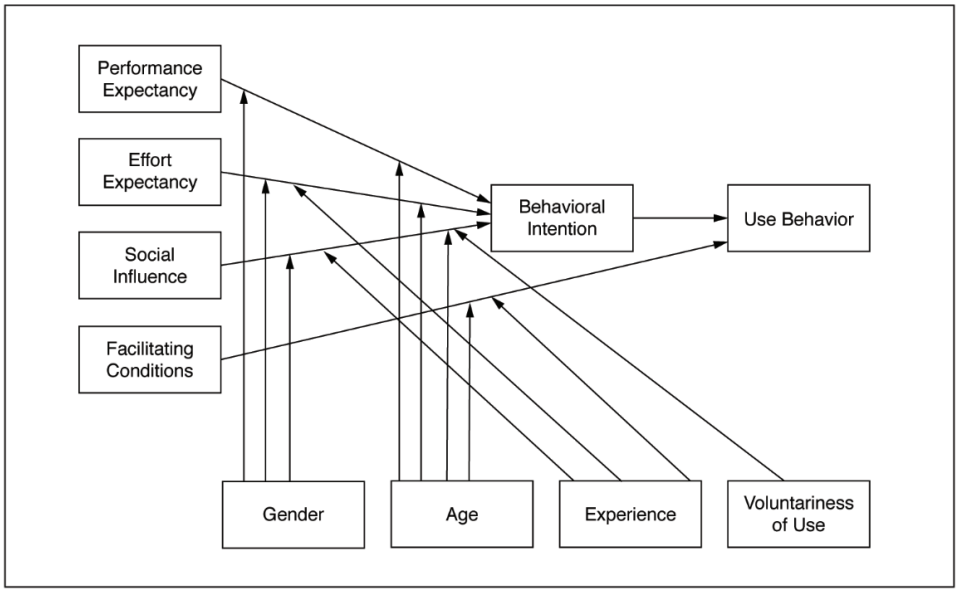

Figure 2: UTAUT. Adapted from "User Acceptance of Information Technology: Toward a Unified View" [21].

The theory has been extended into UTAUT2 by Venkatesh et al. [22] and can be seen in Figure 3. As opposed to TAM, TAM2, TAM3, and UTAUT, it does not focus on the organizational context but is targeted towards consumers. Compared to UTAUT, more variance in BI (74% vs. 70%) and technology use (52% vs. 48%) can be explained with this theory [21, 22].

3.2. Model

Several MPA studies and their research models have been examined. In the end, it was decided to use the model by Khalilzadeh et al. [23] as a starting point. This study is quite new, builds on findings from previous studies, and is based on UTAUT2. Moreover, it was published in a peer-reviewed journal (Computers in Human Behavior) and the model could explain a very high percentage of the variance in BI (87.1%). An interesting aspect is that the study was conducted in the USA. Therefore, it will be interesting to see if the significant factors and relationships will also be important for consumers in Austria. Figure 4 shows the model proposed by Khalilzadeh et al. [23], including all significant

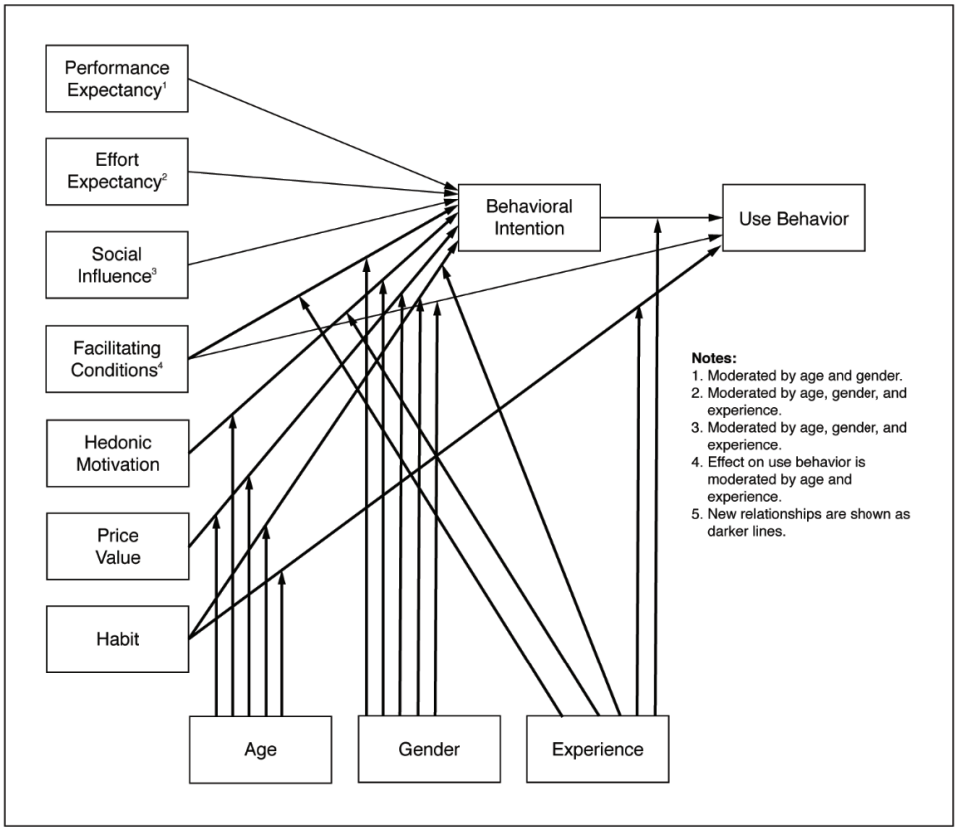

Figure 3: UTAUT2. Adapted from "Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of Acceptance and Use of Technology" [22].

relationships and factors. Figure 5 depicts changes to the basis model made in this study.

