



Delft University of Technology

## Analysis of mobile pre-payment (pay in advance) and post-payment (pay later) services

Molina-Castillo, Francisco Jose; Rodriguez-Guirao, Alicia; Lopez-Nicolas, Carolina; Bouwman, Harry

### DOI

[10.1504/IJMC.2016.078725](https://doi.org/10.1504/IJMC.2016.078725)

### Publication date

2016

### Document Version

Accepted author manuscript

### Published in

International Journal of Mobile Communications

### Citation (APA)

Molina-Castillo, F. J., Rodriguez-Guirao, A., Lopez-Nicolas, C., & Bouwman, H. (2016). Analysis of mobile pre-payment (pay in advance) and post-payment (pay later) services. *International Journal of Mobile Communications*, 14(5), 499-517. <https://doi.org/10.1504/IJMC.2016.078725>

### Important note

To cite this publication, please use the final published version (if applicable). Please check the document version above.

### Copyright

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

### Takedown policy

Please contact us and provide details if you believe this document breaches copyrights. We will remove access to the work immediately and investigate your claim.

# **ANALYSIS OF MOBILE PRE-PAYMENT (PAY IN ADVANCE) AND POST-PAYMENT (PAY LATER) SERVICES**

**Francisco-Jose Molina-Castillo**

**Alicia Rodriguez-Guirao**

**Carolina Lopez-Nicolas**

**Harry Bouwman**

**Abstract:** The diffusion of mobile payments is still in its early stages and further research is needed to understand what motivates or restricts people's behavior when using mobile services. Based on a sample of Dutch mobile service users, this study analyzes the antecedents of two types of mobile payments, those that take place before a product is acquired (pre-payment services) and those that take place at the same time or immediately after the product is acquired (post-payment services). We identified a number of reasons why mobile services have not yet found a place in people's daily routines and provide recommendations for the development of future mobile payments.

**Keywords:** Mobile payments, Motivation theory, Customer behavior

## 1. INTRODUCTION

Mobile payments have increased substantially in recent years, with the infrastructure now making it possible for us to use our mobile devices to pay in supermarkets, book a room or buy a cinema ticket (Wong et al., 2015). Apple pay or Google wallet are just some examples of technologies that will be common in many retailers very soon in traditional e-commerce situations (Cao et al., 2015). As a result, progress in the area of information and communication technology stimulates the use of new shopping tools, leading to a rapid growth in non-store shopping where people can buy products/services without having to travel to retail outlets.

However, the success of mobile payment depends on people's willingness to adopt new technology and use systems and devices that are different from the ones they are accustomed to using, which means that the major challenge facing businesses is to persuade people to use the services once the digital channels are in place (Cao et al., 2015). The decision to subscribe to and use new services is an example of innovative behavior, which varies according to the needs and perceptions of individual customers. Moreover, due to the anytime-anywhere connectivity of wireless devices (Okazaki et al., 2012), M-payment provides enormous opportunities for innovation in the business processes that support the services in question.

Several studies on mobile payment that were conducted in the last decade years suggest that there is a general interest among consumers in using mobile phones for mobile shopping activities, like mobile ticketing (Mallat et al., 2009), purchases on websites, electronic receipts (Mallat et al., 2009), routine bank services (Lin, 2011, Kleijnen et al., 2007), peer-to-peer payments (Nysveen et al., 2005, Dahlberg et al., 2008), etc. However, the use of mobile phones for shopping purposes is still in its initial stages. Accordingly, marketers are trying to identify critical factors that will help persuade people to adopt mobile payment. Thus far, two main critical factors have been identified. Firstly, it is very important to understand what motivates customers to adopt mobile payments services, in order for businesses to adjust their strategy and tactics to match their customers' evolving behavior and habits. However, few studies to date have examined people's behavior with regard to mobile payments (Cao et al., 2015). Secondly, academics argue that one of the reasons for the slow take-off is the lack of relevant information about mobile payments via mobile phones (Dahlberg et al., 2008).

The purpose of this article is twofold. First of all, the goal is to develop a model that explains people's behavior towards mobile payments services based on Motivation Theory, Self-efficacy Theory and Technology Acceptance Model (TAM). Secondly, we want to investigate the validity and differential predictive power of the model for two categories of mobile payment services: a) pre-payment services (payments that occur before acquiring the product) and b) post-payment services (payments that take place at the same time or immediately after the product has been acquired).

This study contributes to the emerging but limited body of research on mobile payment by addressing two critical issues. Firstly, the model integrates different theoretical fields that focus on people's motives for adopting mobile payment and, in doing so, provide a broader and more holistic insight into the antecedents of mobile payment adoption than existing research has been able to do. Furthermore, studies examining the antecedents of mobile payment usage have not focused on the two different types of mobile payment services included in this paper. In addition, this research also offers important practical contributions. In particular, practitioners can gain valuable insight into the driving forces behind mobile payment, which in turn may help them develop more reliable mobile payment tools.

The remainder of this paper is organized as follows. The next section analyzes the differences between traditional, electronic commerce and mobile commerce. In section 3, we discuss relevant literature with regard to mobile payment, and we present our hypotheses in section 4. In section 5, we describe the methodology, in section 6, we present the results of our analysis and section contains 7 the discussion and managerial implications. We conclude by addressing research limitations and possible future research.

## **2. TRADITIONAL COMMERCE, ELECTRONIC COMMERCE AND MOBILE COMMERCE**

Mobile commerce (M-commerce) refers to the mobile character of wireless devices (in particular mobile phones) that support electronic service transactions, such as product ordering, money transfers and stock trading (Kleijnen et al., 2007). In this study, M-commerce refers to the transactions that are carried out via a mobile phone.

M-commerce represents a huge opportunity for businesses to connect to consumers (Venkatesh et al., 2003). Although M-commerce is often seen as an extension of e-commerce, it can arguably be regarded as a separate channel, because it can deliver a unique value

proposition to consumers through its technological characteristics, which include its communication mode and protocols, and access devices. From a consumer's perspective, a uniquely defining characteristic of M-commerce is its ubiquity (Okazaki et al., 2012), in other words, the fact that it is available anytime and anywhere (Nysveen et al., 2005).

