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Innovativeness Impact on Attitude Development Towards Mobile Payment Applications

Gökhan Aydın, Istanbul Arel University, Turkey
Şebnem Burnaz, Istanbul Technical University, Turkey

The purpose of this study is to understand the effect of innovativeness on consumer attitudes towards mobile payment systems. The mobile wallet application of one of the mobile network operators in Turkey was chosen as the setting of the study and used as a proxy of the mobile payment systems. A model was developed based on TAM and technology acceptance literature. Survey methodology was used to collect data from subscribers of the mobile network provider. A total of 666 questionnaires were collected from subscribers that downloaded the mobile wallet using stratified random sampling and computer aided telephone interview. In the analysis, the relations between the constructs as well as their effect on attitudes were explored. The findings highlight the importance of personal innovativeness in attitude development. In addition, security concerns were found to affect attitude development to a smaller extent compared to other constructs such as perceived usefulness and ease of use. Effect of social influence was found to be insignificant among the users which may be attributable to the generally limited use of mobile payment systems.

Introduction

Digital change is shaping both the ways companies deal with their business as well as the attitudes of consumers towards those companies. In this new era of change, mobile devices have become one of the most successful consumer products ever and became one of the basic necessities in nearly all developed and developing countries. Mobile commerce is triggered by the proliferation of mobile devices, which offer new experiences to consumers in their interactions with the companies and their products. The popularity of mobile devices is on the rise around the world and the mobile traffic is replacing desktop reach. According to a research by ComScore (2014), 60% of the consumers in the US prefer mobile devices as the primary method of access to the Internet. Moreover, 65% of the emails are opened on mobile devices (Burdge, 2014). As of June 2015, 28.4% Internet page views have originated from mobile devices in Turkey and time spent on mobile devices increased by 115% annually between June 2015 and 2014 (IAB Turkey, 2015).

The popularity of the mobile devices may be attributed

to their ever present access to various types of services (communication, access to information, entertainment, commerce etc.). Mobile devices are also being utilized in purchasing transactions through mobile payment prospects. In this context mobile payment (MP) can be defined as “payments for goods, services, and bills with a mobile device such as mobile phone, smart-phone, etc. by taking advantage of wireless and other communication technologies” (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008). Consequently, MP can be viewed as an alternative method of payment to the popular credit cards and cash. In line with the continuing popularity of mobile devices and rapidly developing mobile commerce, MP systems are expected to be important actors (Ondrus & Pigneur, 2006).

Turkey, with over 78 million residents, is an attractive and young developing market with half of the population aged under 30. There are around 72 million mobile subscribers corresponding to 92.9% penetration rate as of 2015 Q2. This penetration rate exceeds 100% when the population aged 0-9 are excluded (ICTA, 2015). In terms of mobile applications, the market is booming and ranks among the most rapidly growing markets with a 60% increase rate in app downloads (App Annie & MEF, 2014). In line with high levels of mobile penetration, the mobile payment systems, a relatively new product, is also getting the attention of Turkish mobile users. Currently, all the three mobile operators in the country offer mobile payment systems, first of which was launched in 2009.

Mobile Wallets as Mobile Payment Systems

The popularity of the mobile devices may be attributed to their ever present access to various types of services (communication, access to information, entertainment, commerce etc.). Mobile devices are also utilized in purchasing process through mobile payment prospects. In this context mobile payment (MP) can be defined as “payments for goods, services, and bills with a mobile device such as mobile phone, smart-phone, etc. by taking advantage of wireless and other communication technologies” (Dahlberg et al., 2008). Consequently, MP can be viewed as an alternative method of payment to the popular credit cards and cash. In line with the continuing popularity of mobile devices and rapidly developing mobile commerce, MP systems are expected to play an important

role in related transactions (Ondrus & Pigneur, 2006).

