ANALYSING INTENTION AND ACTION IN MOBILE BANKING SERVICES

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Abstract

Technological advances at the level of mobile devices are transforming the world. Banking users are able to conduct banking services at any place, and at any time, with m-banking. The purpose of this research is to analyse intention and action in m-banking services. A research model was developed and PLS was used to test the causalities in the proposed model. Our proposal extends the existing models with an assessment of the actual usage of m-banking and of how behavioural intention translates into action. This study found that the main determinants of behavioural intention for m-banking are social influence and relative advantage. Furthermore, perceived risk, lack of information and usage barriers have a negative effect on m-banking behavioural intention. Perceived risks, e-banking use, and behaviour intention are found to be significant antecedents of m-banking use. Gender has a positive and significant influence on m-banking usage, but not on the construction of behavioural intention.

Key Words: M-banking actual use, Acceptance factors, Barriers of use, TAM, TBP, IDT, PLS.

Introduction

Technological combinations of information and communication are instigating huge changes in society. In recent years, the use of e-commerce, e-business, and m-business has seen a large-scale increase. M-business in particular has gained the capacity to change lives and ways of doing business, due to the fact that consumers are becoming inseparable from their mobile devices (Yu, 2012), putting pressure on organisations, particularly financial organisations, to develop applications for this communication channel (Picoto et al., 2014). In parallel, with the changes in the banking environment, and with new entrants and agents encroaching on the conventional banking market, globalisation at the level of business operations and service innovation has intensified competition in the markets and banks, putting pressure on them to widen the services offered.

Technological developments have provided the opportunity for service providers to develop their offers with increasing flexibility for clients. As a consequence, banks have opened up various methods for accessing their service through new channels, such as ATMs, the Internet, and more recently, the mobile phone (Laukkanen, 2008). M-banking is defined as being a channel through which the client interacts with the bank through a mobile device, such as a mobile telephone or a smartphone. M-banking is expected to create distinct value, due to its mobile technology attributes, such as convenience, ubiquity and interactivity (Turban et al., 2006). Instead of having to visit a bank branch or using Internet banking (or e-banking), the development of m-banking has allowed users to access their account balances, pay bills and transfer funds using a mobile telephone or another mobile device. Many banks have developed apps for carrying out specific operations, as is the case of share brokerage. The banking sector is one of the foremost sectors of the market when it comes to the adoption of the Internet and mobile technologies (Laukkanen, 2005). This m-banking tendency represents a notable tendency for the banking sector. Banks are able to retain their existing clients with a new service offer (m-banking), and they have the opportunity to convert mobile telephone or smartphone clients into new clients of banking services (Gu et al., 2009).

In June 2011, there were 240,000 recorded smartphone users in Portugal (ACEPI, 2011). For the same year, figures showed that 92% of the population owned a mobile telephone, and 34% of them had a mobile with Internet connection (INE, 2011). For the first quarter of 2010, Portugal was the European Union country with the second highest penetration level for mobile services; with a recorded penetration level of 149.9 per 100 inhabitants, well above the EU average of 122.9 per 100 inhabitants (ANACOM, 2010). This data reinforces the idea that Portugal is a country that has interesting characteristics for developing this study. Given this high penetration rate, it would be interesting to understand what factors contribute to the intention to adopt m-banking services.

M-banking is still at an early stage of adoption. For this reason, it is important to understand the level of acceptance that potential users of m-banking have for these services and identify the factors which affect their intention to use m-banking. These objectives guide this research work. The existing research on m-banking adoption provides the theoretical bases upon which our research model is built and the dependent variable of these studies is the intention to adopt. Our proposal extends existing models with an assessment of the actual usage of m-banking and how behavioural intention translates into action. Additionally, we also hypothesise that the level of e-banking usage also influences m-banking actual use. To our knowledge, this is the first study about m-banking that measures m-banking actual use. To achieve the proposed objectives, this study develops a questionnaire based on existing scales and gauges of the intention to adopt, and about the use of m-banking in the respondents' nomological network. Based on data gathered from an online survey, we then test the measurement and structural models.

Literature Review and Theoretical Background

Several studies have been conducted concerning m-banking and mobile payments in different countries. Table 1 presents a summary of the main studies on m-banking adoption. Many researchers build on the Technological Acceptance Model (TAM) to explain the adoption of a certain technology at an individual level. However, as can be seen in Table 1, the TAM variables by themselves may not be sufficient to explain the adoption of m-banking (Hsu and Lu 2004). Therefore, an assessment may be made by building on other theories that also explain technological adoption at the individual level, such as the Theory of Planned Behaviour (TBP) (Ajzen, 1991), or the Diffusion of Innovation Theory (IDT) (Rogers, 2003).