As shown in figure 1, what differentiates M-commerce from other technological paradigms is that it enables new experiences and mediates social interactions via wireless and mobile technologies. For example, the shopping experience is different in a store, on a Web page or via a managed shopping list over a mobile phone. The experience differs in terms of the physical presence (in-store, sitting at a desk, stuck in traffic), the information space available (all senses, text and pictures, a simple regular shopping list) and the nature of the social interactions (face-to-face, virtual).

**Insert figure 1 about here**

### **3. MOBILE PAYMENTS (POST-PAYMENT AND PRE-PAYMENT)**

For a long time, the lack of suitable payment instruments was seen as an obstacle to the development of mobile commerce (Cao et al., 2015). Mobile payments are payments for goods, services and bills by mobile phone, using wireless and other communication technologies (Dahlberg et al., 2008). Buyers use mobile communication technology in combination with mobile phones to initiate, authorize or complete payments (Pousttchi, 2008), as an alternative payment method (Kim et al., 2010). Mobile phones can be used to make a variety of payments, such as payments for digital content (e.g., ring tones, logos, news, music, or games), concert or flight tickets, parking fees, bus/train/taxi fares and gambling.

People's motives are likely to be different based on whether payment is conducted before or after the goods or services are consumed. As shown in table 1, researchers have carried out separate studies in this specific area. A customer may need to buy a service in advance and, due to the ubiquity of mobile service, acquire it far in advance of actually using the service in question. Alternatively, the customer may have to pay for the service at the same time as obtaining the service. Clearly, in both cases, the motivation, environmental conditions, etc. are completely different.

**Insert table 1 about here**

In this study, we divide mobile payments services into two different categories based on the moment payment occurs:

- ***Pre-payment mobile services:*** mobile services that require payment before consuming the goods or services, for example in the case of plane or train tickets, or when mobile services are used to book a hotel room. In Finland, Helsinki City Transport offers a mobile subway and tram ticket, enabling customers to order a one-hour SMS ticket via their mobile phones by sending a text message to a service number.
- ***Post-payment mobile services:*** mobile services where payment occurs at the same time the goods or services are consumed, for example in the case of Micropayments. When you go shopping and decide to buy clothes in a store and use your mobile phone for payment, you first pick the clothes you want to buy and then pay for them. An example of this type of payments is the NFC chip, which basically uses the mobile phone as a credit card. The same takes place with mobile gambling or paying a restaurant bill. In all cases, payment follows consumption of the goods or services.

#### **4. THEORETICAL BACKGROUND**

We use three theories to explain the antecedents of pre-payment mobile services and post-payment mobile services: a) Motivation theory, b) Self efficacy theory and c) Technology acceptance model theory (TAM)

Motivation has been identified as a key determinant of behavior in a wide variety of domains. Motivation theorists often distinguish two broad classes of motivation as the key drivers of behavior. In the motivational model, motivations related to intrinsic personal goals are distinguished from those related to extrinsic goals associated with job advancement issues.

- ***Extrinsic motivation:*** refers to the performance of an activity because it is perceived to be instrumental in achieving valued outcomes that are distinct from the activity itself, such as improved job performance, pay or promotions. Extrinsic motivation influences people's behavior due to the reinforcement value of the outcomes (Davis et al., 1992).
- ***Intrinsic motivation:*** refers to the performance of an activity for no apparent reinforcement other than the process of performing the activity as such (Davis et

al., 1992). It involves behavior that is carried out for its own sake, to experience the pleasure and satisfaction inherent in the activity.

The self-efficacy theory (Bandura, 1997) argues that people's behavior is cognitively mediated by the strength of their self-efficacy beliefs (Bandura, 1997), which influence their ability to perform a specific task, the degree of effort expended and the persistence of their effort.

- *Self-efficacy*: following Bandura (1997), we define self-efficacy as people's judgment of their ability to perform a certain behavior.

Self-efficacy is not concerned with past performance, but rather with an assessment of what could be done in the future. Perceptions of self-efficacy are not reflective of a global personality trait, but instead vary across different behavioral domains (e.g., physical self-efficacy, productivity self-efficacy, play self-efficacy, etc.).

TAM was developed to predict end-user acceptance of information systems within organizations. It was based on the Theory of Reasoned Action (TRA), which argues that both the attitude toward an action and subjective norms have an impact on behavior, which in turn affects how people carry out an activity. The fundamental rationale is that users of information technology base their actions on a rational decision. TAM proposes that the usefulness and ease-of-use of a system (new hardware, software, etc.) are the most salient factors of a person's behavior to use the system in workplace environments. The key difference between workplace and consumer contexts with respect to TAM is that, with the latter, a hedonic factor may be an important addition to the model (Childers et al., 2001).

- *Perceived ease-of-use (PEOU)*: refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis et al., 1992)
- *Perceived usefulness (PU)*: refers to “the degree to which a person believes that using a particular system would enhance his or her job performance” (Davis et al., 1992).

#### **4. HYPOTHESES**

Computer self-efficacy has been widely applied in information technology/information systems studies (Compeau et al., 1999, Agarwal and Karahanna, 2000), which confirm the critical role that computer self-efficacy plays in understanding the way people respond to information technology. The characteristics and operations of mobile

phones may differ from those used in traditional computing (such as desktop computers). As a consequence, mobile phone self-efficacy or M-Internet self-efficacy is preferable to computer self-efficacy or Internet self-efficacy. When applied to e-commerce, self-efficacy is defined as people's judgments of their own ability to gather product information and purchase products online. Our study has focused on whether respondents believed they had the knowledge or ability needed to adopt or use mobile payments services.

We are more likely to attempt and persist in behavior that we feel we are able to performing. Perceived self-efficacy of mobile payment will be an important knowledge resource for consumers in terms of adopting mobile payment. It has been suggested that the higher a person's level of self-efficacy, the more likely that person is to adopt mobile payment. Therefore, based on the theoretical and empirical support from the information systems literature, the following hypothesis is proposed:

***H1: Perceived self-efficacy has a positive effect on mobile payment behavior***

There is some evidence of a causal link between self-efficacy and PEOU (Agarwal and Karahanna, 2000, Venkatesh et al., 2003). It offers a positive contribution to individuals' perceptions of system ease-of-use and usefulness (Compeau et al., 1999). Self-efficacy influences people's decisions on how to behave, the effort they are willing to make and thus, ultimately, the mastery of their behavior (Compeau et al., 1999). Individuals with high levels of self-efficacy will perceive a system as easy and useful due to the effect their self-efficacy has on the effort, persistence and level of learning involved, and they will be less resistant to change. Thus, self-efficacy is likely to have a direct and indirect effect on the use of a system, through PEOU and PU.