The findings from our literature review are used to construct the research model, which can be seen in Figure 6. It is composed of 12 factors (BI, UPE, HPE, EE, SI, FC, PR, PS, PP, trust, cost, PI) and three moderators (age, gender, experience).

BI is the dependent variable, also called endogenous latent variable (the construct explained by other constructs in the model). The other constructs are the independent variables (also called exogenous latent variables) and explain other factors in the model. Factors that act as independent and dependent variables are also called endogenous [24]. An example for the latter in this study is HPE. As an independent variable, it impacts BI and as a dependent variable it is influenced by UPE, trust, EE, and SI.

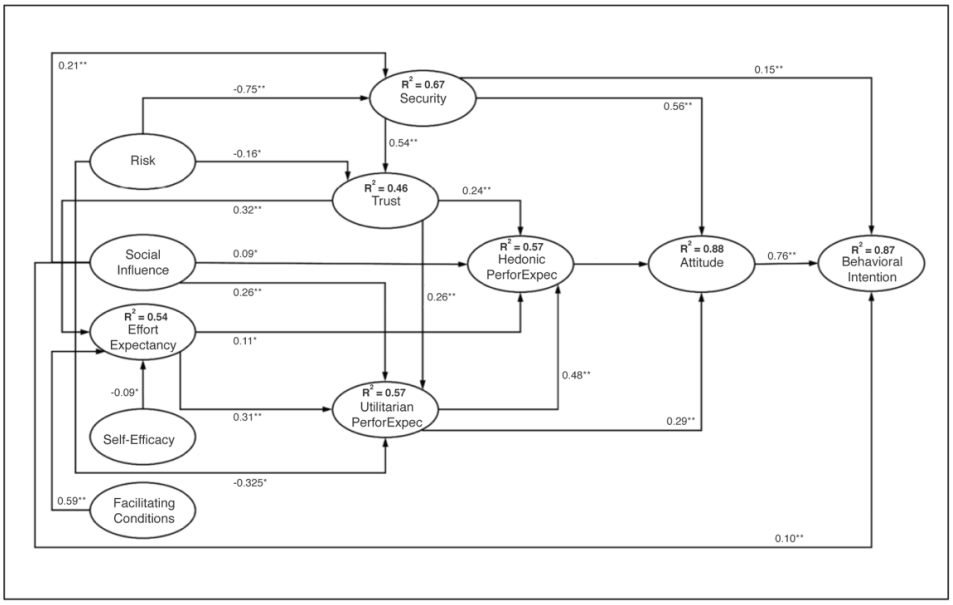

Figure 4: Basis Model. Performance Expectancy (PerforExpec), ** significant at .01, * significant at .05. Adapted from "Security-Related Factors in Extended UTAUT Model for NFC Based Mobile Payment in the Restaurant Industry" [23].