Underlying the adoption behaviour of m-banking services there are a number of factors which are associated with fundamental theories which help in the understanding of such user behaviours. Rogers (2003) defined innovation as being an idea that is understood by people with regard to something that is new. In this sense, m-banking is defined as a technological innovation, and as such, theories that explain the adoption of innovation can be applied to it (Laukkanen, 2007). The adoption of new technologies by individuals has been the subject of various academic studies, as well as the study of those determinants that are behind the acceptance of technologies, as well as their usage (Davis 1989; Moore and Benbasat 1991; Taylor and Todd 1995). Between the various studies and the different models that have been proposed, the (TAM) of Davis (1989), which is based on and is adapted from the Theory of Rational Actions (TRA), is the most widely used and accepted one within the diverse group of Information Systems (IS) researchers.

Reference	Theory used	Variables applied	Sample size	Country
Suoranta (2003)	IDT	Relative advantage*, Complexity*, Compatibility, Observability, Trialability, Risk, Communication, Demography	1,253	Finland
Mallat (2007)	IDT, TAM	Relative advantage*, Compatibility*, Complexity, Costs, Network externalities, Trust*, Perceived security risks	46 interviews	Finland
Mirrela et al. (2004)	TAM	Perceived usefulness, Perceived ease of use, Perceived costs, Perceived system quality, Attitude*, Intention to use, Computer skills, Mobile technology, Social influence*	500	The Netherlands
Bauer et. al (2005)	TRA	Innovativeness, Perceived Utility*, Attitude, Existing Knowledge, Information, Social Norms*, Information Seeker, Entertainment, Behavioural Intention, Attitude toward Advertising, Social norms*, Perceived Risk	1,103	Deutschland
Cruz et al. (2009)	TAM	Usage Barrier*, Value Barrier*, Risk Barrier, Tradition Barrier, Image Barrier, Functional Barrier*, Psychological Barriers, Mobile banking Resistance	2,344	Portugal
Shen et al. (2010)	TAM, Benefit-cost framework	Perceived behaviour control*, Self-efficacy*, Expertise, Convenience*, Trust, Behavioural introspection, Technology anxiety, Security, Adoption Intention	400	Taiwan
Sripalawat et al. (2011)	TAM, TPB	Device Barrier, Perceived Risk, Lack of information, Perceived Financial Cost, Subjective Norm*, Perceived Usefulness*, Perceived Ease of Use, Self- Efficacy*	200	Bangkok
Shuiqing et al. (2011)	TRA, TPB, TAM, IDT	Perceived Risk, Perceived Fee, Compatibility, Relative advantage*, Social influence*, Personal Innovativeness*, Behavioural intention to continue using	639	China
Hsin-Hui (2005)	TAM, TPB	Perceived self-efficacy, Perceived financial cost, Perceived credibility*, Perceived ease of use*, Perceived usefulness*	180	Taiwan
Gu et al. (2009)	TAM, TRA, IDT, TPB	Social Influence, System Quality, Self-efficacy, Facilitating Conditions, Familiarity with bank, Situational Normally, Structural Assurance, Calculative-based Trust*, Perceived usefulness*, Perceived ease of use*, behavioural intention	910	Korea

*Note: Variables marked with * were found to be significant in the corresponding study.*