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Theoretical Foundations

Among the models on user motivation and behaviour focusing on explaining the adoption of new systems and new technology services in the literature, theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), theory of planned behavior (TPB) (Ajzen, 1991), technology acceptance model (TAM) (Davis 1989) and Unified Theory of Acceptance and Use of Technology UTAUT (Venkatesh et al. 2003) appear as the major models in extant literature. TRA accepts behavioural attitude and subjective norms (social influence) as the major factors affecting behavioural intention (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975). TRA is later modified and further developed into TAM by Davis (1989). In TAM, an individual's intention to adopt and use a new information technology (IT) is accepted to be determined by two factors, perceived usefulness and perceived ease of use. TAM is probably the most widely used model in studies explaining adoption of new technology and information systems. This popularity among researchers has led to extensions of this model to include other constructs. Consequently, UTAUT was developed founded upon TAM, TRA and TPB. In this model effort expectancy, performance expectancy, social influence and facilitating conditions are considered as factors affecting behavioral intention. Extant research on MPs have utilized all these aforementioned models. Unfortunately, the applied studies on these well-established foundations are scarce and have limitations regarding sampling. This creates a research gap that need to be addressed to confirm findings which are sometimes contradictory. Among major relevant studies Pousttchi and Wiedemann (2007)'s study on MP use intentions found performance expectancy, effort expectancy, facilitating conditions and social influence as significant factors affecting intentions. Taking a different approach Chen and Nath (2008) found perceived transaction speed, transaction convenience, compatibility, security and privacy concerns as significant antecedents of adoption. In a similar study by Shin (2009), perceived security, social influence, trust and basic TAM constructs were found to affect users' attitudes

towards mobile wallets. Similarly, Liébana-Cabanillas et al. (2014) found the ease of use, external influences, usefulness, risk, and costs as significant predecessors of attitudes in mobile payment systems context. Another study of note is Yang et al. (2012), which incorporated personal innovativeness and found it to be affecting adoption of MPs. All these factors from the major theoretical models and empirical studies are incorporated into the proposed model and each factor is summarized below in detail.

Personal innovativeness (INOV)

Innovativeness refers to the extent to which a customer adopts an innovation earlier than other customers depending on the diffusion of innovations theory (Rogers, 2003). Personal innovativeness, similarly, denotes the inclination of an individual to try out new products and technologies (Agarwal and Prasad 1998; Chang et al. 2005). INOV was found to affect adoption behavior of various innovations in IT systems (Agarwal and Prasad 1998; Chang and Chin 2011). Moreover, it was found to be an important factor positively affecting behavior in online shopping environments (Blake, Neuendorf, & Valdiserri, 2003). Individuals with high INOV are more curious, dynamic and they are more open to trying new things (Kim et al. 2010). MP systems are new technology systems that have not gained mass adoption yet and are in their initial life stages. Therefore, personally innovative customers are expected to develop a more positive attitude towards this new service. Moreover, personally innovative users will have a more profound knowledge of the capabilities of the system and will most likely use it more effectively. Lastly, some of the security concerns regarding the use of MP systems may be addressed by individuals with high INOV that tend to be more curious, and collect more knowledge than their peers.

H₁: Personal innovativeness has a positive effect on perceived ease of use of the mobile payment system
H₂: Personal innovativeness has a positive effect on perceived usefulness of the mobile payment system
H₃: Personal innovativeness has a positive effect on perceived security of the mobile payment system
H₉: Personal innovativeness has a positive effect on attitudes towards mobile payment system

Perceived Ease of Use (EOUS)

The perceived ease of use refers to the individual's perception that using a certain system is effortless or simply easy to do (Davis, 1989). If a system is perceived as easy to use, it provides more usefulness to its users. (Davis, Bagozzi, & Warshaw, 1992). According to extant literature, users' perceptions of a technological system as easy to use positively affects their attitude towards that system and their use intentions (i.e. Gefen, Karahanna, & Straub, 2003; Oum & Han, 2011; Teo, Lim, & Lai, 1999). In MP systems, especially in mobile wallets, EOUS should be established in a superior way than comparative payment systems such as

credit and debit cards. Payment made by using mobile phones with a few touches on the screen can offer ease of use if implemented properly. This factor was found to be one of the most important elements of MPs in providing value (Dahlberg & Mallat, 2002; Ovum, 2012). These observations led to development of the following:

H4: Perceived ease of use has a positive effect on perceived usefulness of the mobile payment system

H5: Perceived ease of use has a positive effect on attitudes towards mobile payment system

Perceived Compatibility (COMP)