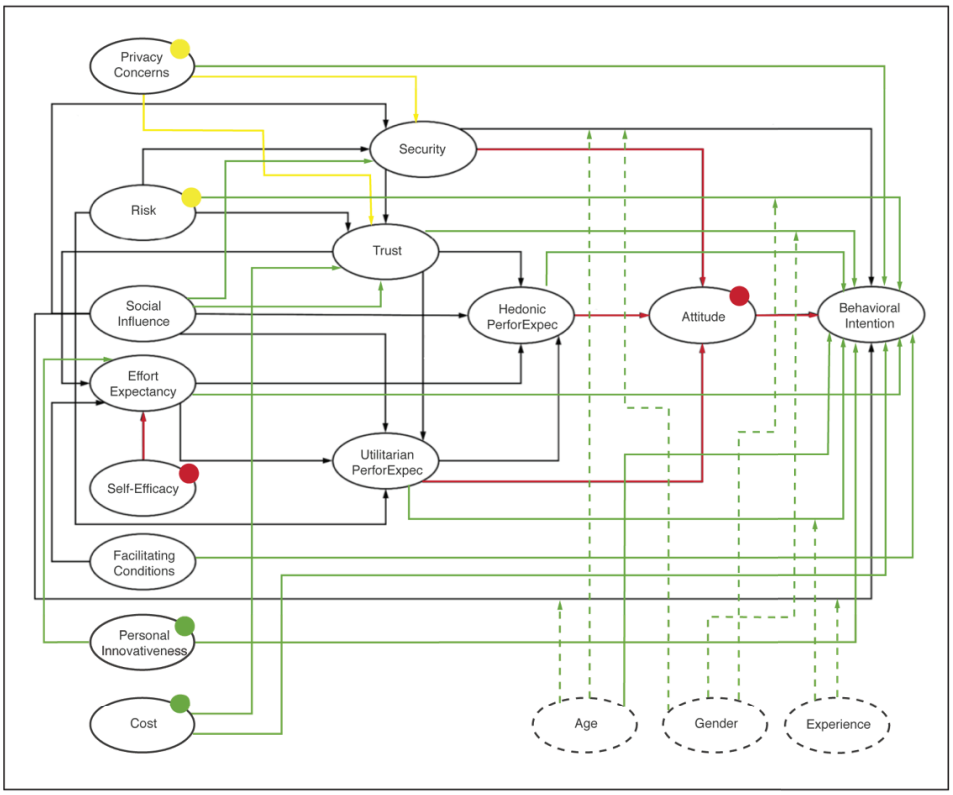

Figure 5: Changes to the Basis Model. Performance Expectancy (PerforExpec); red dots and lines: factors and relationships of the basis model dropped in this study; green dots and lines: newly added factors and relationships; yellow dots: the two constructs and their relationships are one in the basis model; dashed circles and lines: moderator variables and relationships. Adapted from "Security-Related Factors in Extended UTAUT Model for NFC Based Mobile Payment in the Restaurant Industry" [23].

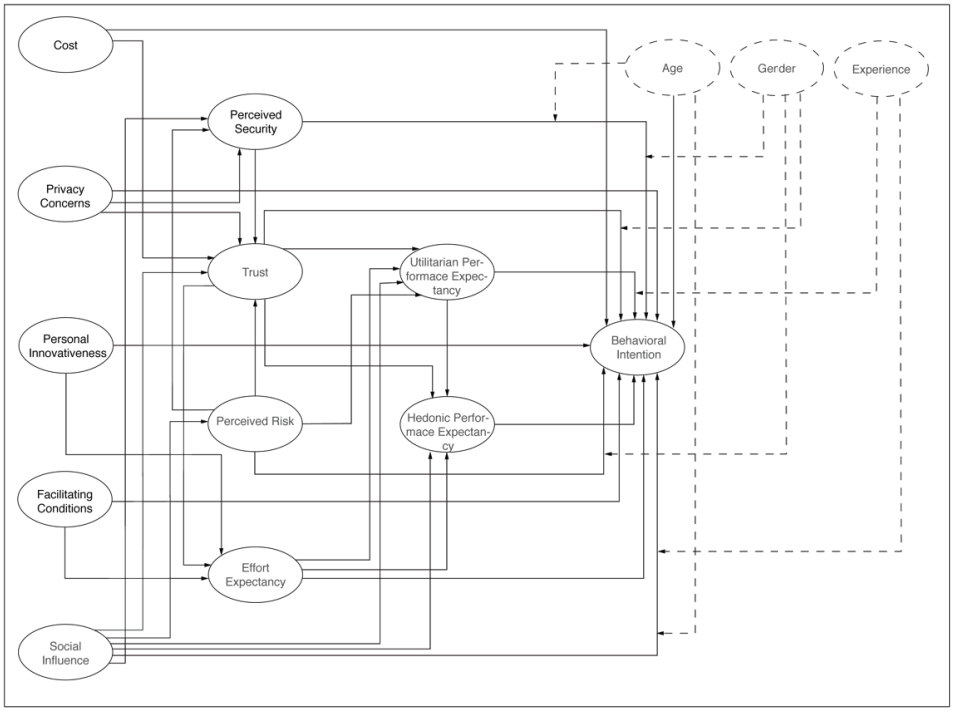

Figure 6: Research Model. Solid lines: direct relationships; dashed lines: moderating effects.

3.3. Methodology

A Structural Equation Model (SEM) allows the creation and investigation of relationships between variables in a model. It is often used to assess causality between variables and therefore, SEM is also called causal modeling [25].

SEM is a second-generation multivariate method and offers researchers the possibility to examine unobservable variables measured indirectly by indicator variables. There exist two types of SEM: covariance-based SEM (CB-SEM) and PLS-SEM. PLS-SEM was found to be suitable for this research due to several reasons. First, it works well with small sample sizes. Second, the research model contains formatively and reflectively measured constructs, which can easily be incorporated. Using formative measurement models is more difficult with CB-SEM. Third, the research model is quite complex, i.e. it consists of many constructs [24, 26].

Each factor of the research model is measured on a seven-point Likert scale, in which one indicates *strongly dis*agree and seven indicates *strongly agree*.

The Likert scale is an ordinal scale, which has ranked attributes [27]. SEM requires equidistant scales and therefore, researchers have to give special attention to coding, i.e. on a typical five-point Likert scale the distance between categories one and two has to be same as between categories three and four. When the Likert scale is modeled

symmetric and equidistant, it acts more like an interval than like an ordinal scale [24]. A seven-point Likert scale is chosen because most previous MPA studies used this type of scale and hence, results can be compared. Furthermore, it is expected that some participants truly have a neutral opinion towards certain measurement items and therefore an odd-numbered scale is chosen.

Of the 12 constructs used in this study, four are measured formatively (UPE, FC, PR, PC) and eight are measured reflectively (HPE, EE, SI, PS, trust, cost, PI, BI) [24].

3.4. Target Audience and Data Collection

The basic population in this study is Austrian consumers from age 15 upward who have the physical and cognitive abilities, as well as the necessary resources (a bank account and a mobile phone), to use MP. A partial survey was conducted, using quota sampling. It is based on a percentage composition of certain structural characteristics of the basic population, e.g. age or gender [28].