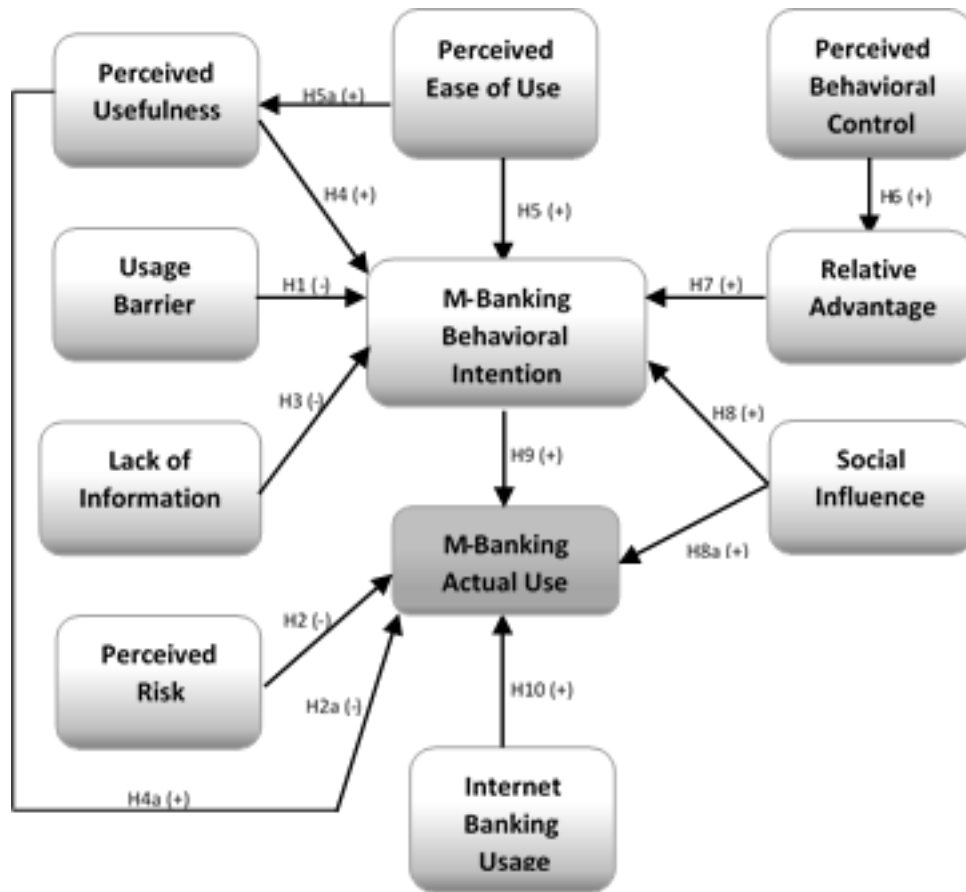### Table 1. Review of Studies on Adoption of M-Banking

TAM is a theoretical model which explains the acceptance of a new Information Technology (IT), and it uses perceived usefulness and perceived ease of use as determining factors for explaining the acceptance of IT. Some years later, this model was extended; TAM2 is an extension of TAM which was proposed by Venkatesh and

Davis (Venkatesh and Davis 2000). Their objective was to extend the initial TAM and to include determining factors for perceived usefulness, as well as constructs for intended use, thus facilitating an understanding of how the effects of these determinants change with the experience of the user and how they increase over time. TAM2 includes the subjective norm as a determinant of perceived usefulness, as does the original TAM model, and through TAM2 it can be seen that the subjective norm exerts a direct effect over the usage intentions, to a larger extent than perceived usefulness and perceived ease of use (Venkatesh and Davis, 2000). In 2003, Venkatesh et al. developed the Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT is an extension of TAM, and in accordance with TAM, both the adoption and use of IT are influenced primarily by four factors: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). TPB (Ajzen, 1991) presents another influential theory for the explanation and prediction of behaviours, and was developed so as to be able to predict a wide range of behaviours (Sheppard et al., 1988). According to TPB, the behaviour of an individual can be explained by his/ her behavioural intention, which is jointly influenced by his/her attitude, subjective norms and perceived behavioural control. Attitude refers to an individual evaluating a particular behaviour as being either positive or negative. Based on the previous studies related to m-banking, as well as the theoretical framework that governs the study of the adoption of technological innovations, a new theoretical model is developed in the next section, which seeks to determine the factors that are antecedents of intention to adopt m-banking, as well as its actual usage, and the way in which these two endogenous variables are associated.

Conceptual Model

This study focuses on the factors that contribute (negatively or positively) to the intent to adopt, and the usage of m-banking. To accomplish this, a conceptual model is proposed in order to provide a better understanding of the antecedents of m-banking behaviour intention, and m-banking usage. The model presented in Figure 1 results from the combined application of the TAM, TBP and IDT theories to the m-banking context. Shen et al. (2010) and Sripalawat et al. (2011) developed two models, both of which were studied contextually and applied to the reality of Thailand. In this study, we have also combined and extended these models, measuring the real usage of m-banking and ascertaining whether the intention to use affects actual usage. We also included e-banking usage as an antecedent of m-banking usage.

Controls: Gender

Figure 1. Research model

Mobile technologies are expected to create unique benefits of mobility, mainly through their portability. However, there is a trade-off between portability and usability (Gebauer and Shaw 2004), as the portability of mobile devices implies some disadvantages when compared to fixed wire e-business, as screens are smaller, there is limited computational power and memory capacity, a shorter battery life and higher risks of data storage (Nah et al. 2005). These usage barriers are identified as being factors which influence users to resisting innovations (Cruz et al. 2009). When compared to traditional Internet services, M-banking is more advantageous for users that are in constant movement, revealing to be a fit between technology and task. On the other hand, when tasks are more difficult or more demanding in terms of information, then mobile technologies have more difficulty in responding to such demands (Gebauer and Ginsburg 2009; Junglas and Watson 2008). As such, this study proposes the following hypothesis:

