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Citation for final published version:

Koenig-Lewis, Nicole , Marquet, Morgan, Palmer, Adrian and Zhao, Anita Lifen 2015. Enjoyment and social influence: predicting mobile payment adoption. *The Service Industries Journal* 35 (10) , pp. 537-554. 10.1080/02642069.2015.1043278

Publishers page: <http://dx.doi.org/10.1080/02642069.2015.1043278>

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Enjoyment and social influence: predicting mobile payment adoption

Please cite as: Koenig-Lewis, N.; Morgan, M., Palmer, A. and Zhao, A. (2015). [Enjoyment and social influence: predicting mobile payment adoption](#). *The Service Industries Journal* 35(10), pp. 537-554. ([10.1080/02642069.2015.1043278](https://doi.org/10.1080/02642069.2015.1043278))

Abstract

The paper begins with the observation that widely used models of technology adoption, notably the Technology Acceptance Model and the Unified Theories of Acceptance and Use of Technology may provide a good theoretical foundation for understanding mobile payment adoption if modified appropriately. This study extends these theoretical frameworks by incorporating the affective state of perceived enjoyment, social influence, knowledge and perceived risk, and by identifying relationships between antecedents to be integrated. Replications of established theories are tested in a new context of young people's adoption of mobile payment. Subsequent hypotheses test the extended theoretical framework. An online survey of 316 young people in France was conducted. The proposed extended model improves the previous models by explaining 62% of variation in intention to use mobile payment services. Against expectations, perceived ease of use had no significant effect on perceived usefulness and intention to use. The study contributes to advancing the understanding of perceived enjoyment which had no direct effect on adoption intention but a significant effect on perceived ease of use, and perceived usefulness. The findings suggest that social influence reduces perceived risk, and a further contribution is made by noting the effect of perceived enjoyment in lowering perceived risk.

Keywords: mobile payment, technology adoption, enjoyment, social influence, perceived risk

Enjoyment and social influence: predicting mobile payment adoption

Introduction

Mobile phones have evolved from basic communication tools to multi-functional devices. During this evolution, new services and facilities provided by mobile phones have brought new challenges to understand consumer adoption processes – initially the basic concept of a mobile communication tool and subsequently mobile Internet browsing, social media tools and online gaming, among others. This paper focuses on a more recent innovation for which likely consumer adoption processes are poorly understood – mobile payment (m-payment) systems.

M-payments also referred to as mobile money, virtual, digital or mobile wallets, can be defined as financial transactions such as “payments for goods, services, and bills with a mobile device (such as a mobile phone, smart-phone, or ... [tablet]) by taking advantage of wireless and other communication technologies” (Dahlberg, Mallat, Ondrus, & Zmijewska, 2008, p. 165). M-payment services can be distinguished from a number of services, such as mobile ordering (where a mobile device is only used to initiate an order but not for payment), mobile delivery (where a mobile device is only used to receive delivery of digital services), mobile authentication (using a mobile device to authenticate a user), and mobile banking (accessing banking functionalities via a mobile device).

The main claimed benefits of m-payment services are their ubiquity and flexibility whereby both consumers and merchants are able to conduct payments at anytime from anywhere (Zhou, 2013). In addition, small and medium-sized companies, such as retailers or restaurants, can take advantage of lower operational costs, in contrast to other traditional transaction mechanisms such as credit card payments. However, many questions remain about likely adoption rates, especially in developed Western countries where m-payment systems compete

with established legacy payment systems. New entrants to the market for payment services have emerged (e.g. Google) in the financial services eco-system, challenging traditional financial services providers. Established mobile operators have a vast consumer base, technical expertise and billing systems and are evolving to meet users' needs for convenience, flexibility, security and low cost (Shin, 2010). While some traders may be slow to adopt m-payment systems, the focus of this paper is the acceptance by consumers rather than by merchants. Moreover, this study focuses on m-payment services but not other forms of mobile trading which were noted previously. Typical of the uses studied here are paying for a metro ticket by holding the mobile phone at a reader, buying a product on a company website using a mobile browser, or transferring funds to a friend by mobile phone.

Users are changing, with newer generations of 'digital natives' more likely to rapidly recognize the advantages (and disadvantages) of m-payments systems. Some technical constraints associated with m-payment systems, such as small screens of smartphones and slow responses, remain to be resolved (Zhou, 2013). A further theme of uncertainty is how m-payment systems will work in the broader environment of online financial services, for example changing the way store checkouts work, bringing offline and online payments closer together, and the possibility of the smartphone becoming a serious replacement for the credit card.

One reason for the apparent slow uptake in Western countries may be a disjuncture between equipment and service providers' ideas of the technologies that they seek to provide, and consumers' perceptions of the benefits that they may get from a mobile device. While banks, equipment manufacturers, retailers and mobile network operators may expect near-field communication payments, cloud wallets, Quick Response codes or some combination of these to be the next 'big things' in mobile services, consumers may be typically more concerned about

convenience, privacy and security. However, the role of perceived risk in the adoption of m-payment services is not yet well understood.

Predictions of uptake of new mobile services may have over-emphasized rational, logical bases for evaluation, and inadequate attention has been given to affective elements of the experience of using a mobile service. Dahlberg et al. (2008) note that the success of m-payment services might depend on the ability to offer added value to customers. In this paper, we make a contribution to debate by examining the affective role of perceived enjoyment, the impacts of social influence and perceived risk as antecedents of intention to use m-payment services. Researchers have called for more theory-based empirical research to examine a variety of underlying factors that affect consumer intention to adopt m-payment technology (Dahlberg, et al., 2008; Shin, 2010). This view is supported by Schierz, Schilke and Wirtz (2010, p. 210) who state that “it is obvious that there is a research gap in regards to a lack of hypothesis-testing studies on mobile payment acceptance and in regards to developing an understanding of the relative importance and relationships of different acceptance drivers.” This paper, therefore, responds to previous calls for further research by empirically testing the application of the Unified Theory of Technology Acceptance and Use of Technology 2 (UTAUT2) to investigate the antecedents of m-payment adoption. In addition, this study extends knowledge by adding perceived risk into the framework and examining the complex relationships amongst the antecedents thus addressing gaps in previous research as identified by Shin (2009).