As of January 2018, 8,822,267 people were living in Austria, of whom 49.18% were male and 50.82% female; 5.06% were between 15 and 19 years old, 6.16% between 20 and 24 years, 13.63% between 25 and 34 years, 36.12% between 35 and 59 years, and 24.60% over 60 years. The other 14.43% are children under 15, who are not relevant for this research [29].

It is hard to tell how many of these people really have the cognitive abilities and necessary resources to use MP but it can be expected that many older consumers do not (due to the increased likelihood of diseases like dementia, the non-possession of a bank account or mobile phone, etc.). Nevertheless, the goal was to include all age categories from age 15 upwards and to achieve an almost equal distribution between men and women.

Following the 10 times rule by [30], the sample size needs to be 10 times as large as the maximum of exogenous constructs pointing towards a certain endogenous construct. In this case, BI is the endogenous construct with the most predictors (12, including age). Therefore, a minimum sample size of 120 is required. As it was expected that some submitted questionnaires could not be used for the analysis, we aimed for 150 completed and valid questionnaires.

The final survey was released on 29^{th}May 2018 and was distributed online. This choice was made due to several reasons. First, videos can be included in the survey and it supports fast and cheap data collection [31]. Moreover, the collected data can immediately be used for further analysis without the need to enter responses manually

into a computer program. Google Forms was used as a survey tool. The aim of 150 responses was able to be reached on 12^{th} June 2018 and in the end, 97 English and 77 German questionnaires (174 completed surveys) were able to be obtained.

3.5. Data Analysis

Table 1 shows a results summary of the reflective measurement models' evaluation. To conclude, all reflective constructs and their indicators fulfill the requirements of internal consistency reliability, convergent validity, and discriminant validity.

Table 1: Results Summary Reflective Measurement Models.

Reflective Construct	Indicator	Internal Consistency Reliability		Convergent Validity		Discriminant Validity			
		Cronbach's Alpha	Composite Reliability	Outer Loadings	AVE	Outer Loading > Cross-Loadings	Fornell-Larcker Criterion	HTMT < 0.90	HTMT Confidence Interval Does Not Include 1
BI	BI1	.954	.970	.963	.916	yes	yes	yes	yes
	BI2			.968		yes			
	BI3			.940		yes			
HPE	HPE1	.831	.898	.936	.747	yes	yes	yes	yes
	HPE2			.896		yes			
	HPE3			.749		yes			
EE	EE1	.814	.888	.875	.727	yes	yes	yes	yes
	EE2			.881		yes			
	EE3_R			.799		yes			
Cost	Cost1	.704	.834	.717	.630	yes	yes	yes	yes
	Cost2			.723		yes			
	Cost3			.923		yes			
PI	PI1	.828	.897	.855	.743	yes	yes	yes	yes
	PI2			.869		yes			
	PI3			.862		yes			
SI	SI1	.879	.925	.871	.803	yes	yes	yes	yes
	SI2			.911		yes			
	SI3			.907		yes			
PS	PS1	.849	.908	.768	.767	yes	yes	yes	yes
	PS2			.912		yes			
	PS3			.938		yes			
Trust	Trust1	.921	.950	.911	.864	yes	yes	yes	yes
	Trust2			.949		yes			
	Trust3			.928		yes			

3.6. Hypotheses Testing

3.6.1. Direct Effects

To test the hypotheses that propose direct relationships, the path coefficients and the results of the bootstrapping procedure are used. Table 2 summarizes the results and shows that H_4, H_{10}, H_{13}, H_{17}, H_{19}, H_{26}, H_{28}, H_{31}, $H_{32,}$and H_{34} have to be rejected. $H_{25,}$which proposes a positive impact of trust on BI,represents an interesting case. While the analysis can confirm the significance of this relationship, it is not positive (as hypothesized) but negative instead. All other hypotheses can be supported.

Note: Behavioral Intention (BI), Effort Expectancy (EE), Facilitating Conditions (FC), Hedonic Performance Expectancy (HPE), Privacy Concerns (PC), Perceived Risk (PR), Perceived Security (PS), Personal Innovativeness (PI), Social Influence (SI), Utilitarian Performance Expectancy (UPE). Supported Alternate Direction (SupportedAD)

H_{24} proposes the impact of UPE on BI to be stronger than the influence PC exerts on BI. Looking at the path coefficient, it can be observed that PC shows a slightly stronger impact than UPE. Hence, H_{24} is rejected. To evaluate H_{29} and H_{30}, the mean of the answers given to the questions about trust towards seven different types of MP providers are evaluated. Trust in banks is higher than in any other kind of institutions, thus confirming H_{29}. Furthermore, trust in companies from Austria is higher than in companies from outside Europe. Even a small company from Austria is trusted more than a globally acting company from outside Europe. Comparing trust in globally acting and small companies from outside Europe trust in the former is higher. Therefore, H_{30} can partly be confirmed.

3.6.2. Final Empirical Model

Figure 7 shows the revised empirical model including the R^2 values of the endogenous constructs, as well as the path coefficients and their significance. It can be observed that the R^2 value of BI dropped from .691 in the original model to .680 in the revised version. But this is no surprise since several relationships from exogenous constructs to BI were deleted and this usually decreases the R^2 value [24, 32]. Another important change from the research model to the final empirical model concerns PR: it is no longer an endogenous construct, since the path pointing towards it had proven to be insignificant. Furthermore, the importance of trust as a predictor of BI has dropped since all other variables impacting BI exert a greater effect.