H1: U*sage barriers have a negative effect on the intention to adopt* m-banking*.*

Perceived risk about technology innovation is related to the uncertainty associated with the possible outcomes (Ram and Seth 1989). This is particularly important when sensitive financial information is involved. In the context of m-banking, perceived risk is related to security concerns (Shen et al. 2010). Risk is a factor which influences the resistance of the consumer to innovations (Laukkanen 2008). In this case, perceived risk is a significant inhibitor of m-banking adoption and usage (Cruz et al., 2009; Aldás-Manzano et al., 2009). For as it is at present, e-banking and m-banking are subject to similar risks, the difference being in the channels used for information communication. As such, this study proposes the following hypotheses:

H2: Perceived risk has a negative effect on the intention to adopt m-banking.

H2a: Perceived risk has a negative effect on the actual use of m-banking.

Information is crucial in any process of innovation diffusion (Rogers 2003). Good, or bad communication can be reflected in the success, or failure, of the innovation diffusion process, and this is also valid for the context of Internet banking (Jun and Cai 2001). Following the theory of innovation diffusion, during the initial phase of the innovation process (the "knowledge" or "consciousness" phase), representation of information and usefulness play a crucial role in the reduction of resistance to consumption (Rogers, 2003). The supply of adequate information is a factor which affects the attitudes of users in relation to m-banking. Besides this, lack of information, such as the awareness of a service and its benefits, prevents the adoption of such services (Kuisma et al. 2007). As such, this study proposes the following hypothesis:

H3: Lack of information has a negative effect on the intention to adopt m-banking.

Perceived usefulness is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" (Davis, 1989 p. 320). A system with a high degree of perceived usefulness is, in itself, one in which the user believes in the existence of a positive relationship between its performance and its usage (Davis, 1989). With regards to m-banking, perceived usefulness signifies that a bank client recognises the service as being able to improve their performance, increase their productivity and improve their effectiveness. Existing studies (Luarn and Lin, 2005; Sripalawat et al. 2011, Wang et al., 2006) have found that perceived usefulness is a vital factor in determining the usage of m-banking by consumers. As it stands, the reason why people use mobile banking systems is because they think that they are useful. At the same time, as perceived usefulness remains important in the long term (Venkatesh and Morris, 2000), we can infer that the usefulness that is individually perceived through using m-banking applications will have, thereafter, an influence on actual usage. As such, this study proposes the following hypotheses:

H4: Perceived usefulness has a positive effect on the intention to adopt m-banking.

H4a: Perceived usefulness has a positive effect on the actual use of m-banking.

Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free from effort" (Davis, 1989, p.320). In this study, perceived ease of use is defined as being the degree to which m-banking is perceived as being easy to understand and to operate. In the context of m-banking, users understand that m-banking is easy to use when they recognise that they have a high degree of self-efficacy. Much research lends support to TAM, due to the fact that perceived ease of use has a positive impact on perceived usefulness and on the intention by users to use mobile services (Gu et al. 2009; Luarn and Lin 2005; Sripalawat et al. 2011, Wang et al. 2006). As such, this study proposes the following hypothesis and sub-hypothesis:

H5: Perceived ease of use has a positive effect on the intention to adopt m-banking.

H5a: Perceived ease of use has a positive effect on perceived usefulness.

In general, perceived behavioural control (PBC) carries out two roles in TPB. In the first place, it is a co-determinant of intention, together with attitude and the subjective norm. In the second place, together with intention, it is a co-determinant of behaviour (Pavlou and Fygenson, 2006). When a user has a high level of perceived behavioural control, it is easier for them to dominate a technology, which in turn allows an individual to have spare cognitive capacity for learning and dominating other convenience traits. Perception of control leads to users making use of the convenience benefit from the m-banking service (Shen et al. 2010). According to TPB, perceived behavioural control, together with the behavioural intention, can be directly used to anticipate the realisation of behaviours. As such, this study proposes the following hypothesis:

H6: Perceived behavioural control has a positive effect over the intention to adopt m-banking*.*

Through m-banking, consumers can make financial transactions via mobile telephones, or smartphones, without having to visit the physical branch. M-banking offers benefits of mobility and convenience, which is something which traditional services and Internet banking do not offer. Among the list of innovation and diffusion characteristics proposed by Rogers (2003), relative advantages were validated for the most consistent explanation for the adoption of innovation, particularly in the context of the adoption of services based on mobile technologies (Mallat 2007; Wu and Wang 2005). In the context of this research, m-banking in many cases has relative advantages over traditional channels in terms of efficiency, convenience and ubiquity, which are unique advantages of mobile technologies. These benefits enables users to develop a positive attitude to the service, even without having had prior experience. Thus, this study proposes the following hypothesis:

H7: Relative advantage has a positive effect on the intention to adopt m-banking.