Davis et al. (1992) argue that PEOU is related to feelings about self-efficacy. Prior to having direct experience with the target technology, individuals anchor the specific PEOU of a new technology to their general beliefs regarding other technologies and their use (Venkatesh et al., 2003). The causality between self-efficacy and ease-of-use has been demonstrated in several studies. For example, Venkatesh et al. (2003), after examining six different systems, found support for the hypothesis that people's perception of a particular system's ease-of-use is at all times connected to their general computer self-efficacy. Agarwal and Karahanna (2000) further distinguished between general computer self-efficacy and application-specific self-efficacy. Their results indicate a stronger relationship between



specific computer self-efficacy and ease-of-use. Consistent with earlier studies, we hypothesize that:

***H2: Perceived self-efficacy has a positive effect on the perceived usefulness of mobile payment behavior***

***H3: Perceived self-efficacy has a positive effect on the perceived ease-of-use of mobile payment behavior***

With regard to motivation, Davis et al. (1992) tested a motivational model of technology usage. Consistent with earlier studies into different kinds of behavior, they found that extrinsic and intrinsic motivation were key drivers for engaging in a particular behavior (i.e., technology usage). Research suggests that, for behaviors that are not purely intrinsic in the first place (for example, use the mobile phone to purchase goods or services), extrinsic and intrinsic motivations play an additive role in explaining behavior. Applied to mobile payment, Ko et al. (2009) have confirmed that both intrinsic and extrinsic motives are significant predictors of the use of mobile shopping for fashion products in Korea. We expect intrinsic and extrinsic motivation to have a combined effect within the context discussed in this paper. The following hypotheses are proposed:

***H4: Extrinsic motivations have a positive effect on mobile payment behavior***

***H5: Intrinsic motivations have a positive effect on mobile payment behavior***

Mobile phones and services enable people to move around while maintaining access to relevant services and staying (socially) connected. The nomadic value of mobile services is reflected in concepts like anytime and anyplace, which are mentioned in almost every paper discussing the potential of mobile services. Literature mentions mobility, availability (anytime, anyplace) and personalization as being important benefits of (multimedia) mobile services. It is important for users to be able to access the network while they are on the move, but also to be able to access the network from different locations. Many benefits have been associated with the use of mobile services, such as timeliness, easy access, place and time interdependence (Kleijnen et al., 2007). In contrast to earlier technologies, whose extrinsic motivations used to be proxied by the PU of the system they used (Davis et al., 1992, Venkatesh et al., 2003), today's mobile phones and services are adopted for the sake of flexibility (Lopez-Nicolas et al., 2008). Therefore, in the context of advanced mobile services, people's extrinsic motivation to adopt these services may rely on their perception of

flexibility. Users of mobile payment can benefit from flexibility (portability and instant accessibility), and their perceptions of portability can enhance the PU. Usefulness has to do with the degree to which people believe a certain system will help them perform a certain task. Kleijnen et al. (2007) find that the benefits derived from the ubiquitous nature of mobiles can create value for mobile services in terms of, among other things, usefulness, efficiency and functionality. Also, Hong and Tam (2006) find that perceived service availability, defined as the extent to which an information appliance is perceived as being able to provide timely connections, is positively related to the PU of mobile data services. Accordingly, a perceived higher flexibility will increase the PU of mobile payment services.

***H6: Extrinsic motivations have a positive effect on the perceived usefulness of mobile payment behavior***

PEOU is a construct that focuses on an individual's perception of the level of effort needed to use a system and represents the user's subjective evaluation of the process of interaction with a system (Venkatesh et al., 2003). Bandura (1997) suggests that there are two types of expectation, efficacy and outcome, that determine people's behavior. He defines an efficacy expectation as the conviction that one can successfully execute the behavior required to produce a certain the outcome (Bandura, 1997), while an outcome expectancy is defined as a person's estimate that a given behavior will lead to certain outcomes (Bandura, 1997). PEOU is related to efficacy beliefs (Venkatesh et al., 2003). Based on intrinsic motivation and user acceptance research, it can be expected that, for a given objective level of effort, greater levels of intrinsic motivation during the process of adopting mobile payments services will have a favorable impact on perceptions of effort (PEOU). People who are more intrinsically motivated to use computer technologies expected to be pleased using a new technology for the sake of using it, rather than just the associated positive outcomes. Such individuals may tend to "underestimate" the difficulty associated with using a new technology, because they enjoy the process and do not perceive it as requiring much of an effort, compared to people with a lower intrinsic motivation. This implies that there is likely to be a positive relationship between intrinsic motivation and PEOU. Research in psychology suggests that higher levels of intrinsic motivation typically lead to a willingness to spend more time on a given task, facilitating perceptions of ease-of-use. According to Davis et al. (1992), intrinsic motivation can be operationalized as perceived enjoyment - the extent to which using a computer is perceived to be enjoyable distinct from any potential performance outcomes. Earlier studies into computer usage found that intrinsic motivation strongly predicted people's perceptions of

ease-of-use (Venkatesh et al., 2003). We extend this argument to suggest that higher levels of intrinsic motivations will lead to lower perceptions of effort when using mobile phones to purchase goods or services. In summary, we expect that intrinsic motivations will affect mobile payment behavior both directly and indirectly via PEOU. Thus, we propose the following:

***H7: Intrinsic motivations have a positive effect on the perceived ease-of-use of mobile payment behavior***

**Insert figure 2 about here**

## **5. METHODOLOGY**

### **5.1. DATA COLLECTION AND SAMPLE**

The respondents were selected from a large panel of 25,000 households that are regularly used for survey research and that are representative of the Dutch population. The panel data has been previously analyzed to assure the representativeness of the population and obtain an appropriate sample for analysis. Potential respondents (N = 900) were first approached via telephone to invite them to participate and to determine whether or not they used a mobile phone. Respondents who agreed and matched the selection criterion (N=714) were sent an e-mail with a link to the online questionnaire. We received 429 questionnaires, representing a 60% response rate. The sample was checked against relevant criteria to determine whether or not it was representative of the Dutch population. The results demonstrated adequate levels of sample representativeness.