The aims of this study are threefold. Firstly, we aim to provide further insight into the factors that lead consumers to express an intention to use m-payment services. Secondly, from a theoretical perspective, we examine two widely used bases for predicting technology adoption – Technology Acceptance Model (TAM) and UTAUT2 to develop and test a model which is better

able to predict consumers' intention to use an innovative technology, in this case m-payment services. Thirdly, our research integrates perceived risk, social influence and the affective state of enjoyment into these established models. We suggest that these latter three constructs are crucial to understanding and predicting adoption of m-payment services; however, they are not yet well explored in the literature in the context of m-payment.

The plan of this paper is as follows. The first section introduces the background and development of m-payment systems. Secondly, we provide a brief overview of technology adoption models in the context of m-payment services. We note variability in successfully explaining adoption and explore the role of enjoyment and social influence in particular as variables for improving predictability. We then develop hypotheses linking social influence and enjoyment with intention to use m-payment services, proposing perceived risk, perceived ease of use and perceived usefulness as mediating variables. A methodology is described and followed by the presentation of the results. In the final section we discuss the findings and their implications for theory and practice.

Literature review

Predicting technology adoption

A number of models have been developed to help explain processes of consumer adoption of new technologies. TAM and UTAUT are probably the most widely applied and validated models evident in many empirical studies of consumers' uptake of new technologies (Kim, Mirusmonov, & Lee, 2010; Liu, Huang, & Chiou, 2011). In particular, these models have been extended to various contexts involving the acceptance of e-commerce (Koufaris, 2002) and mobile commerce (Koivumaki, Ristola, & Kesti, 2006). Innovation Diffusion Theory emphasizes

innovation as an agent of behavior change with innovation being defined as “an idea, practice, or object perceived as new” (Rogers, 2003, p. 12). According to Innovation Diffusion Theory, the adoption rate of a new technology depends on its perceived relative advantage, compatibility, complexity, trialability and observability (Rogers, 2003). However, only relative advantage, complexity, and compatibility, have been consistently identified as key indicators of adoption in previous research (e.g. Agarwal & Prasa, 1998; Lee, McGoldrick, Keeling, & Doherty, 2003). In addition, there is a substantial overlap between the TAM constructs of perceived usefulness and perceived ease of use and the Innovation Diffusion Theory constructs of relative advantage and complexity, and it has been proposed that these may be used interchangeably (Venkatesh, Morris, Davis, & Davis, 2003). Several studies have thus adopted only some of these attributes, for example compatibility, into other frameworks, such as TAM (e.g. Koenig-Lewis, Palmer, & Moll, 2010; Schierz, et al., 2010).

If modified appropriately, TAM and UTAUT may provide a good theoretical foundation for understanding m-payment adoption (Shin, 2009), as they go beyond the technology aspect and focus on social and individual factors that influence consumers’ decision process. For example, TAM can be extended by considering relevant factors, e.g. antecedents or moderators of both perceived usefulness and perceived ease of use (Eze, Gan, Ademu, & Tella, 2008). TAM and UTAUT therefore appear to fit the purpose of the current research, as other frameworks tend to focus on different levels of analysis or different topics of emphasis (e.g. diffusion mechanisms – Shin, 2009) and thus show a relatively limited scope for discussion.

TAM is an adaptation of the Theory of Reasoned Action, which suggests that behavior is a direct consequence of behavioral intention (Fishbein & Ajzen, 1975). According to TAM, behavioral intention is influenced by a user’s attitudes towards a product or a new technology;

this attitude in turn is affected by its perceived usefulness and ease of use (Davis, Bagozzi, & Warshaw, 1989). Research has suggested that perceived usefulness is a significant predictor of acceptance of mobile services (Koivumaki, et al., 2006). One criticism of TAM is that intention to use a new technology, rather than actual use, is the principal outcome variable. Intentions mirror the motivational factors that affect users' behavior and thus it will lead us to understand how willing users are to commit to a behavior (Ajzen, 1991), meaning that the stronger one's intention to engage in a behavior, the more likely he or she will actually do it. It is suggested that TAM typically explains approximately 40% of variance in usage intentions and behavior (Venkatesh & Davis, 2000).

After years of 'confusion and chaos' (Benbasat & Barki, 2007), Venkatesh, Morris, Davis and Davis (2003) conducted an extensive review of the user acceptance literature. To maintain relatively consistent explanatory power, the researchers took a unified view incorporating consistent attributes from eight prominent theories. From this, they proposed the UTAUT model with four constructs – performance expectancy, effort expectancy, social influence and facilitating conditions. These constructs are suggested to be direct antecedents of behavioral intention and ultimately behavior. Also, they can be moderated by gender, age, experience and voluntariness. It should be noted that the original UTAUT model was developed to predict adoption and use of technology in an organizational context and therefore some factors in relation to consumer adoption processes were not included in this model. Thus, the UTAUT2 was developed and three constructs – hedonic motivation, price/value and habit – were added to the original UTAUT making it more relevant to consumer contexts. UTAUT2 claims superior predictive ability compared to TAM with the direct effects model explaining 44% of the variance in behavioral intention and 35% in technology use (Venkatesh, Thong, & Xu, 2012).