Empirical studies also indicate that subjective norm positively affects the intention to use m-banking, Internet banking services, wireless Internet and e-payment services (Gu et al., 2009; Sripalawat et al. 2011). In fact, users may notice that m-banking is useful when they see their colleagues, friends and family use it, and they obtain a positive recommendation from them about its use. Recently, in the context of mobile technology adoption, several studies have incorporated social influences in their research models and have found some empirical support. They have also discovered that social influences affect the intent to adopt, both directly, and indirectly through perceived usefulness (Gu et al., 2009, Lu et al., 2005, Sripalawat et al. 2011). As social environment can shape individual behaviours (Fishbein & Ajzen, 1975; Ajzen, 1991), we can infer that social influence also exert influence on continued and actual usage of m-banking. Thus, this study proposes the following hypotheses:

H8: Social influence has a positive effect on the intent to adopt m-banking.

H8a: Social influence has a positive effect on the actual use of m-banking.

Behavioural intention is the willingness of individuals to act on their expectations. According to TAM and TPB, it is what drives a person to act out a behaviour or to put an innovation to real use (Ajzen, 1991; Davis, 1989). For m-banking, the attitude towards adoption (or continued usage) of a particular system is generated by individual salient beliefs about the consequences of adoption (or continued use) (Karahanna et al., 1999). Individual attitude towards the use of a system is expected to influence intention to use the system. This study expects that this relationship would be maintained in the context of m-banking. Thus, this study proposes the following hypothesis:

H9: Behavioural intention has a positive effect on the actual use of m-banking.

Before the existence of mobile banking, many studies were developed about the factors that promoted or inhibited the use of Internet banking or e-banking at the individual level. The study of Lee (2009) was one of the studies which analysed various factors and which found that perceived risk was one of the factors which negatively influenced intention to use Internet banking. Users show concern about the possibility of fraud and threat which inhibit use intention. However, users who already use e-banking services are those that possibly overcame the risk barrier. As mentioned earlier, due to Internet banking and mobile banking being subject to similar risks, we assume that users of Internet banking are potential users of mobile banking. On the other hand, Lin's (2012) study was able to find a positive influence of e-services on m-services in a multi-channel study in the services industry. Thus, this study proposes the following hypothesis:

H10: The use of Internet banking has a positive effect on the actual use of m-banking.

Methodology

The conceptual model was tested by collecting data through an online survey. Given that m-banking use is adapted from Venkatesh et al.'s (2012) formative scale, and that e-banking use was inserted as a new formative construct composed of one item (in order to analyse its influence over actual m-banking usage), we tested the survey with 20 subjects prior to applying it to the final sample. Other scales were adapted from existing instruments. The survey questionnaire was constructed based on a review of the literature and two studies in particular (Shen et al., 2010; Sripalawat et al., 2011). Appendix A shows the instrument developed and the respective references. To ensure that the instrument was correctly translated from English to Portuguese, we followed the suggestions of Sekaran (2003) regarding instrument translation. Initially, we made pre-tests, where three accompanied people answered the questionnaire, allowing the identification of any difficulties in its completion. Then some changes were made regarding the usability of the online survey. The pilot test was then carried out, where twenty people responded to the questionnaire, and the results were analysed using the Smart PLS 2.0 (Ringle et al., 2005).