Compatibility, in the context of MP, is defined as the degree to which MP systems are compatible with the values, experiences and behavioral patterns that consumers already have (Lu, Yang, Chau, & Cao, 2011; Schierz, Schilke, & Wirtz, 2010). For instance, individuals choosing cash as their preferred payment method will have low compatibility with the notion of using MP systems. Consequently they will develop a negative attitude towards these systems (Shatskikh, 2013). Previous studies on technology adoption has shown positive effects of COMP on attitudes towards using a technology and perceived usefulness (Hardgrave, Davis, & Riemenschneider, 2003; Schierz et al., 2010). We expect people's lifestyles to affect their view towards MP services and therefore COMP is expected to affect consumer's attitudes (Kim et al. 2010; Lu et al. 2011):

H6: Perceived compatibility has a positive effect on perceived usefulness of the mobile payment system.

H7: Perceived compatibility has a positive effect on attitudes towards mobile payment system.

Perceived Usefulness (USEF):

Lack of a clear understanding of the benefits presented by the MP systems is considered among the main reasons for the slow adoption of MP systems (Shatskikh, 2013). The usefulness offered by a new technology is operationalized under USEF construct in the literature. A user's intention to use a new technology is based on his or her perception of the USEF of that technology (Davis 1989). Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her performance" (Davis 1989). In other settings, USEF indicates that "the use of a given technology should be useful for someone in achieving a particular result" (Vijayasathy, 2004). When an individual finds something to be useful he or she develops a positive attitude towards it and uses the system to reap the benefits. USEF of a service is among the key factors shaping attitudes and explaining intention to adopt the service (Davis 1989; J. Kim and Lee 2011; Leng and Lada 2011; Malhotra et al. 2008). It has been seen that customers mention new payment solutions as valuable and useful if their lives would become easier. This construct incorporates mostly the performance, quality (in use), (Davis 1989; Moore and Benbasat 1991) and mobility (use location

and time) factors (Arvidsson, 2013). This factor is incorporated into the study with the following hypothesis:

H8: Perceived usefulness has a positive effect on attitudes towards mobile payment system.

Perceived Security (SECU)

Security concerns regarding the use of mobile payment systems appears as one of the most important factors affecting attitudes (Linck et al. 2007; Shatskikh 2013). MP industry includes a high number of parties such as banks, small merchants and large telecommunication operators that can lead to concerns among users. Albeit the use of various technologies to provide high-level of security in MP systems and transactions (Crowe & Tavilla, 2012), the users' perception of the security of MP systems creates a significant barrier to adoption of MP systems (Kim et al. 2010; Linck et al. 2007; Ovum 2012). Losing the mobile phone and identity theft are among the concerns of the users in using MP systems (Gross, Hogarth, & Schmeiser, 2012). The mobility and portability of mobile devices unfortunately make them more vulnerable to loss and theft leading to such concerns. Accordingly we hypothesize that SECU of MP system will have a positive effect on attitudes:

H10: Perceived security has a positive effect on attitudes towards mobile payment system.

Social Influence (SOCI)

The beliefs of the people important to an individual affect her or his intention to behave in a particular way, which is a postulations of TRA that gave rise to subjective norms and social influence concepts (Ajzen & Fishbein, 1980). In MPs, this effect can be defined as the degree to which individuals' social environment (peers, friends, family etc.) perceives MP systems positively (Schierz et al., 2010). This concept emphasized the role of the peer and social group's opinions on an individual's attitudes and intentions (Fishbein & Ajzen, 1975, p. 302). Empirical evidence confirming this assumption was found in the literature on new technology systems and services settings (Hu et al. 2011; Leng and Lada 2011; Taylor and Todd 1995; Venkatesh and Davis 2000). Accordingly, this factor is expected to affect attitudes towards MP systems and the following hypothesis is proposed:

H11: Social influence has a positive effect on attitudes towards mobile payment system