A few studies have employed UTAUT to investigate m-payment adoption and found the model useful (e.g. Chen & Chang, 2013; Shin, 2009, 2010; Wang & Yi, 2012). Chen and Chang (2013) identified a positive significant link between performance expectancy and social influence on attitude towards use of Near Field Communication technology. In addition, they found that anxiety is a negative indicator of attitude. Whilst their study adopted the UTAUT model, a shortcoming was a focus on the antecedents of attitudes rather than behavioral intention or usage. The key drivers of consumer acceptance of mobile wallets were explored by Shin (2009) in their study of 296 experienced users. Shin's study extended UTAUT and found consistent with prior research that security and trust are the main predictors of behavioral intention. In addition, social influence had a strong influence on intention suggesting the opinion of peers plays a significant role in the acceptance of mobile wallet services. In the context of m-payment, Shin (2010) confirmed the main predictors of intention – perceived risk and trust. However, social influence did not have a direct relationship with behavioral intention, but a moderating effect on perceived risk. Similarly, no significant relationship between social influence and intention has been found by Wang and Yi (2012) in their study of m-payment usage based on the UTAUT model, though they identified a non-significant influence of perceived risk on behavioral intention. In line, with previous studies, the results indicated that performance expectancy and effort expectancy were the key determinants of m-payment adoption (Wang & Yi, 2012).

The empirical findings above regarding the role of perceived risk and social influence in the context of m-payment provide conflicting results. Our study thus provides further replication. Studies adopting the more recent UTAUT2 are still very limited. We advance theory by empirically testing an extended UTAUT2 model in the context of m-payment adoption. In the

following discussion, we will scrutinize this further by focusing on five constructs (i.e. perceived ease of use, perceived usefulness, perceived enjoyment, social influence and knowledge), as foundations of UTAUT2. Perceived price/value and habit were excluded as these are less applicable in the m-payments context which usually causes no or very little additional financial cost to users, and habit as m-payment services are not yet well established in the markets studied. Furthermore, perceived risk was incorporated in our framework. By examining not only the direct effects on m-payment adoption but also the relationships between these antecedents, our paper contributes to the understanding of these factors, which have been largely neglected in previous studies.

Conceptual development

In identifying aims of our empirical investigation, we distinguish between replications of existing theory to the specific context of m-payment systems and hypotheses which test new proposed theoretical linkages. The proposed conceptual model is shown in Figure 1.

Insert Figure 1 here

Perceived usefulness and perceived ease of use

Perceived usefulness (also referred to as ‘performance expectancy’ in UTAUT2) is defined as “the degree to which using a technology will provide benefits to consumers in performing certain activities” (Venkatesh, et al., 2012, p. 159). Within the domain of high-tech services, researchers have found that perceived usefulness plays a significant role in determining intention to adopt, although evidence of a direct linkage with intention to use remains mixed (Gefen, 2000). Perceived ease of use (also referred to as ‘effort expectancy’ in UTAUT2) is defined as “the degree of ease associated with consumers’ use of technology” (Venkatesh, et al., 2012, p. 159).

Perceived ease of use reflects a favorable tendency or intention towards use and subsequently affects self-reported actual usage (Davis, et al., 1989).

There is much recognition that both perceived usefulness and perceived ease of use form a basis for predicting end-user acceptance of computer technologies (Davis, 1989). However, researchers also have questioned the extent of direct effects of perceived ease of use on intention to use. For example, Davis (1989) suggested that perceived ease of use may operate indirectly through perceived usefulness. Given the extensive incorporation of perceived usefulness and ease of use into models derived from TAM and UTAUT, we therefore examine the relationships between these constructs and their relative impact on intention to adopt m-payment services. This part of the study seeks to replicate existing theory in the novel context of m-payment services adoption. Our first three replications are:

R1: Perceived usefulness has a positive effect on intention to use.

R2: Perceived ease of use has a positive effect on intention to use.

R3: Perceived ease of use has a positive effect on perceived usefulness.

Perceived risk

Adoption of innovative products can involve perceived risk, but, perceived risk, privacy concerns and trust have been overlooked by TAM and UTAUT. However, the literature shows that trust and perceived risk are salient bases for evaluation in e-commerce in general (Miyazaki & Fernandez, 2000), online financial services (Dimitriadis & Kyrezis, 2010), and in mobile commerce in particular (Keramati, Taeb, Larijani, & Mojir, 2011). According to Bauer (1960), consumers perceive risk when they face uncertainty, from which they worry about undesirable consequences. Perceived risk is also referred to as the probability of something happening and the consequences of the outcome (Mitchell & Groatorex, 1993).

The intangibility of m-payment services prevents potential users being able to evaluate the service in advance, leading to prospective users being anxious about security and privacy issues (Chang, Chen, & Zhou, 2009). Fear of monetary losses could also discourage potential users from m-payment acceptance and perception of financial risk could be linked to widespread knowledge of actual losses, reports of vulnerabilities, and uninformed concerns or natural risk-aversion (Shin, 2010). M-payment service providers are therefore challenged to design services which are simultaneously easy to use, effective, secure and reliable.

There is evidence that an individual's level of perceived risk is negatively related to their attitude towards using Internet services (Polasik & Wisniewski, 2009). Chen (2008) found that perceived risk negatively affects consumers' intention to adopt m-payment. Amin's study (2008) of the adoption of mobile phone credit cards suggests that customers expect a system which is completely secure. We therefore replicate these findings to the domain of m-payment services:

R4: Perceived risk has a negative influence on intention to use.

Knowledge of the technology

Consumer's perceptions of the resources and support available to use a new technology (referred to as 'facilitating conditions' in UTAUT), are hypothesized to have a direct positive effect on behavioral intention and use (Venkatesh, et al., 2012). In the context of m-payment, knowledge has been deemed an important antecedent of behavioral intention and actual usage (Chen & Chang, 2013; Keramati, et al., 2011). We therefore propose the following two replications:

R5: Knowledge has a positive effect on behavioral intention.