### **5.2. MEASURES**

Our multi-item scales were drawn from earlier studies. For the intrinsic/extrinsic motivation, we used items adapted from Davis et al. (1992). Intrinsic motivation was measured as perceived enjoyment and extrinsic motivation as perceived flexibility. To measure the different dimensions of the TAM model, PU and PEOU, we use scales adapted from the work by Davis (1992). Self-efficacy was measured by adapting the scale of Compeau and Higgins (1999), consistent with previous work on the determinants of PEOU (Venkatesh et al., 2003). Finally, Mobile pre-payment and post-payment behaviors were adapted on the basis of the different mobile services (Kim et al., 2010, Mallat et al., 2009, Kleijnen et al., 2007, Nysveen et al., 2005) and the moment payment of these services takes place. The appendix shows the scales we used.

All items were assessed using five-point Likert scales from 1= “strongly disagree” to 5 = “strongly agree” (ease-of-use, usefulness, self-efficacy, extrinsic motivation and intrinsic motivation) and from 1 = “I definitively would not use” to 5 = “I definitively would use” (pre/post-payment behavior). The instruments were examined first to establish the reliability of scales.

### **5.3. RELIABILITY AND SCALE PROPERTIES**

To refine our measures, we conducted a confirmatory factor analysis (CFA) using LISREL 8.8 to determine the validity and reliability of our measures. As can be observed from Table

7, the results of the seven factor model provided an acceptable fit (chi-square(168)= 456.21 ; CFI=.97 ; NNFI=.97 ; RMSEA=.06 ; RMSEA Range= (0.05;0.07)). The comparative fit index (CFI) and the non-normed fit index (NNFI) were both above 0.90, and the root mean square error of approximation (RMSEA) was lower than 0.08. Since our research contains several multi-item reflective scales, we investigated the psychometric properties of these measures through the composite reliability index and the average variance extracted index (Bagozzi and Yi, 1988). Both indexes exceeded the recommended benchmark of .60 and .50, respectively.

### **Insert table 2 about here**

Evidence of discriminant validity among the dimensions was provided by two different procedures recommended in literature, as follows: 1) the 95% confidence interval constructed around the correlation estimate between two latent variables never includes value 1. 2) the comparison of the square root of the AVE (diagonal in Table 7) with the correlations among constructs (i.e., off-diagonal elements) reveals that the square root of the AVE for each component is greater than the correlation between components, in support of discriminant validity. These findings provide evidence of discriminant validity among the components and constructs. Overall, the results obtained from these tests provided evidence of reliability for reflective constructs. The hypotheses will be tested subsequently using a structural model, to test whether TAM dimensions fully or partially mediate the effect of motivations and self-efficacy on pre-payment and post-payment behavior.

### **5.4. COMMON METHOD BIAS**

Most researchers agree that common method variance is a potentially serious biasing threat in behavioral research. We used two procedures to examine the common method bias. Firstly, we applied a confirmatory factor-analytic approach to Harman's one-factor test. A worse fit for the one-factor model would suggest that common method variance does not pose a serious threat. In our study, the one factor model yielded chi-square = 2442.37. Compared with chi-square = 456.21 of the measurement model, the fit is considerably worse, suggesting that common method bias is not a serious threat in the study. Secondly, we used a single factor method that includes all the measures as indicators of one factor measurement model. This approach yielded a chi-square = 448.26, which is considerably worse than the chi-square = 456.21 of the measurement model, again suggesting that common method bias is not a serious threat in the study.

## 6. RESULTS

### 6.1. STRUCTURAL MODEL

The hypotheses were tested using the path analysis method drawn from Structural Equation Modeling (SEM) using Lisrel 8.8. The analysis examined the model fit for both mobile pre-payment and post-payment behavior. The fit of the structural model was estimated mostly with the CFI, NNFI and RMSEA. As shown in Table 3, the model fit was reasonably adequate for testing the hypotheses proposed in the current study.

**Insert table 3 about here**

#### Mobile Post-payment behavior

The results presented in Figure 3 illustrate that our hypotheses are mostly confirmed for this type of mobile service. At a significant level of 0.01, our results reveal a positive and significant effect for self-efficacy (.44) on PU, supporting H2. Furthermore, self-efficacy has a positive and significant effect (.74) on PEOU at a significant level of 0.001, supporting H3. Self-efficacy has no significant direct impact on mobile post-payment behavior.

**Insert figure 3 about here**

With regard to the hypotheses related to motivations, we find the expected result for H5 and H6. Intrinsic motivations have a positive and significant effect (.17) at a significant level of 0.05, supporting H5, whereas extrinsic motivations have a positive effect (.77) on PU at a significant level of 0.001, supporting H6. For H4 (-.58) and H7 (-.14) we find a significant effect in the opposite direction of the hypothesized effect.

#### Mobile Pre-payment behavior

As can be observed in Figures 3 and 4, most of the relationships were confirmed. Also, there are important differences among the types of mobile services, which clearly confirmed that users vary in their motivations for using mobile payments services. The most important difference is related to the direct effect of extrinsic and intrinsic motivations on mobile pre-payment behavior. Whereas there is a direct effect of extrinsic motivations and intrinsic motivations on mobile post-payment behavior, that effect does not occur in mobile pre-payment behavior. Extrinsic and intrinsic motivations have no significant direct impact on mobile pre-payment behavior.

**Insert figure 4 about here**

## 7. DISCUSSION

The first theoretical contribution of this paper is directly related to the inclusion of the Motivational Theory, Self-efficacy Theory and TAM in the same model. To the best of our knowledge, this is the first time that they have all been combined into a single model. TAM was first developed to predict the acceptance of information systems within organizations. We adapt it to a consumer context to predict mobile payment behavior. We extend the TAM by including extrinsic and intrinsic motivations, two concepts adapted from Motivational Theory. Although the motivations included in the model have a direct effect, PEOU and PU also mediate the effects. Furthermore, we add the self-efficacy concept adapted from Self-efficacy Theory, which also plays an important role in behavior. The extension of the TAM with intrinsic motivations, extrinsic motivations and self-efficacy represent important antecedents of consumers' behavior.

Secondly, we develop a model to explain consumer behavior of two different types of mobile services, validating existing theories by studying two unexplored types of services (mobile pre-payment and post-payment services) based on the timing of the payment. The most promising and notable effects revealed in this study refer to intrinsic and extrinsic motivations. These effects are different for the two types of mobile services, proving the importance of studying mobile pre-payment and post-payment services separately. The result is consistent with prior studies (Verkasalo et al., 2010), which argue that models like TAM should specifically address individual mobile services. The models we tested in this paper show that there are significant differences between the various types of mobile services.