Methodology

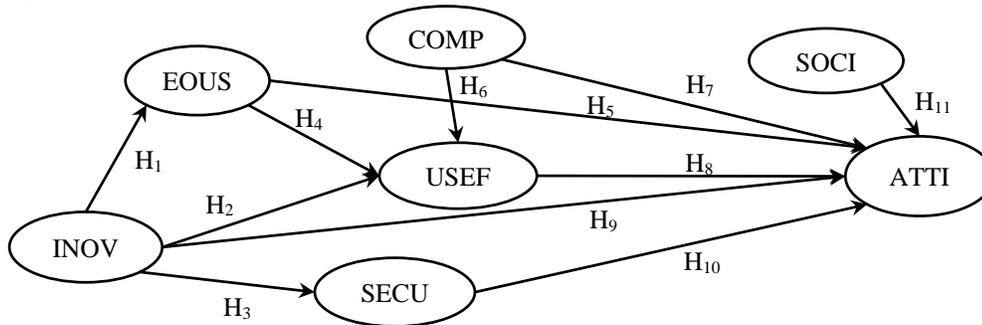
To understand the overall attitudes towards MP systems and their antecedents, the mobile wallet application of one of the major mobile network operators in Turkey was chosen as a proxy of MP systems. The impacts of innovativeness as well as perceived usefulness, compatibility, perceived security of the payment system and social influence on attitudes are investigated. The utilized research model is

visualized in Figure 1.

In implementation stage, the respondents were asked to indicate the extent of their agreement on a five-point Likert scale (1=“strongly disagree” and 5=“strongly agree”) with a series of statements related to the variables in the research

model. The scales used in the study were translated from their original sources that are summarized in Table 1 to Turkish. Please refer to the studies provided in Table 1 to see the details of the items in each scale.

Figure1. Proposed Model



INOV: Personal Innovativeness, SECU: Perceived Security, EOUS: Perceived Ease of Use, COMP: Compatibility, USEF: Perceived Usefulness, SOCI: Social Influence, ATTI: Attitude

Table 1: Scales and Constructs

Construct	Items	Source(s)
Attitude	4	(Ajzen, 1991)
Compatibility	4	(Moore & Benbasat, 1991; Plouffe, Huland, & Vandenbosch, 2001)
Perceived Ease of Use	5	(Davis 1989; Venkatesh and Davis 2000)
Personal Innovativeness	6	(Agarwal & Prasad, 1998)
Perceived Security	5	(Luarn & Lin, 2005; Parasuraman, Zeithaml, & Malhotra, 2005)
Social Influence	4	(Ajzen 1991; Venkatesh and Davis 2000)
Perceived Usefulness	6	(Bhattacharjee, 2001; Van der Heijden, 2004)

Respondents were asked to indicate the extent of their agreement on a 5-point Likert scale (1 = “strongly disagree” & 5= “strongly agree”) with a series of statements related to the variables in the research model. The scales used in the present study are summarized in Table 1.

Data Collection and Sampling

Random sampling was used in the selection of the sample among a population of 54,000 registered downloaders of the mobile wallet application. One of the major global marketing research firms active in Turkey collected the data using computer-aided telephone interview (CATI) system. The ordering of the construct related questions was randomized to reduce the effect of respondent fatigue. A total of 666 questionnaires were collected and the partially completed and low-quality surveys (e.g. >95% of

questions coded in the same way) were eliminated. 640 valid questionnaires were available for analysis following this screening process. Sample demographics are presented in Table 2.

Table 2: Main Characteristics of the Sample

Demographic	Value	Frequency	%
N=640			
Age	18-24	190	30%
	25-32	263	41%
	33-47	163	25%
	48+	24	4%
Socio-Economic Status	A&B	226	35%
	C1&C2	375	59%
	D & E	39	6%
Gender	Male	589	91%
	Female	51	9%
Education	Elementary & Mid. School	87	14%
	High School	296	46%
	Bachelor	224	35%
	Masters & Doctorate	33	5%

Analysis & Findings

As a first step of the analysis, descriptive statistics were examined. The respondents considered themselves innovative with an average score of 3.95 for the INOV items. They have a

positive attitude in general towards the MP system (avg. of ATTI items: 3.78). They believe that it will be relatively easy to use and interact with the system (avg. of EOUS items: 3.85) and the system will offer superior / different uses and benefits compared to other payment methods (avg. of USEF items: 3.68). SOCI item scores' average was 2.66, which is below 3 and indicates that there is a tendency to ignore to some extent the thoughts of family, friends and other reference groups in terms of MP system use. This can be explained by the lack of wide-spread adoption of the system in Turkey. On compatibility, the average score was 3.44 indicating a positive perception. Finally, the security concerns of using MP systems was not severe and respondents on average (avg. SECU score: 3.48) consider the system to be more secure than insecure.