The m-banking system is designed primarily to serve consumers with needs in the area of financial management. The participants of this study were customers of banks in Portugal who may, or may not, be users of m-banking. It is important to gather this type of information in order that we can analyse responses from different sides of the factors. The questionnaire was sent to public institutions in Portugal, in order to achieve greater geographic reach and a diverse age and social range. The online questionnaire (www.surveymonkey.com) was sent by e-mail. A total of 354 responses were collated in 18 days. Of these, 70 responses were eliminated as they failed to respond to the third section of the survey. Thus, 284 responses were considered valid. The majority of respondents (59%) were female, aged 20-30 (50%), and full time employees (49.30%).
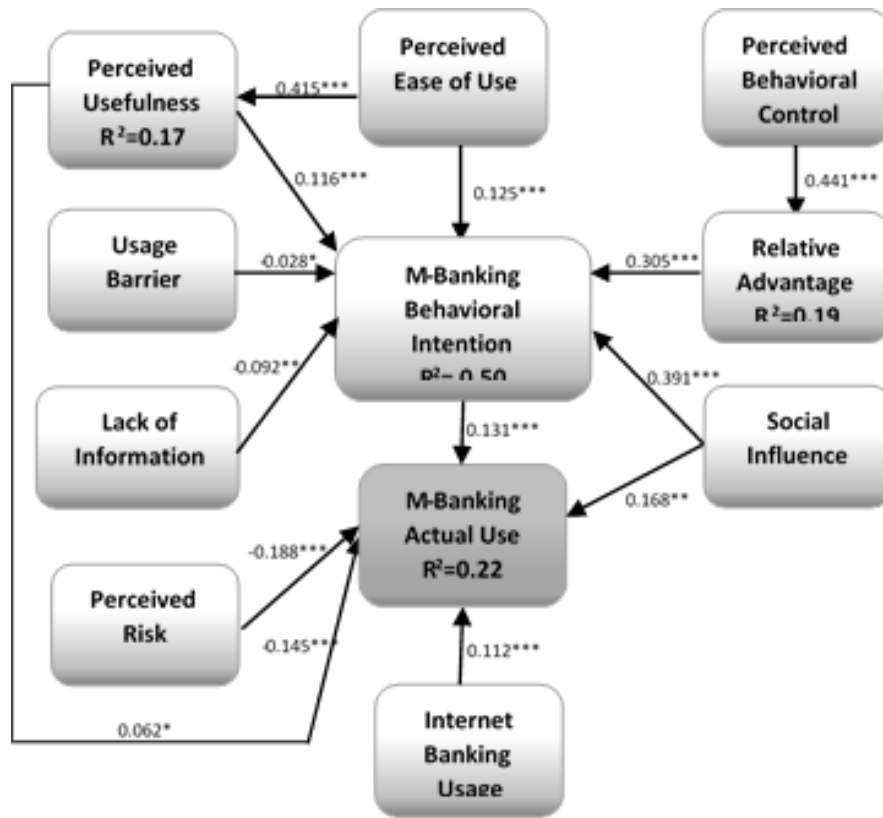
Data Analysis and Results

As we are interested in the effects of a set of variables for m-banking behaviour intention and use, an individual-level model was developed and tested. Structural equation modelling as implemented in Smart PLS 2.0 (Ringle et al. 2005) was performed to evaluate the measurement and structural models as we intend causal-predictive analysis when explaining complex relationship. Furthermore, the model is complex, with many latent variables, and PLS has minimal residual distribution requirements when compared to other structural models technics. We followed Henseler et al.'s (2009) suggestions to assess the measurement and the structural model quality.

The following measurement criteria are analysed: (i) internal consistency reliability, (ii) indicator reliability, (iii) convergent validity, and, (iv) discriminant validity. We

computed the reliability of scales for the reflective variables, using Cronbach's alpha and the composite reliability. All constructs have Cronbach's alpha values higher than 0.7. Additionally, all indicators have a composite reliability greater than 0.8. According to these criteria, the constructs in our instrument have good internal consistency reliability. For all indicators, the loadings are above that cut-off value, which means that our instrument has good indicator reliability. The AVE (Average Variance Extracted) is considered as a criterion for convergent validity, and a value of at least 0.5 indicates sufficient convergent validity (Henseler et al., 2009). All constructs have AVE values above the 0.5 limit, which means that the latent variable is capable of explaining more than 50% of the variance of its indicator on average. Another criterion for evaluating convergent validity is the estimated standard loading significance. The Fornell-Larcker criterion indicates that a latent variable should share more variance with its assigned indicators than with any other latent variable. Finally, for good discriminant validity, the measurement instrument should have an AVE for each variable higher than the square of correlations with all other latent variable (Henseler et al., 2009). In our dataset, the numbers in the diagonal are higher than any other number off-diagonal, indicating that the instrument has good discriminant validity. With regards to the evaluation of discriminant validity on the indicator level, all cross-loadings values are satisfactory, with the exception of item FU5, which interfered with Perceived Usefulness. Therefore this item was removed.

Although all the previous criteria are meet, taking into account that absolute standardised outer loadings should not be inferior to 0.7 (Henseler et al., 2009), items BA3, BA4, UP3 and IC8 were eliminated, as they did not meet this requirement. All previous values were kept acceptable, as mentioned above. For formative variables (m-banking actual use and e-banking usage), we calculated the Variance Inflation Factor (VIF) to assess multicollinearity. For all indicators, values range from 1.000 to 6.946. As values are below the cut-off value of 10, low multicollinearity between indicators is confirmed. After the confirmation that our measurement model holds good psychometric proprieties, Smart PLS 2.0 was used to assess the structural model. In order to assess the structural model (the inner model) we analysed the (i) R^2 of the endogenous latent variables and (ii) the path coefficients. Hypotheses and sub-hypotheses testing were performed by examining the size, sign and significance of path coefficients and the weights of the dimensions of the constructs. The results reported in Figure 2 support all hypotheses.