Our results emphasize several implications for marketing managers with regard to the development of mobile services (Cao et al., 2015). Literature proposed the importance of using mobile services for organizations to survive and prosper. Thus, understanding people's behavior in using mobile services is very important to marketing managers when developing new services and marketing communication campaigns.

With regard to mobile post-payment behavior, motivations have a direct and an indirect effect (through PEOU and PU). Whereas intrinsic motivations have a positive effect on behavior, extrinsic motivations have the opposite effect. As is shown in studies that explain people's attitudes toward using mobile services (Nysveen et al., 2005), enjoyment plays a role and has a positive impact on post-payment mobile services. However, extrinsic motivations have a negative influence on this type of service. In other words, people are more likely to use a service if they perceive the process as being enjoyable (intrinsic motivation)

than if they are driven by extrinsic motivations (e.g., flexibility). According to Davis et al. (1992), extrinsic motivation influences behavior due to the reinforcement value of outcomes. However, for post-payment services, this effect is not direct. The reinforcement process requires an intermediate outcome in the form of a higher perception of usefulness, which is why, with mobile post-payment, the service is enjoyed before payment takes place. Shang et al. (2005) also found that intrinsic motivation was the major reason for consumers to shop online and that the effect of extrinsic motivations was not significant, while Ko et al. (2009) found intrinsic motivations to have a positive effect on mobile shopping for fashion products. Thus, it is important to develop enjoyable products and services when developing mobile post-payment services. However, these motivational variables have a different effect on mobile pre-payment services, where motivations do not have a direct effect. In this case, intrinsic or extrinsic motivation is not enough for people to use a service. The direct effect is not significant. Motivations in the case of mobile pre-payment services only have an impact through PU or PEOU.

However, there were some surprising results with regard to the indirect effect of intrinsic motivations through PEOU. If we take a more detailed look at the mediating role of PU and PEOU, we can confirm that they play an important role. Whereas extrinsic motivations strongly affect PU (.77), intrinsic motivations have a negative and significant effect on PEOU (-.14). Davis et al. (1992) argue that perceived enjoyment is an intrinsic motivation that directly influences people's intention to use PCs. Venkatesh (2003) found that perceived enjoyment may have an indirect impact via PEOU, while Hong and Tam (2006) found a positive effect of perceived enjoyment on PEOU.

If we look at the effect of self-efficacy on PU and PEOU, some interesting conclusions can be drawn. The effect of self-efficacy has to be studied through the effect on usefulness and ease-of-use. If people feel they have the necessary skills to engage in a certain behavior, but they do not perceive the service as being useful or easy to use, they will not use that service. Self-efficacy has a strong effect on PU (.44) and PEOU (.74), which is consistent with Agarwal and Karahanna (2000) and Compeau and Higgins (1999) in their studies about the acceptance of information technology. In a mobile context, Luarn and Lin (2005), in their study into M-banking, find self-efficacy to have a positive effect on PEOU. As suggested by our model, perceived self-efficacy indirectly influences people's behavior through its effect on PEOU and PU. Thus, it may be useful for management to focus on the development of perceived self-efficacy. Organizing education and training courses on various mobile payment



applications can increase people's familiarity with mobile computing technologies and help them develop perceived self-efficacy.

Table 4 shows the overall effects of motivations and self-efficacy on mobile payment behavior for both post-payment and pre-payment services. The most important difference is the overall effect involving extrinsic motivations. The coefficient for pre-payment services is .28, compared to the non-significant value for post-payment services. Thus, extrinsic motivations lead to higher levels of pre-payment services whereas, for post-payment services, extrinsic motivations do not lead to higher levels of those types of services.

#### **Insert table 4 about here**

With regard to intrinsic motivations and their overall effect on people's behavior, the coefficients are positive and significant for both pre-payment (.15) and post-payment (.19) services. This study shows that the overall effect of motivation depends on the type of service. The overall effect of intrinsic motivations on behavior is stronger for post-payment services, whereas extrinsic motivations have a greater effect on pre-payment services. This empirically validates that consumers of mobile payments have both intrinsic and extrinsic shopping motivations for adopting pre-payment services. Consumers obtain not only product value, but also pleasure and enjoyment during the process of shopping.

Finally, the total effects analysis shows another interesting difference between the two services. Whereas self-efficacy is the most important variable for post-payment services, extrinsic motivations is the most important for pre-payment services. In other words, people use the mobile phone to buy services/goods they have to pay before consuming (e.g., a flight tickets), mostly because of their perceptions of flexibility. However, the perception of having the necessary skills to perform the activity is the main determinant for post-payment services. Thus, a possible marketing strategy aimed at increasing the use of mobile services through the effects of perceived self-efficacy could be to offer free use of the service for a period of time. This would enable potential users to learn the service and thus increase their perceived ability to perform the behavior. Once customers start using and become used to the mobile service, they may be inclined to continue using it. Perhaps levels have remained low because potential users lack the knowledge required to use the service. Also, it may make more sense to set up an education campaign rather than go for a system redesign. Organizing education and training courses can increase people's perceived self-efficacy. Training programs should also highlight the influence of individual factors. For example, for men, the training program

should emphasize usefulness or flexibility, while for women, ease-of-use or enjoyment should be emphasized.

Based on the discussion presented above, our results have several implications for marketing managers to empower the use of mobile services (Wong et al., 2015). The results show an overall impact of self-efficacy, extrinsic motivations and intrinsic motivations on mobile services. Regarding the overall effects, perceived enjoyment has a significant and positive effect on mobile pre-payment and post-payment services.

The proposed model describes a concrete set of factors that sellers can readily use to enable consumers to purchase with their mobile devices (enjoyment, flexibility, self-efficacy, usefulness). Managers should include more enjoyment values while operating and designing shopping mobile websites, such as interactive designs to stimulate shopping of consumers. It is also important to increase the PU, another critical factor in encouraging potential customers to use mobile payment services. The specific characteristics of mobile services adding value can be used in promoting PU. For example, mobility can help individuals make quick reservations or take advantage of situation dependent promotions. Finally, an interesting recommendation is to implement new mobile payments methods based on the context of the service (pre-payment services or post-payment services) because their antecedents are different.