Table 2: Direct Relationships and Hypotheses Tests Summary.

Hypothesis	Exogenous Construct	Endogenous Construct	Relationship	Effect	p-Value	Decision
H_1	UPE	BI	Positive	.141	.023	Supported
H_2	UPE	HPE	Positive	.431	.000	Supported
H_3	HPE	BI	Positive	.209	.001	Supported
H_4	EE	BI	Positive	-.078	.225	Rejected
H_5	EE	UPE	Positive	.270	.000	Supported
H_6	EE	HPE	Positive	.145	.028	Supported
H_7	SI	BI	Positive	.134	.012	Supported
H_8	SI	UPE	Positive	.275	.001	Supported
H_9	SI	HPE	Positive	.152	.016	Supported
H_{10}	SI	PR	Positive	.164	.065	Rejected
H_{11}	SI	Trust	Positive	.131	.039	Supported
H_{12}	SI	PS	Positive	.256	.000	Supported
H_{13}	FC	BI	Positive	.121	.092	Rejected
H_{14}	FC	EE	Positive	.625	.000	Supported
H_{15}	PR	BI	Negative	-.290	.001	Supported
H_{16}	PR	PS	Negative	-.376	.000	Supported
H_{17}	PR	Trust	Negative	-.101	.267	Rejected
H_{18}	PR	UPE	Negative	-.440	.000	Supported
H_{19}	PS	BI	Positive	.141	.094	Rejected
H_{20}	PS	Trust	Positive	.325	.000	Supported
H_{21}	PC	BI	Negative	-.145	.019	Supported
H_{22}	PC	PS	Negative	-.312	.000	Supported
H_{23}	PC	Trust	Negative	-.292	.003	Supported
H_{25}	Trust	BI	Positive	-.184	.004	SupportedAD
H_{26}	Trust	UPE	Positive	-.051	.490	Rejected
H_{27}	Trust	HPE	Positive	.155	.016	Supported
H_{28}	Trust	EE	Positive	-.067	.282	Rejected
H_{31}	Cost	BI	Negative	.018	.783	Rejected
H_{32}	Cost	Trust	U-shaped	.017	.817	Rejected
H_{33}	PI	BI	Positive	.195	.004	Supported
H_{34}	PI	EE	Positive	.145	.055	Rejected

A comparison of the model by Khalilzadeh et al. [23] and the one developed in this study is presented in Figure 8. It can be observed that several paths of the basis model have proven to be insignificant in this study, e.g. PS BI. Moreover, many newly hypothesized relationships have been found significant, e.g. PI BI. The importance of all endogenous constructs from the basis model, which were also used in this analysis (PR, SI, EE, FC, PS, Trust, UPE, HPE), could be confirmed. Regarding the moderators, this analysis only found significant age but no gender and experience differences.

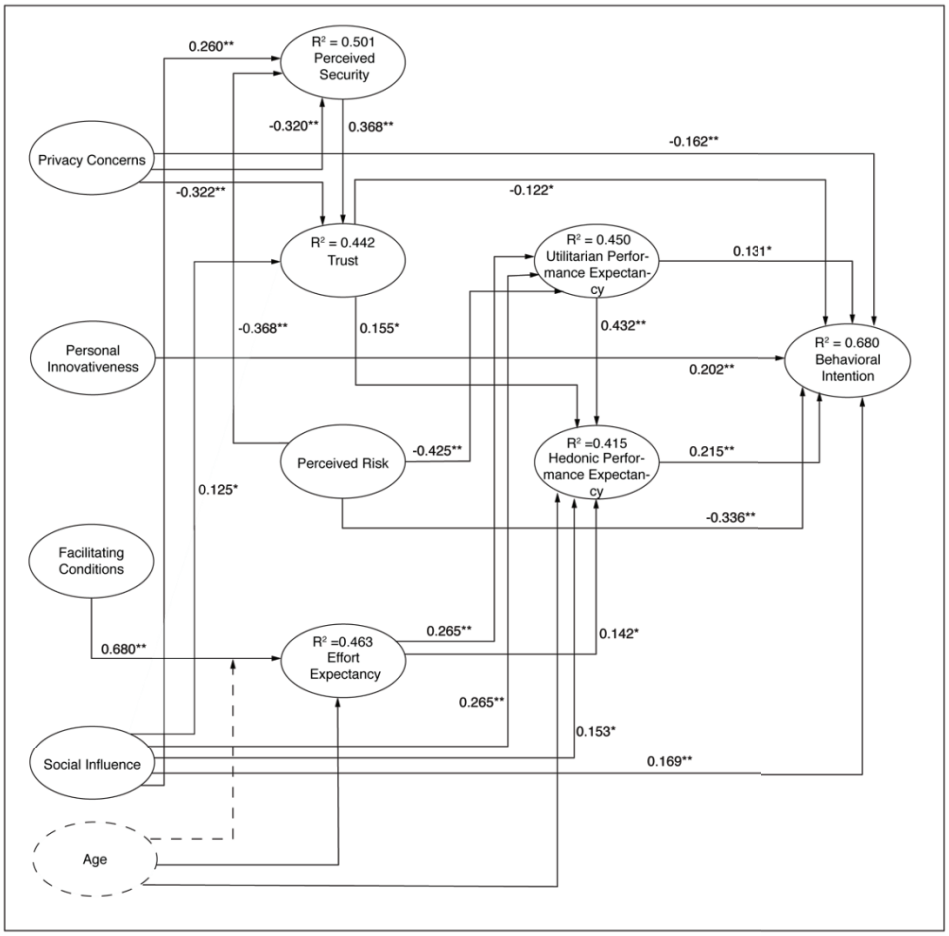

Figure 7: Revised Empirical Model. Dashed circle and arrow: moderating variable and relationship; ** significant at .01, * significant at .05.