Controls: Gender

* Significant at p<0.05, ** Significant at p<0.01, *** Significant at p<0.001

Figure 2. PLS Results

Chin (1998) describes R2 values of 0.67, 0.33 and 0.19 in PLS as substantial, moderate or weak, respectively (Chin 1998). This criterion is the main one for the assessment of the structural model. Figure 2 shows the R2 values for the endogenous variables. R2 indicates how well the antecedent's variables explain the endogenous variables, as it is a measure of the model fit. m-banking behavioural intention, has a R2 value greater than 0.33, and relative advantage and m-banking actual use have R2 greater than 0.19. Therefore, we have a moderate model fit. However, perceived usefulness has a low R2 value of 0.17. The individual path coefficients can be interpreted as standardised beta coefficients of ordinary least squares regressions (Henseler et al., 2009). The significance of path coefficients was calculated by means of bootstrapping procedure generating 5.000 random samples of size 284. Results for the path coefficients' sign, significance and magnitude are shown in Figure 2. The path coefficients allow us to evaluate whether our empirical data collected with the questionnaires support the research hypotheses. If paths hold an algebraic sign contrary to that which was expected, then they do not

support the a priori developed hypotheses. Additionally, if paths are not significant, even though they have the expected algebraic sign, then it is not possible to support the hypothesis.

As gender could influence the endogenous variables m-banking behaviour intention and m-banking use, we considered gender as a control variable. We followed the method used by Hsu et al. (2006), creating one dummy variable for female (and male is the reference category). We found that gender has a negative and significant path for m-banking usage (-0.197; $p < 0.001$), but does not for behavioural intention (-0.005; ns). This result means that women use m-banking less than men do, but without statistically significant differences in their behavioural intention.

Discussion

In our study, social influence is the factor which most affects behavioural intention in relation to m-banking (path coefficient of 0.412 significant at $p < 0.01$). This may be related to the fact that there is a social status associated with the use of mobile telephones in this country. Therefore, colleagues, friends and family all exert a strong influence on the decision of an individual to adopt m-banking. Consistent with previous studies, the early adopters, who have had no previous experience in relation to m-banking services, tend to rely more on the opinions of others to make their decision (Sripalawat et al., 2011). Applying this reasoning to IDT, we realised that, due to the fact that this service is still in its infancy, the percentage of users is still very low. That is to say, m-banking users are in a category of innovators and early adopters, however, a typical member of a social system falls in between the early majority and late majority categories (Rogers, 2003). Therefore, in Portugal, the effect of social influence deserves special attention from banks that wish to provide banking services through the mobile device.

Results also indicate that relative advantage affects behavioural intention (path coefficient of 0.294 significant at $p < 0.01$). This result is consistent with previously studies (Yang et al., 2011; Zhou et al., 2010). The influence of relative advantage over behavioural intention regarding m-banking, stresses the need to include relative advantage in research models, which explains the behaviour of users who already use the service. Previous studies demonstrate that beliefs based on direct experiences provide a better prediction of behaviour than beliefs formed through indirect experiences. The third variable with the greatest influence on behavioural intention is perceived usefulness (path coefficient of 0.135 significant at $p < 0.05$), which is directly affected by perceived ease of use. Perceived ease of use is the most important construct of perceived usefulness. According to TAM, perceived ease of use directly and indirectly affects behavioural intention through perceived usefulness, as has been noted in several studies (Agarwal et al., 2000; Hsu, 2004; Taylor and Todd, 1995b). Moreover, perceived ease of use is directly affected by

self-effectiveness (path coefficient of 0.684 significant at p<0.01). These results reveal the strong influence of self-efficacy on the ease of use, which is also consistent with the previously published studies (Luarn and Lin, 2005; Sripalawat et al., 2011; Venkatesh, 2000; Wang et al. 2006). Self-efficacy also significantly affects behavioural control (path coefficient of 0.678 significant at p<0.01), as it helps to reduce perceived limitations, and thus increases perceived behavioural control (Hung, 2003; Shen et al., 2010). With regards to intended behaviour, self-efficacy does not have a significant influence, contrary to results obtained in the study by Sripalawat et al. (2011). One possible explanation for this may be that people think that just having the ability to use m-banking is not reason enough to adopt it. Following on from this, if self-efficacy is reconciled with behavioural control, then it reflects a strong impact on relative advantage, which in turn, strongly influences behavioural intention. Behavioural control has a significant influence on relative advantage, which is consistent with that which has already been found by other researchers (Shen et al., 2010). A good sense of behavioural control leads users to enjoy the benefit of the relative advantage of mobile banking services, which ultimately influences behavioural intention in relation to the service.