R6: Knowledge has a positive effect on actual usage.

Intention to use

UTAUT and related models are based on the notion that behavioral intention drives actual usage behavior (Venkatesh, et al., 2012). Thus the following replication is proposed in the specific context of m-payment services:

R7: Behavioral intention has a positive influence on actual usage.

Perceived enjoyment

TAM and the original UTAUT models are dominated by variables reflecting rational, cognitive-processes. Davis et al. (1989) recognized that extrinsic motivation provided by stimulus-response cues should have a heavier weighting in predicting intention to use than intrinsic motivators. The latter refer to unconscious, affective processes reflecting the extent to which the activity, interaction, process or experience of using innovative technology is perceived to be fun, enjoyable or pleasurable in its own right. Davis, Bagozzi and Warshaw (1992) considered perceived enjoyment to be a form of intrinsic motivation in contrast to perceived usefulness which was a form of extrinsic motivation. As such, intrinsic motivators based on affective evaluation were not considered in TAM.

However, researchers have suggested that consumers adopt new technologies not just as devices to enhance performance but also as sources of enjoyment. Venkatesh et al. (2012, p. 161) included hedonic motivation in UTAUT2 and defined it as “the fun or pleasure derived from using a technology.” Hedonic motivation has been conceptualized as ‘perceived enjoyment’ in the literature, and found to be a significant predictor of consumers’ technology acceptance (Venkatesh, et al., 2012), Internet usage (Teo, Lim, & Lai, 1999) and an evaluatory component of online browsing (Cox, Cox, & Anderson, 2005). In the context of m-payments, perceived enjoyment may be derived from consumers’ novelty-seeking and instant gratification associated with a state of flow (Csikszentmihalyi, 1990).

We propose that perceived enjoyment can act as an antecedent of perceived ease of use and perceived usefulness, suggesting that an enjoyable technology is also seen as easier to use and more useful (Agarwal & Karahanna, 2000; Van der Heijden, 2004). Higher levels of perceived enjoyment in using a new technology may lead to a decrease in anxiety, worry or concern, in turn lowering perceived risk. In this stage of the study, we test new proposed relationships with the following hypotheses.

H1: Perceived enjoyment has a positive effect on behavioral intention.

H2: Perceived enjoyment has a positive effect on perceived usefulness.

H3: Perceived enjoyment has a positive effect on perceived ease of use.

H4: Perceived enjoyment has a negative effect on perceived risk.

Social Influence

Social influence is firmly grounded in models of technology acceptance, and more generally in models of consumer behavior, for example the Theory of Planned Behavior and Theory of Reasoned Action. It has been argued that “TAM tends to neglect the social context in which a technology is being adopted” (Shin, 2009, p. 1344). However, social influence can be an important motivation for adopting of new technologies. Early research, for example investigating the role of social influence in the field of e-commerce and e-mail, has found a direct effect on usage (Fang, 1998). More recently, social influence has been shown to affect individuals’ behaviors in adoption of, mobile phone services (Lee, Murphy, & Swilley, 2009), mobile-Internet (Kim, Chan, & Gupta, 2007) and online game communities (Hsu & Lu, 2007).

For new technology adoption involving connectivity among peers, people tend to rely heavily on peer-to-peer communication, and social norms are thus important antecedents for the adoption of technology with network externalities (Dickinger, Arami, & Meyer, 2008). Mobile

phones are generally used in a public or social context where users can observe others' behavior and are therefore likely to be influenced by their peers, or people who are important to them (Nysveen, Pedersen, Thorbjørnsen, & Berthon, 2005). Consequently, in the context of m-payment, a positive relationship between social influence and individual adoption behavior is expected. Social influence may also have an indirect effect via perceived usefulness on intention to adopt m-payment (Yang, Lu, Gupta, & Zhang, 2012). Furthermore, there is evidence that perceived enjoyment is a socially constructed phenomenon. Because many hedonic products are consumed in the presence of others, it is important to understand how social influence affects the perceived enjoyment of shared experiences involving new technologies (Raghunathan & Corfman, 2006). This leads to the following hypotheses:

H5: Social influence has a positive effect on behavioral intention.

H6: Social influence has a positive effect on perceived usefulness.

H7: Social influence has a positive effect perceived enjoyment.

H8: Social influence has a negative effect on perceived risk.

Methodology

Sample

The hypotheses were tested using young people aged 18-34, resident in France. Young people are of particular interest as they are typically early adopters of innovative technologies, such as m-payments. Moreover, an understanding of their opinions can provide significant insights as they are 'Web2.0 experts' and constantly confronted with new digital services. The restriction of the study to one country reduces the effects of differences in culture and the economic/technological/legal environment. France provides a good case for investigating m-

payment adoption, as the French mobile phone market is one of the largest in Europe with almost 77 million subscriptions and worth Euro 16 billion in 2013 (Lancaster, 2014).

An online questionnaire was adopted, a method shown to be an efficient and effective tool for this target group (Wilson & Laskey, 2003). In this study a convenience sample was employed, consistent with the approach adopted in many previous studies of technology adoption (e.g. Chen, 2008). An e-mail was sent to 4,800 students of two business schools in France inviting them to take part in a survey during July 2013. Overall 460 took part in the study, accounting for around 9.6% of the total population. Of these, 316 respondents fully completed the questions of the survey and were included in this research. The sample was examined for potential effects of non-response error but no significant differences between early and late respondents (i.e. the last 16% of respondents) were found with regard to the key constructs used in this study. The average age of the respondents was 23.31 years, 58% of the respondents were female and 42% were male.