Red dots and lines: significant relationships and constructs in Khalilzadeh et al. [23] but not in this study; green dots and lines: significant relationships in this study but not in Khalilzadeh et al. [23]; yellow dots: the two constructs and their relationships are one in Khalilzadeh et al. [23]; black constructs and lines: significant in Khalilzadeh et al. [23] and in this study; dashed circle and arrow: moderator variable and relationship.

4. Discussion

The model used in this study is able to explain 68% of the variance in consumers' intention to use MP. Although this is less than in the model presented by Khalilzadeh et al. [23], it is still higher than in many MPA models that built on UTAUT or UTAUT2, e.g. the ones developed by Koenig-Lewis et al. [33] and Teo et al. [34]. Furthermore, this study found support for privacy as a distinct factor, which is contrary to UTAUT2 and Khalilzadeh et al. [23]. Both models were developed in the US, which allow certain data

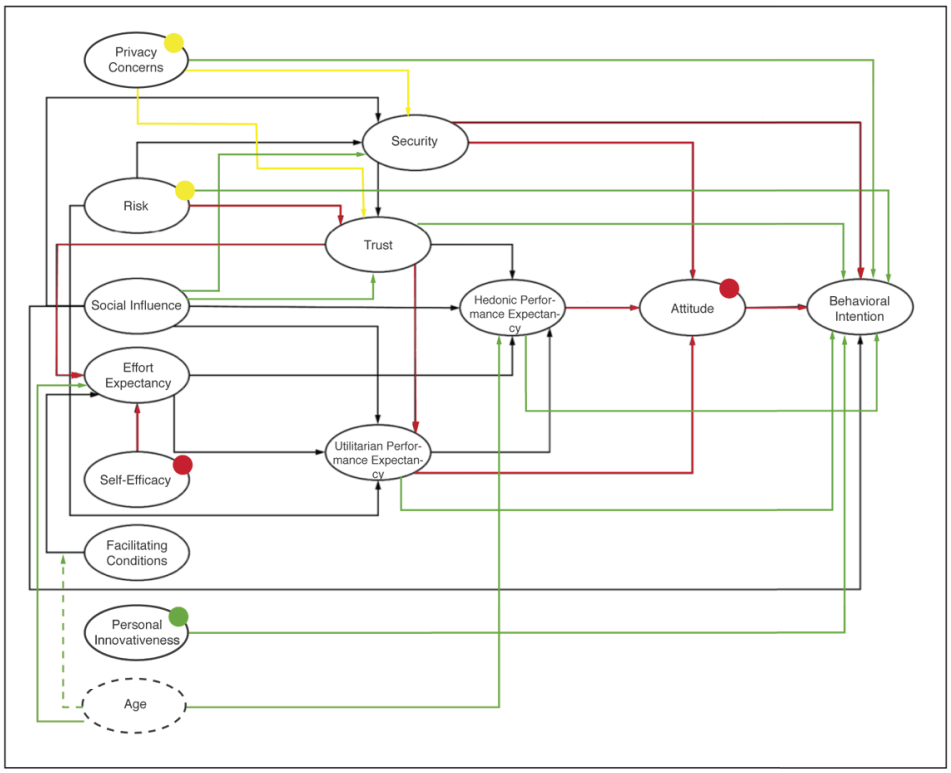

Figure 8: Comparison Constructs and Paths of Empirical Models. Adapted from "Security-Related Factors in Extended UTAUT Model for NFC Based Mobile Payment in the Restaurant Industry" [23].

practices not allowed in Europe, e.g. automated processing of personal information [35]. Furthermore, with the General Data Protection Regulation, the European Union has shown that it takes data privacy and security very seriously. Therefore, the model presented in this study can be seen as a European perspective on MPA.

Interestingly, of the three strongest drivers of BI, two are not part of UTAUT2. This is contrary to expectations, as usually UPE is found to be most important in MPA studies. It implies that traditional technology acceptance models need to be adapted to capture special aspects of a technology, its usage environment, and users.

The most crucial factor influencing BI in this study is PR. Usually it is less important than PU, e.g. in Koenig-Lewis et al. [33] and Pham and Ho [36]. Interestingly, the risk aspect that was most important to participants was psychological risk, which was the risk dimension with the least impact in Featherman and Pavlou [37]. The findings indicate that the potential risk of MPA is of great importance to Austrian consumers. They will not start using MP if they perceive this technology as incompatible with their self-image. This suggests that MP is more than just a way to pay for goods and services. It is also part of a certain lifestyle and a way to express one's personality.

The second most important driver is HPE, which is in line with Morosan and DeFranco [38] who found HM to be the second most important factor (but after PE) and contradictory to Oliveira et al. [39] who did not find support for the impact of HM on BI at all. The findings suggest that consumers are greatly interested in the joy derived from using MP. This may be because people associate smartphones with fun due to several features and services, e.g. games. Mobile phones offer many more possibilities to create an enjoyable and even (positively) surprising payment process than other forms of payment and it seems that consumers are aware of this fact and demand an enjoyable MP solution.