## **8. LIMITATIONS AND FUTURE RESEARCH**

Any study's contribution must be evaluated in light of its limitations and this study is no exception. One of the limitations of our study is that it is a cross-sectional research. However, perceptions change over time as individuals gain experience, which means that longitudinal research may offer more interesting results.

With regard to future research, there is a need to identify additional variables, such as subjective norms, that can improve our ability to predict people's behavior more accurately. Also, testing these models in different countries would allow us to examine differences in consumer behavior with regard to different cultural characteristics. There may be differences with regard to the advance of mobile services between US and Europe, as well as within different European countries.

## APPENDIX

### Ease-of-use:

- I think that mobile services are user-friendly
- It seems easy to me to learn how to use mobile services
- It seems to me that using mobile services is easy

### Usefulness

- Communication becomes more effective
- Use of time becomes more effective
- Communication is more efficient with mobile services
- Advanced mobile services make me more efficient

### Self-efficacy

- I know how to use mobile services
- It takes too much time and effort to learn how to use mobile services
- I have the knowledge and skills to operate mobile services

### Extrinsic motivation

- With mobile services I get needed information wherever and whenever
- With mobile services I can carry out tasks wherever and whenever

### Intrinsic motivation

- When I have time to kill, I use mobile services
- Mobile services offer me entertainment (e.g., games, videos, chat)
- I can share my experiences with my virtual communities (e.g., via Twitter, Facebook)

### Mobile Pre-payment behavior

- Reservation and/or purchase of cinema/theater/concert tickets via a mobile phone
- Reservation for accommodation via a mobile phone
- Reservation and/or purchasing flight, train or bus tickets

### Mobile Post-payment behavior

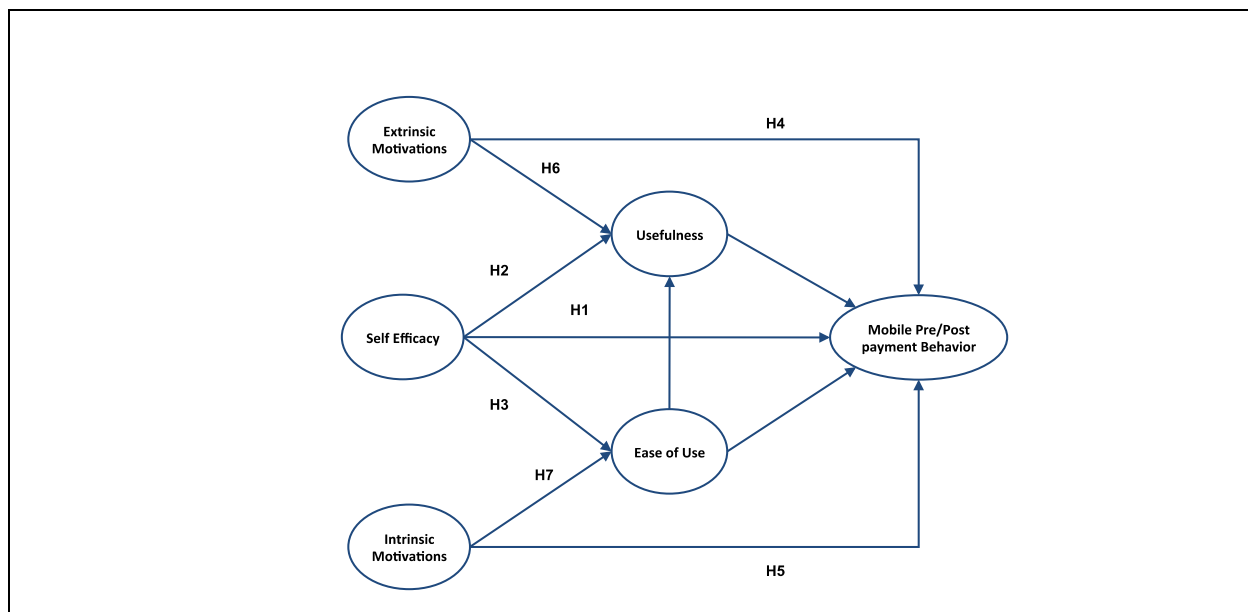
- Small payments via a mobile phone (vending machines, bus trips, etc.)
- Routine bank services (paying small bills, etc.)
- Mobile gambling via a mobile phone

## FIGURES

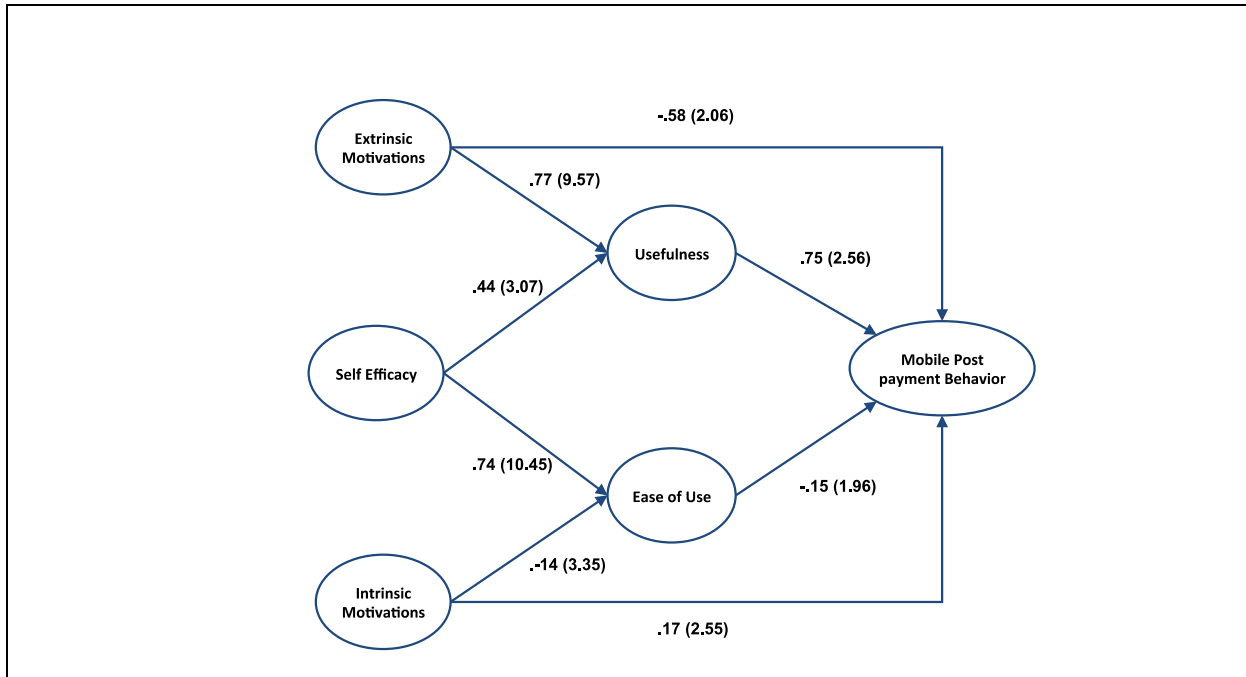
**Figure 1. Traditional, E-commerce and M-commerce experiences**