Smartphone ownership amongst the sample was very high (90.5%), and 63% of these consider themselves to be advanced or very advanced smartphone users (less than 5% said they were inexperienced). With regard to m-payment, 20.3% of the respondents considered themselves knowledgeable or very knowledgeable, whilst 40.5% said that they had neither high nor low knowledge of m-payments. Of the 316 respondents, 50.6% had already used their smartphone to make a payment. However, m-payment services are still a novel technology; approximately a third of the adopters had used m-payments for less than a year. Amongst the m-payment users, 80.6% made payments via the mobile Internet and 76.3% paid via mobile apps. Paying directly via credit/debit card was the most common m-payment method used (93.8%), whilst 35% and 33.1% had already used existing payment services (such as PayPal) or had been

charged directly to their phone bill, respectively. The most common purposes for making m-payments were paying for tickets (76.3%) and digital content (72.5%).

Measures

Previously validated and reliable measurement scales were employed in this study. The majority of the scales were based on UTAUT2 (Venkatesh, et al., 2012), refined and adapted to our context of m-payments. All constructs were measured by multiple items on five-point Likert-type scales ranging from (1) strongly disagree to (5) strongly agree, with the exception of 'usage' and 'knowledge' (one item). 'Usage' was measured on a scale from 1 (never) to 5 (several times per week or more) and the scale for 'knowledge' was anchored at 1 (very low) and 5 (very high).

The items for 'perceived usefulness' and 'perceived ease of use' were adapted from Davis (1989) and Venkatesh et al. (2012). 'Perceived risk' has been conceptualized as security risk in the context of m-payments and is measured with three items adapted from Featherman and Pavlou (2003). This is consistent with the literature (e.g. Lu, Yang, Chau, & Cao, 2011; Yang, et al., 2012). The 'perceived enjoyment' scale was based on items used by Venkatesh et al (2012) and Davis et al (1992). Three items measuring 'social influence' were adapted from Venkatesh et al (2012) and Nysveen, Pedersen and Thorbjornsen (2005). 'Knowledge', 'Intention to use' and 'usage' scales were adapted from Venkatesh et al (2012).

The questionnaire was administered in French and back translated to validate the translation from English to French. The order in which the items appeared in the online questionnaire was randomized to avoid possible order effects (Perreault, 1975). Appendix 1 lists measures used in this study.

Results

Measure validation

The hypotheses were tested using structural equation modeling using AMOS 21. This provides a confirmatory rather than an exploratory approach and estimates measurement errors of the observed variables thus increasing the reliability of the results (Baumgartner & Homburg, 1996). Firstly, to assess the measurement reliability and validity, a confirmatory factor analysis with maximum likelihood estimation was employed containing all the multi-item constructs.

The hypothesized measurement model provides a good fit to the data as demonstrated by a range of goodness-of-fit statistics ($\chi^2=204.42$, $df=100$, $p\leq.0001$). The chi-squared value divided by the degrees of freedom ratio was 2.04 and thus within the recommended range of 1 to 3 (c.f. Carmines & McIver, 1981). The goodness of fit index (GFI=.93), the comparative fit index (CFI=.97) and the Tucker-Lewis index (TLI=.95) were all above .9 and the root mean squared error of approximation (RMSEA=.058) was well below .08 (c.f. Bentler & Bonett, 1980; Steiger, 1989). Appendix 1 presents the standardized loadings, alpha coefficients, construct reliabilities and average variance extracted for all constructs.

Cronbach's alpha values and construct reliabilities computed from the squared sum of factor loadings for each construct and the sum of error variance terms exceeded .7 for all the multi-item constructs, thus confirming adequate reliability (Bagozzi & Yi, 1988). The estimated standardized factor loadings for all indicators were significant ($p<.001$) and above .5 with the majority exceeding .7 (Anderson & Gerbing, 1988) thus supporting convergent validity. Furthermore, the average variance extracted from each construct exceeded the corresponding squared inter-construct correlation estimates, establishing discriminant validity (Fornell &

Larcker, 1981). Table 1 illustrates the average variance extracted, the squared correlation coefficients, as well as the construct reliabilities.

Insert Table 1 here

Structural model results

Structural Equations Modeling with maximum likelihood estimation was employed to test the hypothesized relationships among latent variables. The results are displayed in Table 2. An inspection of the goodness of fit indicators demonstrated an acceptable fit for the structural model ($\chi^2=331.3$, $df =135$; $p=.00$, $\chi^2/df=2.45$, $GFI=.90$, $CFI=.94$, $TLI=.92$, $RMSEA=.068$). The proposed model explains 62% of variance in intention to adopt m-payment services and 33% of the variance in m-payment usage.

R1 was supported, indicating that higher perceived usefulness leads to higher intention to use m-payment services ($\beta=.39$, $p<.001$). Perceived ease of use had no significant effect on intention to use and perceived usefulness, thus R2 and R3 were rejected. Perceived risk had a negative significant relationship to intention to use ($\beta=-.29$, $p<.001$), thus confirming R4. Higher knowledge levels of m-payment systems led to higher intention to use ($\beta=.18$ $p<.001$) and actual usage ($\beta=.28$, $p<.001$) confirming R5 and R6. Intention to use had a positive significant effect on actual usage with a .45 path coefficient providing support for R7.

Whilst perceived enjoyment had no direct significant effect on intention to use and thus H1 was not supported, perceived enjoyment was found to be a significant predictor of perceived usefulness ($\beta=.77$, $p<.001$), perceived ease of use ($\beta=.73$, $p<.001$) and perceived risk ($\beta=-.62$, $p<.001$). This provided supported for hypotheses H2, H3 and H4. Furthermore, the results indicated that social influence had a significant positive effect on intention to use ($\beta=.12$, $p<.05$),

perceived usefulness ($\beta=.20$, $p<.001$), perceived enjoyment ($\beta=.45$, $p<.001$) and a significant negative effect on perceived risk ($\beta=-.15$, $p<.05$), thus confirming H5, H6, H7 and H8.