PI was found to be the third most important driver of BI, which supports the results of Tan et al. [2] and Pham and Ho [36]. But contrary to Kim et al. [40] and Oliveira et al. [39], this study did not find PI to impact EE/PEU, suggesting that it is not important if consumers are interested in new technologies in order to perceive MP as easy to use. Maybe this is due to the fact that most study participants have never used MP before and therefore might be reluctant to claim that MP is easy to use (since they have never experienced it firsthand), even if they consider themselves as innovative.

SI is of particular importance since it does not only drive BI but also PS, trust, UPE, and HPE. It shows that Austrian consumers are inclined to adopt MP if people whose opinions they value recommend it to them. As such it is in line with many previous studies, e.g. Koenig-Lewis et al. [33] and Oliveira et al. [39], but contrary to Shin [41] and Teo et al. [34]. Furthermore, the impact of SI on trust shows that if potential adopters' social environment values and recommends MP, they are more inclined to trust MP providers. This is in line with Liébana-Cabanillas et al. [42]. Additionally, the effects on PS, HPE, and UPE support the findings of Khalilzadeh et al. [23] and show that if close friends or relatives have a high opinion of MP, potential adopters perceive MP as more secure, more fun to use, and offering more utilitarian benefits..

PC were found to negatively impact BI, suggesting that the more people worry about the handling of their personal information when using MP, the less likely they are to plan to use it. This is in line with Bailey et al. [43] who also found privacy to impact BI. Additionally, PC have a negative impact on PS. In line with Johnson et al. [44], this shows that if consumers fear for their privacy when using MP, they also perceive the solution as less secure. Furthermore, PC lower trust in the MP provider. To the authors' best knowledge, no other MPA study has included this path.

UPE positively impacts BI, which supports the results of many previous MPA studies, e.g. Kim et al. [40] or Abrahão et al. [45]. But similarly to Tan et al. [2], it is of lower

importance than other constructs. The UPE dimension that is most important to consumers is convenience, followed by time. Both were also found to be crucial in other MPA studies, like Chen and Nath [46] or Ozturk et al. [47]. Moreover, UPE was found to be the strongest driver of HPE, which confirms the findings by Khalilzadeh et al. [23] and suggests that if MP solutions appear useful to consumers, there is a higher probability that they are also perceived as being fun to use.

The last construct that was found to have an impact (albeit rather weak) on BI is trust. Contrary to expectations, it does not have a positive but a negative impact, i.e. a higher level of trust in MP providers leads to a lower intention to use MP. This finding is surprising and contradicts previous MPA studies, where trust has been a positive driver, e.g. Arvidsson [48] or Ooi and Tan [10]. In general, MP giants such as Google and Apple are not really trusted by participants in this study. Still, most people in Austria possess an Android or iOS smartphone [49][?], suggesting that consumers use the products of Apple and Google although they do not trust them. This could explain why trust is of marginal importance (of all the relationships trust BI is the weakest). But to explain why the influence is negative, further research is necessary. In line with Khalilzadeh et al. [23], trust was found to positively impact HPE, suggesting that a higher level of trust increases consumers' expectations about the fun of using MP. On the other hand, the impact of trust on UPE could not be confirmed, which supports Chandra et al. [16]. It suggests that it is not important for consumers to trust MP providers in order to perceive an MP system as useful. This may be due to the fact that UPE comprises observable benefits of MP (e.g. the possibility to leave cash and cards at home), which consumers can acknowledge even if they do not trust MP providers.

The direct impact of EE on BI could not be confirmed in this study, which supports the results of Pham and Ho [36] and Liébana-Cabanillas, Marinkovic, et al. [50]. It implies that in order for consumers to intend to use MP, it does not matter whether or not they perceive it as easy to use. Koenig-Lewis et al. [33] suggested this might be due to the fact that young people in particular are experienced with using smartphones for various purposes. Therefore, the impact of EE/PEU is not as strong as in the case of a completely new piece of technology [51]. As most participants in this study were rather young, this argument seems plausible. Consistent with Khalilzadeh et al. [23], EE was found to positively impact HPE and UPE. This indicates that if consumers perceive the usage of MP as easy, they are also more likely to see MP as useful and fun to use.

In line with Khalilzadeh et al. [23], PS was found to positively influence trust, suggesting that if consumers perceive an MP system as secure, there is a higher probability that they trust the respective MP provider. As opposed to Khalilzadeh et al. [23] and

contrary to expectations but in line with Morosan and DeFranco [38], PS was not found to drive BI, indicating that consumers' PS of the MP system is not important for them when deciding about whether to use it. A possible explanation is that they expect MP systems to be secure as many MP providers promote this aspect [?].

FC was found to be a strong predictor of EE, which is in line with Khalilzadeh et al. [23] and shows that if individuals believe there are favorable conditions when they use MP they also perceive it as easier to use. But contrary to predictions, FC was not found to drive BI. Venkatesh et al. [21] noted that if UPE and EE are present in a model, FC becomes insignificant in predicting BI. This may be a reason for the non-significant relationship in this study. Knowledge and compatibility with technologies that have already been used were the two dimensions that mattered most to study participants. This supports the findings of previous studies, which have found knowledge [40] and compatibility [54] to drive EE/PEU. Among all the relationships in the model, FC EE is the strongest, indicating the factor's importance.