	Physical presence	Information available	Social Interaction
<b>TRADITIONAL</b>	In-store	All senses	Face-to-face
<b>E-COMMERCE</b>	At a desk	Text and pictures	Virtual
<b>M-COMMERCE</b>	Stuck in traffic	Text and pictures /shopping list	Virtual

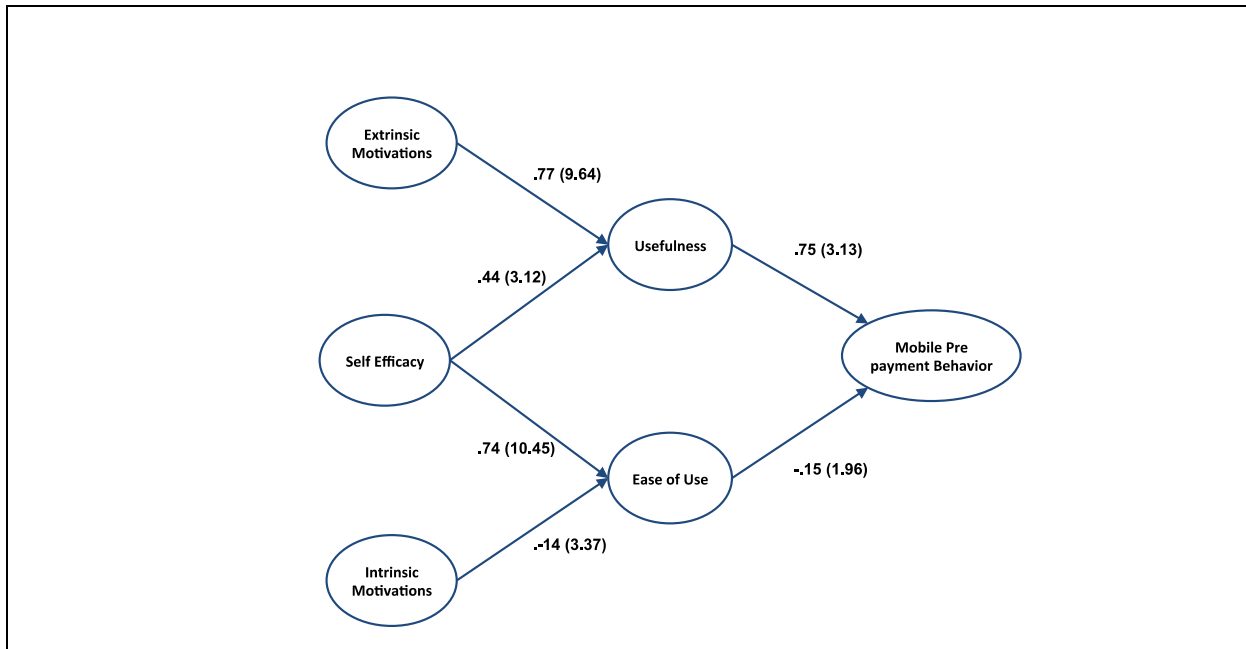
**FIGURE 2. Theoretical Model**



**FIGURE 3. Results “Mobile post-payment behavior”**



**FIGURE 4. Results “Mobile pre-payment behavior”**



**TABLES**

**TABLE 1. Mobile Pre-payment / Post-payment Services**

<b>AUTHOR</b>	<b>MOBILE PRE-PAYMENT SERVICES</b>	<b>MOBILE POST-PAYMENT SERVICES</b>
<b>Dahlberg et al., (2008), (2015) (Dahlberg et al., 2015)</b>		Micropayments
<b>De Reuver (2015)</b>		Micropayments
<b>Kim et al., (2010)</b>	Bus/train/flight/concert tickets	
<b>Kleijnen et al., (2007)</b>		M-brokerage
<b>Lin, (2011)</b>		M-banking
<b>Liu et al. (2015)</b>		Micropayments
<b>Luarn et al., (2005)</b>		M-banking
<b>Mallat et al., (2009)</b>	M-ticketing	
<b>Nysveen et al., (2005)</b>		Micropayments

**TABLE 2. Descriptive and measurement statistics for reflective constructs**

	<b>Mean</b>	<b>SD</b>	<b>CR</b>	<b>AVE</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>
<b>1. Extrinsic Motivations</b>	2.89	1.01	0.82	0.70	0.84						
<b>2. Intrinsic Motivations</b>	1.59	0.82	0.84	0.64	0.32	0.80					
<b>3. Self-Efficacy</b>	3.14	1.04	0.82	0.62	0.42	0.34	0.79				
<b>4. Usefulness</b>	2.78	0.92	0.75	0.50	0.65	0.46	0.49	0.71			
<b>5. Ease of Use</b>	2.99	0.90	0.83	0.64	0.47	0.21	0.74	0.46	0.80		
<b>6. Pre-payment behavior</b>	2.91	1.15	0.87	0.68	0.31	0.17	0.28	0.43	0.26	0.82	
<b>7. Post-payment behavior</b>	2.37	1.03	0.77	0.52	0.22	0.31	0.31	0.38	0.27	0.59	0.72

Notes: Mean = the average score for all items included in this measure; SD = standard deviation; CR = composite reliability; AVE = average variance extracted; n.a. = not applicable. The numbers on the diagonal are the square root of the AVE. Off-diagonal elements are correlations among constructs.