Insert Table 2 here

Discussion

Several authors have suggested that the TAM and UTAUT models were applicable to m-payment technology adoption (Chen & Chang, 2013; Shin, 2010). This study confirmed that perceived usefulness is a salient factor in explaining intention to use m-payment services, consistent with prior studies in the context of new information technologies (Kim, et al., 2010; Venkatesh, et al., 2012). However, against our expectations, perceived ease of use had no significant effect on perceived usefulness and intention to use. The insignificant link from perceived ease of use to perceived usefulness might indicate that the overall importance of the perceived degree of ease in consumer adoption of m-payment technologies might be overrated as consumers become more familiar with the underlying technology (i.e. smartphones) as suggested by Keil, Beranek and Konsynski (1995) in the general context of new technologies.

The insignificant link between perceived ease of use and behavioral intention confirms the findings by Wu and Wang (2005) and Koufaris (2002) in the context of mobile commerce and online consumer behavior. It has been suggested that the effect of perceived ease of use will decrease over time, as users become more proficient with a specific system (Venkatesh, 2000; Venkatesh & Davis, 1996). Most young people consider themselves very knowledgeable and experienced with regard to smartphones, and frequently use their smartphones ubiquitously for many purposes, such as downloading apps, playing online games and using the mobile Internet.

It is thus not surprising that their ease of use perception is not a significant predictor of their m-payment adoption decision, providing a good argument to support our findings.

The present study confirms that in addition to rational, logical bases of evaluation, such as perceived usefulness, affective elements of the experience of m-payment services need to be given more consideration. Perceived enjoyment did not have a direct significant link with intention to use m-payment services which contradicts prior research (Van der Heijden, 2004; Venkatesh, et al., 2012), however, perceived enjoyment had a significant indirect effect via perceived usefulness. This is in line with studies suggesting higher perceived enjoyment will also lead to a higher perceived ease of use and usefulness (Agarwal & Karahanna, 2000; Van der Heijden, 2004). Traditionally, perceived enjoyment was not seen as an essential factor for the adoption of financial services, but our findings suggest that in the context of m-payment services, the role of fun and pleasure should be noted. This might be due to the way in which young people constantly interact with their smartphones in everyday life and due to the possibility that m-payments often involve low monetary value, thus novelty seeking and instant gratification (e.g. completing the purchase) are essential.

The original TAM and UTAUT models have not considered perceived risk as an antecedent to intention to accept new technologies. However, previous studies have demonstrated that security concerns are a major factor for the diffusion of m-payment services (Chen, 2008; Lu, et al., 2011; Yang, et al., 2012). The present study has thus made a contribution by extending the UTAUT2 model and our results confirm that perceived risk has a significant negative influence on intention to use. Moreover, the findings suggest that social influence reduces perceived risk, giving support to Shin (2010). A further contribution is made by validating the observed effect of perceived enjoyment in lowering perceived risk. As discussed,

the relationship between perceived enjoyment and perceived risk has been extensively studied in social psychology, but application to consumer attitudes towards innovative and potentially risky new products is scarce. One possible explanation for our results may be the existence of a state of 'flow', characterized by an individual becoming completely engrossed in a phenomenon to the exclusion of possible attendant risks (Csikszentmihalyi, 1990).

The influence of peers is particularly important for young users' adoption of m-payment services as this group of people are in the stage of forming norms (Dickinger, et al., 2008). M-payment services are often used in public or social contexts where people observe each other's activities and try to adapt their attitude and behaviors (Nysveen, et al., 2005), therefore normative pressure can influence behavior (Teo & Pok, 2003). This effect has been found in the general domain of mobile Internet adoption (Shin, 2007) and we have made a contribution by noting this effect in the specific context of m-payments. Our findings demonstrate that users of m-payments are sensitive to social influence, and consider their friends' expectations regarding their usage of the technology. In addition, peer influence has a significant positive effect on the perceived enjoyment and the perceived usefulness of m-payment services. Finally, our study confirms the results of prior studies (Venkatesh, et al., 2012), that facilitating conditions, operationalized as m-payment knowledge has a significant effect on intention to use and actual usage, and intention to use is a significant predictor of actual usage.

The main purpose of this research was to explore the key drivers of m-payment adoption amongst young people. This study makes a contribution by not only adopting the UTAUT2 model in the context of m-payment services, but more importantly extending the model by including perceived risk and by examining the complex relationships between the antecedents. One of the shortcomings of UTAUT2 is that only direct links between the antecedents and

intention to use were included. However, as discussed, many studies have suggested that the key drivers of technology adoption might not be independent as suggested by Venkatesh et al. (2012). Thus this study responds to the call for more theory-based empirical research examining a variety of antecedents and their interlinks affecting the adoption of m-payment services (Dahlberg, et al., 2008; Shin, 2010). UTAUT2 with direct effects only explained 44% of behavioral intention (Venkatesh, et al., 2012). In addition, this study acknowledges that social influence and perceived enjoyment may not only be direct drivers of m-payment services adoption, but more importantly they significantly influence perceived ease of use, perceived usefulness and perceived risk. Our model explained 62% of the variation in intention to use m-payment services and thus demonstrates the merits of examining linkages between the antecedents.