As another finding of descriptive analysis that affected further analysis was the detection of non-normality in the data. 29 out of 34 items showed significant Kurtosis and 24 items showed significant Skewness. Thus, partial least squares structural equation modeling (PLS-SEM), a SEM technique that does not require normality in distributions was selected to continue the analysis. (Henseler, Ringle, & Sinkovics, 2009).

As the first step of assessing SEM analysis, the validity and reliability of the measures were evaluated. The findings are

presented in Table 3 and contemplated below. First of all the internal consistency reliability of the model is tested using composite reliability (CR) and Cronbach's alpha (CA). The results provided in Table 3 show that CA and CR are higher than 0.7 threshold (Carmines & Zeller, 1979; Fornell & Larcker, 1981; Nunnally, 1978) for all the variables. Therefore, we conclude that the internal consistency reliability conditions are met. Convergent validity is evaluated using the outer loadings of the indicators and average variance extracted (AVE). The indicators' loadings on their own construct (outer loadings) were compared to loadings on other constructs (cross-loadings) to assess the discriminant validity. Following the initial analysis, a total of four indicators, one of each from EOUS, INOV and two from SECU constructs were left out of the analysis due to low outer loadings (Churchill, 1979). The loading data indicate that the loadings of items with their related constructs were higher than loadings with others for all the items. In addition, the square root of AVE was compared to the between-item-correlations (Fornell & Larcker, 1981). All the outer loadings and AVE were greater than 0.50. The inter-item correlations were lower than the square root of AVE. Consequently, the convergent and discriminant validity conditions are satisfied (Hair, Hult, Ringle, & Sarstedt, 2013).

Table 3: Construct and discriminant validity analysis

Latent Var.	AVE	CR	CA	Com-munality	Avg. inter-item corr.	ATTI	COMP	EOUS	INOV	SECU	SOCI	USEF
ATTI	0.850	0.958	0.941	0.850	0.420	0.922*						
COMP	0.650	0.880	0.816	0.650	0.408	0.615	0.806					
EOUS	0.619	0.867	0.796	0.619	0.381	0.654	0.505	0.787				
INOV	0.581	0.873	0.818	0.581	0.177	0.256	0.280	0.232	0.762			
SECU	0.608	0.860	0.796	0.608	0.350	0.570	0.497	0.447	0.225	0.780		
SOCI	0.752	0.924	0.890	0.752	0.273	0.388	0.447	0.379	0.070	0.393	0.867	
USEF	0.650	0.901	0.859	0.650	0.417	0.739	0.687	0.597	0.242	0.451	0.428	0.806

*The square root of average variance extracted is provided on the diagonal. AVE > 0.5; CR > 0.7; CA > 0.7

Following validity and reliability assessment, the PLS-SEM model was evaluated. Unfortunately there are no universal good-of-fit criteria for PLS-SEM models, consequently coefficients of determination (R^2), significance of the path coefficients and predictive relevance (Q^2) were used to evaluate the quality of the model (Hair et al., 2013).

R^2 of ATTI construct, the main variable in the analysis to be predicted, is 0.662. This indicates a high predictive accuracy for the model. The significant path coefficients excluding COMP -> ATTI path are all significant at 0.001 level again indicating a high level of predictive power (Hair et al., 2013). Stone-Geisser's Q^2 value (Geisser, 1974; Stone, 1974) was calculated using blindfolding, a sample reuse technique that omits every n^{th} data point of the indicators. Using 7 as omission distance Q^2 values were obtained as 0.561 for ATTI, which exceeds 0.350 threshold suggesting large predictive relevance for the model employed (Hair et al., 2013; Henseler et al., 2009).

According to the results of the analysis presented in Table 4, eight of the eleven hypotheses testing direct effects between constructs were supported. The expected effect of INOV on USEF and ATTI were not detected as well as SOCI's on ATTI. All the effects observed in the analysis were positive; consequently improvements in a construct improve the other related constructs. Largest significant direct effect on ATTI was observed in USEF construct followed by EOSU and lastly SECU constructs.