**TABLE 3. Goodness-of-Fit of Structural Model**

	<b>Chi-square</b>	<b>df</b>	<b>CFI</b>	<b>NNFI</b>	<b>RMSEA</b>
<b>(Recommended value)</b>			$\geq 0.90$	$\geq 0.90$	$< 0.08$
<b>Post-payment behavior</b>	427.84	122	0.96	0.96	0.07
<b>Pre-payment behavior</b>	399.97	122	0.97	0.97	0.07

**TABLE 4. Total effects of motivations on mobile payment behavior**

<b>TOTAL EFFECTS COEFFICIENTS</b>	<i>Mobile pre-payment behavior</i>	<i>Mobile post-payment M- behavior</i>
	<b>Overall</b>	<b>Overall</b>
<b>Ext. motivations - Mobile payment behavior</b>	.28 (3.97)	n.s.
<b>Int. motivations - Mobile payment behavior</b>	.15 (1.96)	.19 (2.96)
<b>Self-efficacy - Mobile payment behavior</b>	.21 (3.01)	.27 (3.79)
<b>R<sup>2</sup> (Mobile pre-payment behavior)</b>	.35	
<b>R<sup>2</sup> (Mobile post-payment behavior)</b>		.30
n.s. = not significant. (t-values)		

## REFERENCES

- AGARWAL, R. & KARAHANNA, E. 2000. Time flies when you're having fun: Cognitive absorption and beliefs about information technology usage. *MIS Quarterly*, 24, 665-694.
- BAGOZZI, R. P. & YI, Y. 1988. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*, 16, 74-94.
- BANDURA, A. 1997. Self-Efficacy: The Exercise of Control. *New York: WH Freeman & Co.*
- CAO, Y., LU, Y., GUPTA, S. & TANG, S. 2015. The effects of differences between e-commerce and m-commerce on the consumers' usage transfer from online to mobile channel. *International Journal of Mobile Communications*, 13, 51-70.
- CHILDERS, T. L., CARR, C. L., PECK, J. & CARSON, S. 2001. Hedonic and utilitarian motivations for online retail shopping behavior. *Journal of Retailing*, 77, 511-535.
- COMPEAU, D. R., HIGGINS, C. A. & HUFF, S. 1999. Social Cognitive Theory and Individual Reactions to Computing Technology: A Longitudinal Study. *MIS Quarterly*, 23, 145-158.
- DAHLBERG, T., GUO, J. & ONDRUS, J. 2015. A critical review of mobile payment research. *Electronic Commerce Research and Applications*, 14, 265-284.
- DAHLBERG, T., MALLAT, N., ONDRUS, J. & ZMIJEWSKA, A. 2008. Past, present and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, 7, 165-181.
- DAVIS, F. D., BAGOZZI, P. & WARSHAW, P. R. 1992. Extrinsic and Intrinsic Motivation to Use computers in the Workplace. *Journal of Applied Psychology*, 22, 1111-1132.
- DE REUVER, M., VERSCHUUR, M., NIKAYIN, F., CERPA, N. & BOUWMAN, H. 2015. Collective action for mobile payment platforms: A case study on collaboration issues between banks and telecom operators. *Electronic Commerce Research and Applications*, 14, 331-344.
- HONG, S. J. & TAM, K. Y. 2006. Understanding the adoption of multipurpose information appliances: The case of mobile data services. *Information Systems Research*, 17, 162-179.
- KIM, C., MIRUSMONOV, M. & LEE, I. 2010. An empirical examination of factors influencing the intention to use mobile payment. *Computer* 26, 310-322.
- KLEIJNEN, M., RUYTER, K. & WETZELS, M. 2007. An assessment of value creation in mobile service delivery and the moderating role of time consciousness. *Journal of Retailing*, 83, 33-46.
- KO, E., KIM, E. Y. & LEE, E. K. 2009. Modeling consumer adoption of mobile shopping for fashion products in Korea. *Psychology & Marketing*, 26, 669-687.
- LIN, H.-F. 2011. An empirical investigation of mobile banking adoption: the effect of innovation attributes and knowledge-based trust. *International Journal of Information Management*, 31, 252-260.
- LIU, J., KAUFFMAN, R. & MA, D. 2015. Competition, cooperation, and regulation: Understanding the evolution of the mobile payments technology ecosystem. *Electronic Commerce Research and Applications*, 14, 372-391.
- LOPEZ-NICOLAS, C., MOLINA-CASTILLO, F.-J. & BOUWMAN, H. 2008. An assessment of advanced mobile services acceptance: Contributions from TAM and diffusion theory models. *Information & Management*, 40, 359-364.
- LUARN, P. & LIN, H. 2005. Toward an understanding of the behavioral intention to use mobile banking. *Computers in Human Behaviour*, 21, 873-891.
- MALLAT, N., ROSSI, M., TUUNAINEN, V. & ÖÖRNI, A. 2009. The impact of use context on mobile services acceptance: the case of mobile ticketing. *Information & Management*, 46, 190-195.
- NYSVEEN, H., PEDERSEN, P. & THORBJORNSSEN, H. 2005. Intentions to use mobile services: Antecedents and cross-service comparisons. *Journal of the Academy of Marketing Science*, 33, 330-346.
- OKAZAKI, S., NAVARRO-BAILON, M. A. & MOLINA-CASTILLO, F. J. 2012. Privacy Concerns in Quick Response Code Mobile Promotion: The Role of Social Anxiety and Situational Involvement. *International Journal of Electronic Commerce*, 16, 91-119.



- POUSTTCHI, K. 2008. A modeling approach and reference models for the analysis of mobile payment use cases. *Electronic Commerce Research and Applications*, 7, 182-201.
- SHANG, R.-A., CHEN, Y.-C. & SHEN, L. 2005. Extrinsic versus intrinsic motivations for consumers to shop on-line. *information & Management*, 42, 401-413.
- VENKATESH, V., MORRIS, M., DAVIS, G. & DAVIS, F. D. 2003. User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27, 425-478.
- VERKASALO, H., LOPEZ-NICOLAS, C., MOLINA-CASTILLO, F. J. & BOUWMAN, H. 2010. Analysis of users and non-users of Smartphone applications. *Telematics and Informatics*, 27, 242-255.
- WONG, C.-H., WEI-HAN, G., OOI, K.-B. & LIN, B. 2015. Mobile shopping: the next frontier of the shopping industry? An emerging market perspective. *International Journal of Mobile Communications*, 13, 92-112.