Implications for practice

The world of online financial services is rapidly evolving, and m-payment systems are only one part of a financial services eco-system. Legacy payment processing companies face challenges from new market entrants bringing innovative technologies aimed particularly at younger 'digital natives' who may be accustomed to successive new technologies. Legacy payment processing companies have themselves innovated to extend their established processes to incorporate new m-payment technologies. Technology offered by m-payment systems may be a trigger for realignment of the major players in the financial services eco-system. In developing economies such as Kenya, the technology of m-payment systems has significantly changed this eco-system, as mobile network operators have become major players in the market for payment processing. In developed Western countries new entrants to the market for payment services have emerged

(e.g. Google) to challenge established financial services providers. Within the financial services eco-system, adoption of a new technology by key intermediaries or merchants may be crucial to successful development. Merchant adoption may remain a barrier to more widespread use of m-payment systems in Western developed economies. There could potentially be a 'chicken and egg' process of development whereby merchants do not invest in new m-payment facilities until they have clear evidence of demand from customers, while customers may defer using such systems until they are sure that merchants will generally accept such payment. In this complex inter-related jigsaw of innovation processes, we have looked specifically at the consumers' perspective of adoption.

The findings of this research have several implications for the improvement of m-payment services which are valuable for stakeholders involved in the financial services eco-system, including mobile network operators, merchants, banks, m-payment system designers and consumers. Perceived risk is a critical theme that needs to be addressed to increase adoption among consumers as they express significant security and privacy concerns. In order to attend to these issues, m-payment service providers should address consumers' concerns through effective advertising. Trust building strategies such as the creation of certificate authorities that test control systems may help to overcome security concerns.

Moreover, the relationships between the various m-payment stakeholders, such as traditional financial service providers (e.g. banks), mobile network providers and m-payment operators might seem complex and unclear to consumers, thus increasing their perceived risk levels. M-payment services need to evolve from limited proprietary solutions to more trustworthy, cooperative, integrated and standardized solutions in order to reduce perceptions of risk and improve perceived usefulness. However, further research needs to establish to what

extent perceived risk differs for the various m-payment stakeholders. Reputable mobile phone manufacturers, for example, might be able to reduce perceived risk by extending their brands to m-payment services, such as the recent innovation of ApplePay. The results of the study suggest that perceived risk of m-payments can be decreased by providing customers with an engaged and enjoyable experience. Thus, simply addressing the benefits of perceived usefulness is insufficient to appeal to consumers; instead, demonstrating how the use of the technology is fun (through perceived enjoyment) would appear to be more effective in reducing the risk and in encouraging a faster uptake of m-payments.

As perceived enjoyment was found to be a salient construct in the m-payment adoption process, telecommunications technologies need to be improved and system characteristics enhanced to facilitate a state of flow for adopters. M-payment service providers should probably achieve this goal in the near future without significant additional investments given the declining cost of technology. There are several ways to increase perceived enjoyment of m-payment technologies, such as offering pleasant user interfaces, enjoyable navigation, vibration indicators, easy downloadable user manuals, online help desks, e.g. via chat rooms and quick processing of payment.

Perceived enjoyment had a positive influence on perceived usefulness. It is thus recommended, that retailers link enjoyment to perceived benefits of m-payments, such as enhanced in-store experiences due to shorter queues. Further research should examine in more detail the key antecedents of perceived enjoyment in the context of m-payments. This is especially important considering the recent innovations of wearable technology such as Smartwatches and GoogleGlass which might change the way consumers carry out daily offline and online transactions.

The social environment of the adopter plays an important role in the adoption process of m-payment, thus promoting m-payment services via word of mouth from opinion leaders is crucial for a faster diffusion of these technologies amongst young people. Vendors and service providers should encourage sharing of m-payment experiences via social networks and facilitate this process by making it easy. In addition, offering incentives to early adopters such as providing extra value, payment credits or discounts when adopting m-payment services could enhance the network effect (i.e. consumers will perceive m-payment services as more enjoyable, less risky, more useful if friends and family are also using m-payment services). Encouraging word of mouth both offline and online will help convince young consumers who show high level of social influence. Another suggestion would be to use social norms in the promotion of m-payment services to young people.

Like every piece of research, this study has limitations. Firstly, this study does not examine moderator effects such as age, gender and experience as suggested in UTAUT2. This study has been conducted in France and the findings might not be generalizable to populations in other countries. However, evidence of variation in m-payment adoption rates between different countries suggests that more research needs to be undertaken in different countries and within different target population segments to examine cross-cultural differences in more detail. Future studies should compare the motivations and barriers of m-payment adoption between non-users, adopters (first time usage) and frequent users.