Contrary to predictions but in line with Tan et al. [2] and Abrahão et al. [45], no significant impact from cost on BI could be observed. Furthermore, cost does not impact trust. These findings indicate that the costs for using MP do not influence consumers' intention to adopt MP or their trust towards the MP provider. Kleijnen et al. [55] noted that cost plays a marginal role as long as the service is of high quality and Leong et al. [56] stated that as long as the costs of using MP are relatively low, they are not important in order for consumers to decide to use MP. As many MP solutions in Austria can be used for free or a small fee, this might be the reason why cost was not important in this study.

Age was found to moderate the FC EE relationship, which was not hypothesized and neither found to be significant by Khalilzadeh et al. [23]. The results suggest that this relationship is much stronger for people over 35 than for consumers under 25, i.e. older (much more than younger) consumers perceive an MP system as easy to use if FC are given. To the authors' best knowledge, no past MPA research has found the same result. A reason may be that older consumers did not grow up with the Internet and mobile devices. In absence of past experiences with MP systems, they still think of MP as being easy to use if they have already used similar technologies, get support from others, and have theoretical knowledge about the system. For younger consumers these aspects may not be as relevant, as they are more familiar with the technology. The non-significant age differences for the SI BI and PS BI relationships are contradictory to Khalilzadeh et al. [23] and indicate that SI is equally important to consumers of all age group, whereas PS BI is not important at all. Age was found

to affect EE with the explained variance being lower for consumers under 25 than for people over 35. As FC is the only exogenous construct impacting EE and this relationship has already been found to be more important to older consumers, this result is not surprising. What is more interesting is the impact of age on HPE. The explained variance for people over 35 is higher than for people between 26 and 35, suggesting that the hedonic aspect of MP is much more present in the case of older consumers. A reason for this may be that older people are not used to many mobile technologies and therefore perceive MP as fun to use whereas it is not so exciting for younger consumers who have already seen lots of similar apps.

No significant gender and experience differences could be found. But as in both cases partial measurement invariance could not be established, the results are not meaningful. However, in the case of gender, the present research is in line with many previous studies, which did not find this factor to be important either, e.g. Shin [41] and Leong et al. [56]. But it contradicts Khalilzadeh et al. [23]. Leong et al. [56] ascribed the lack of gender differences to the higher level of gender equality and equal access to education – which can also be attributed to Austria. Furthermore, there are no real gender differences in smartphone usage in Austria: women and men use the mobile Internet equally [57] and shop more mobile [58]. This may be the reason why no gender differences could be found in this study.

As for experience, the results are contradictory to past research, e.g. Leong et al. [56] and Khalilzadeh et al. [23] who found this moderator to be of importance. But as already noted, the majority of study participants have never used MP before and therefore more data is necessary to conduct a thorough analysis and get meaningful results.

The empirical study used the same dependent variable as Khalilzadeh et al. [23], BI, and the results confirmed the importance of the following factors also found to be relevant by Khalilzadeh et al. [23]: HPE, UPE, trust, PS, SI, EE, FC, and PR. PR was further separated into PR and PC, both of which were found to drive BI. Of the two added factors, PI and cost, PI was found to be crucial, whereas the importance of cost could not be confirmed. Regarding the three moderators proposed by UTAUT2 and Khalilzadeh et al. [23], only age was found to make an impact, whereas gender and experience did not have an effect. It can be concluded that HPE, UPE, trust, PS, SI, EE, FC, PR, PC, PI, and age influence consumers' acceptance of MPA in Austria.

5. Conclusion

This study is among the first (2018) to empirically examine MPA in Austria. As opposed to previous research in this field, the present study thoroughly compared different user acceptance models to find the most appropriate one to study MPA. UTAUT2 was identified as the best starting point but still needed to be expanded to cover the most important characteristics of MP.

The importance of 11 of the 12 tested constructs could be supported in the empirical part, among them all examined UTAUT2 constructs (BI, UPE/PE, HPE/HM, EE, FC, and SI). With 68% explained variance in BI, this model achieved one of the highest values in the MPA research area.

PC and PR were found to be crucial for Austrian consumers, making the model a great fit to Europe's emphasis on privacy and the two factors, as well as PI and PS, potential extensions of UTAUT2. This study incorporated the three constructs PC, PR, and PS as separate factors and found support for all of them. Moreover, this study incorporated HPE and FC, which had often been neglected in past MPA research. Both have been found to be important, with HPE being the second strongest driver of BI and FC exerting the strongest impact on another construct in the whole model. Furthermore, to the authors' best knowledge no other study found PR as the strongest driver of BI and HPE to be more important than UPE. In addition, the negative impact of PC on trust and the moderating impact of age on the FC EE relationship are unique contributions.

This research showed that MPA is a complex field with many different factors playing an important role. It needs to be investigated holistically by considering aspects of the technology itself (UPE, EE, HPE), the impact of other people (SI), existing/non-existing FC, the image of MP and MP providers (PS, trust), people's fears and concerns (PR, PC), but also their personality (PI) and demographic factors (age). Moreover, this study showed that cost, gender, and experience are not important for Austrian consumers.

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