To be able to analyze the effects between constructs, the total effect of each construct on other constructs are calculated by adding indirect effects through other paths into the direct effects and presented in Table 4. Total effects lead to better evaluation of PLS-SEM analysis results and offer insights to marketing practitioners. When total effects were analyzed, only the effect of SOCI on ATTI was found to be insignificant. All the other relationships were significant. The total effect of INOV on ATTI and EOUS were significant albeit lack of any significant direct effects. In

accordance with the direct effects, the largest total effects on ATTI were observed in USEF and EOUS constructs. The other constructs of significance are COMP, SECU and INOV. COMP's effect on ATTI is partly generated by the

indirect effect through USEF construct. Similarly, the effect of INOV on ATTI originated from indirect effects through SECU, EOUS and USEF constructs.

Table 4: Direct Effects, Hypothesis Testing and Total Effects

Hypothesis	Path	Path Coeff. (Direct Effects)	St. Dev.	t- stat.	Hypot. Supported	Total Effect	St.Dev.	t-stat
H ₁	INOV->EOUS	0.232	0.044	5.245***	Yes	0.232	0.044	5.245***
H ₂	INOV->USEF	0.021	0.023	0.888	No	0.098	0.036	2.708**
H ₃	INOV->SECU	0.225	0.042	5.425***	Yes	0.225	0.042	5.425***
H ₄	EOUS->USEF	0.333	0.040	8.334***	Yes	0.334	0.04	8.334***
H ₅	EOUS->ATTI	0.259	0.038	6.844***	Yes	0.403	0.04	10.201***
H ₆	COMP->USEF	0.513	0.036	14.423***	Yes	0.513	0.036	14.423***
H ₇	COMP->ATTI	0.080	0.038	2.100*	Yes	0.302	0.04	7.552***
H ₈	USEF->ATTI	0.432	0.046	9.475***	Yes	0.432	0.046	9.475***
H ₉	INOV->ATTI	0.020	0.020	1.016	No	0.173	0.039	4.475***
H ₁₀	SECU->ATTI	0.223	0.033	6.728***	Yes	0.223	0.033	6.728***
H ₁₁	SOCI->ATTI	0.018	0.020	1.019	No	-0.020	0.028	0.718

* p ≤ 0.05; ** p ≤ 0.01; *** p ≤ 0.001

Conclusions

The present study carried out by one of the leading global market research companies in a large developing country offers a good point of reference for future studies and contribute to the theoretical understanding of consumer attitudes towards mobile payments. So far, there are no similar studies carried out in Turkey on this subject and studies in other countries are also scarce. This study offers a foundation for upcoming research in this area by using well-established scales validated in various settings.

Mobile payment systems in Turkey are in an infancy stage and their use is limited to a very small subset of mobile line subscribers. The attitude formation and related factors shaping attitudes among this group have important consequences for companies in mobile services, retail and other related business fields.

There are several findings that can be beneficial for theoreticians and practitioners of marketing. One important finding is that there is no significant effect of SOCI on attitude formation. The limited number of users, awareness and knowledge on this product category may be considered as an underlying reason. Personal innovativeness, which was expected to be an important factor among the initial adopters of a new product category had affected attitudes through other constructs but had no direct effect on attitude. INOV affected the level of USEF of the mobile payment system as well as the perceived ease of use. This leads to the conclusion that users who feel more innovative have more positive

perceptions of mobile payment system's usefulness and also they feel that it is easier to use. Furthermore, as the INOV increases, so the SECU of the mobile payment system improves, which indicates that more innovative users see fewer security concerns or they don't see security issues as significant threats. A practical implication of this finding is that by choosing and targeting users that perceive themselves more innovative in the marketing efforts will yield better returns.

In accordance with the findings on direct effects, the strongest total effects on attitude were observed in USEF and EOUS constructs. These two constructs appeared as the most important constructs affecting attitudes towards mobile payment systems. The other constructs affecting attitude significantly were COMP and SECU. COMP's effect on attitude is partly generated by the indirect effect through perceived usefulness. Differing from the existing literature, perceived security, which is assumed as the central barrier in the adoption of mobile payment systems (Kim et al. 2010; Linck et al. 2007) appeared as the least important factor of significance. A practical implication of this finding is that the owners and promoters of mobile payment systems should focus the other dimensions of significance, namely the ease of use and usefulness of the system rather than security. Establishing and promoting mobile payment systems that are easy to use and also increasing the benefits and usefulness of the system will help in improving attitudes to a greater extent than promoting security of the system.

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