Figure 1: Conceptual Model

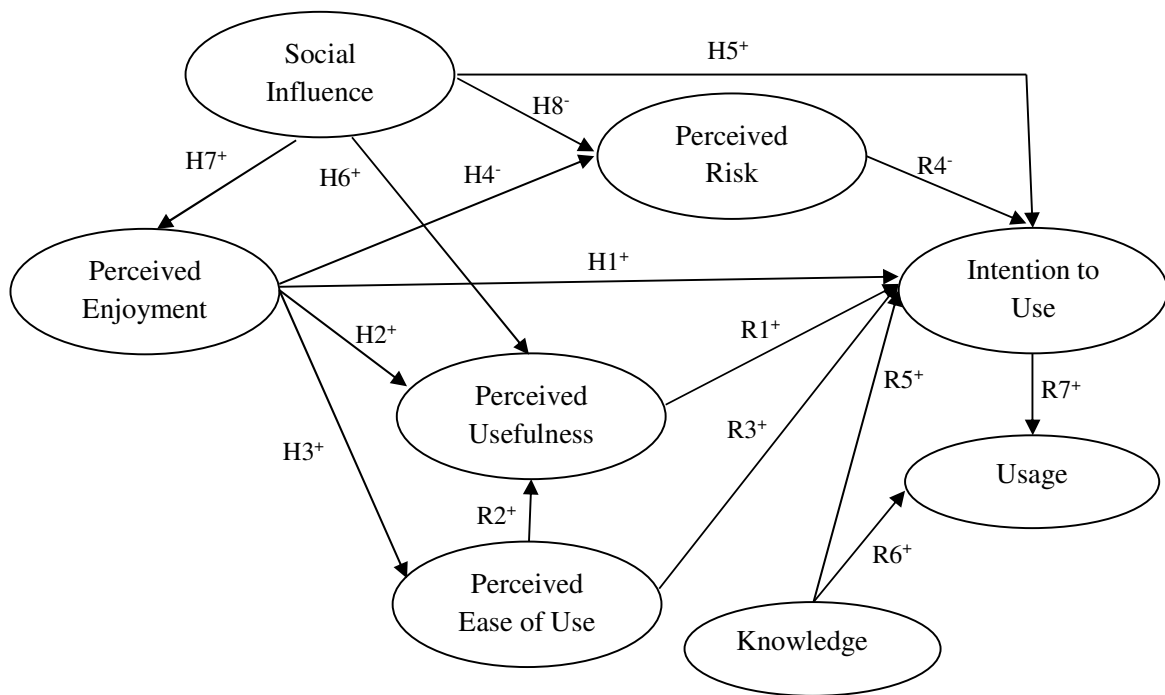


Table 1: Squared correlations, construct reliabilities, average variance extracted, and descriptive statistics of latent constructs

| Measurement parameter estimates | Construct Reliability | (1) | (2) | (3) | (4) | (5) | (6) |
|---------------------------------|-----------------------|------|------|------|------|------|------|
| (1) Perceived Usefulness | .80 | .57 | | | | | |
| (2) Perceived Ease of Use | .80 | .23 | .57 | | | | |
| (3) Perceived Risk | .85 | -.34 | -.28 | .65 | | | |
| (4) Perceived Enjoyment | .79 | .55 | .54 | -.42 | .65 | | |
| (5) Social Influence | .87 | .26 | .06 | -.18 | .23 | .69 | |
| (6) Intention to Use | .92 | .53 | .16 | -.43 | .44 | .26 | .79 |
| Mean | | 3.58 | 3.30 | 3.56 | 3.35 | 2.67 | 3.53 |
| Standard Deviation | | .74 | .72 | .95 | .80 | .86 | 1.02 |

Note: Values in the diagonal represent the average variance extracted

Table 2: Structural model estimates

| Replications/ Hypotheses | Hypothesized paths | Standardized path coefficient | t-value | Result |
|-----------------------------|--|-------------------------------------|-------------|-----------------|
| R1 | Perceived Usefulness → Intention to Use | .39 | 3.07** | Supported |
| R2 | Perceived Ease of Use → Perceived Usefulness | <i>n.s.</i> | <i>n.s.</i> | <i>Rejected</i> |
| R3 | Perceived Ease of Use → Intention to Use | <i>n.s.</i> | <i>n.s.</i> | <i>Rejected</i> |
| R4 | Perceived Risk → Intention to Use | -.29 | -3.97*** | Supported |
| R5 | Knowledge → Intention to Use | .18 | 4.44*** | Supported |
| R6 | Knowledge → Usage | .28 | 5.88*** | Supported |
| R7 | Intention to Use → Usage | .45 | 8.62*** | Supported |
| H1 | Perceived Enjoyment → Intention to Use | <i>n.s.</i> | <i>n.s.</i> | <i>Rejected</i> |
| H2 | Perceived Enjoyment → Perceived Usefulness | .77 | 7.09*** | Supported |
| H3 | Perceived Enjoyment → Perceived Ease of Use | .73 | 10.75*** | Supported |
| H4 | Perceived Enjoyment → Perceived Risk | -.62 | -8.09*** | Supported |
| H5 | Social Influence → Intention to Use | .12 | 2.23* | Supported |
| H6 | Social Influence → Perceived Usefulness | .20 | 3.62*** | Supported |
| H7 | Social Influence → Perceived Enjoyment | .45 | 6.47*** | Supported |
| H8 | Social Influence → Perceived Risk | -.15 | -2.46* | Supported |

*p<.05, **p<.01, ***p<.001

Appendix 1

| Constructs and measures | Standardized loading | Construct reliability | α | Average variance extracted |
|--|----------------------|-----------------------|----------|----------------------------|
| Perceived Usefulness Mobile payment technology helps make payments more effectively. Using mobile payment technology would enable to pay more quickly. Mobile payment is a useful payment method. | .80 .62 .83 | .80 | .71 | .57 |
| Perceived Ease of Use Mobile payment technology is easy to learn. My interaction with mobile payment procedure is generally clear and understandable. I generally find mobile payment services to be complicated to use.* | .74 .87 .65 | .80 | .73 | .57 |
| Perceived Risk I feel secure while making payments via mobile phone.* I feel safe providing personal private information over the mobile payment system.* Making mobile payments is risky. | .86 .86 .70 | .85 | .85 | .65 |
| Perceived Enjoyment Using mobile payment system is rather pleasant The mobile payment procedure is rather enjoyable | .78 .83 | .79 | .79 | .65 |
| Social Influence People who are important to me are likely to recommend using mobile payment technology. People who are important to me would probably suggest that I should use mobile payment technology. People who are important to me expect me to use mobile payment technology. | .91 .88 .67 | .87 | .86 | .69 |
| Knowledge How would you qualify your level of knowledge of mobile payment? | n/a | n/a | n/a | n/a |
| Intention to Use I intend to use mobile payment technology in the near future. I plan to use mobile payment technology in the next years. Two years from now I intend to pay (at least occasionally) for purchases with a mobile phone. | .85 .92 .90 | .92 | .92 | .79 |
| Usage On average, how frequently do you make mobile payments? | n/a | n/a | n/a | n/a |

Note: * denotes reverse coded item

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