The negative effect of perceived risk, lack of information and usage barriers on the intention to use m-banking was found to exist, as was expected. Perceived risk is the factor that has a higher negative influence on m-banking behavioural intention (path coefficient of -0.182 significant at p<0.01). This same factor had also been identified by a study carried out in Portugal as being a strong inhibitor for the adoption of m-banking (Laukkanen and Cruz, 2009). The results show that people still identify lack of information as being an inhibitor of behavioural intention (path coefficient of -0.087 significant at p<0.1).

Potential users feel that there is not enough publicity about the service. However, the usage barriers showed no significant effect on intended behaviour. People realize that mobile phones have limitations, such as screen size and processing power, in other words, that these devices have limiting factors, but this not sufficient to diminish intention to use, and use of, m-banking. Interestingly, e-banking usage has a significant positive effect on m-banking usage (path coefficient of 0.149 significant at p<0.01). This result was expected, as e-banking users have a low concern about e-banking's risk. These users have crossed this barrier and give more value to other issues, and therefore, they present a greater level of willingness to adopt similar technologies. This result is consistent with that of Lin (2012), who found a significant influence of e-services on m-services.

Concluding Remarks

Over the past few years, many studies have been developed worldwide attempting to explain the behaviour of individual acceptance or resistance in relation to new technologies. The fact that Portugal is the country in the European Union with the second highest penetration rate for mobile services presents interesting features for developing this study. It is interesting to understand which factors contribute to the behavioural intention and use of m-banking services. To achieve this objective, this study adapted conceptual models existent in the literature and collected data through an online survey questionnaire. Based on this conceptual model, we were able to explain a substantial amount of m-banking behaviour intention (R^2=0.50). The results also indicate that the main determinants of behavioural intention for mobile banking are social influence and relative advantage. Additionally, e-banking usage and m-banking behavioural intention are found to be significant antecedents of m-banking usage.

This study presents contributions for both the academic and practitioner communities. For academics, this study proposes a scale for the use of m-banking and tests its nomological network, allowing a comparative analysis in terms of the relative importance of each factor in explaining the behavioural intention in relation to m-banking. Turning to the focal point of the innovation of this study, which is the influence of behavioural intention on actual use, this study found a very significant relationship between these two constructs (path coefficient of 0.28 significant at $p<0.01$). This means that, as would be expected taking into account the theories guiding the present work, the greater the latent behavioural intention in an individual, the more emphatic their usage behaviour will be. This is the trend that is anticipated to occur over the next few years in Portugal.

In terms of implications for managers, this study shows that social influence is the factor which most affects behavioural intention. Banks can create an advantage from the "early adopters" of mobile banking, as their opinions may generate positive perspectives for potential users, as well as word-of-mouth, having subsequent effects on the adoption behaviour of potential users. This study emphasises the need for banks to present an m-banking service with features that allow customers of a bank to recognise the service as being able to improve their performance, increase productivity and improve effectiveness, which consequently leads to an increase of actual use. For the factors that negatively influence behavioural intention, results suggest that some improvements can be made, one of which relates to usage barriers. As mobile technology is always changing and evolving, financial firms should create interfaces which eliminate these limitations with respect to m-banking access.

This study also presents some limitations. Firstly, the sample collected comprises only Portuguese individuals, and the results from this study may not directly translate to other countries. Furthermore, comparison between the results of

various countries would also be of interest. As this subject has so far received little attention in Portugal, there are still many possibilities to develop studies of interest on this topic. Thus, future research should compare m-banking with online banking, due to the differences in environment and technology. The causality between the acceptance of an individual and practical results needs to be researched, in order to demonstrate the long-term effects of mobile banking.

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Appendix A – Research Instrument

Construct	Code	Indicators	Source
Usage Barriers	BA1	The small screen of mobile phone obstructs m-banking.	(Sripalawat et al., 2011)
	BA2	The small screen of mobile phone creates difficulty for application uses and text reading.	
	BA3	Too small a keyboard size of mobile phone obstructs easily typing.	
	BA4	Too small a keyboard size causes data entry errors.	
	BA5	The slow connecting of mobile phone impedes m-banking.	
Perceived Risk	RP1	I am skeptical about the security mechanism of m-banking services.	(Shen et al., 2010; Sripalawat et al., 2011)
	RP2	While banking, unrelated persons would be able to see and use of the financial information.	
	RP3	You are concerned about the security of banking via mobile phones.	
	RP4	I do not believe that the design of the m-banking system can provide security and privacy.	
	RP5	I think the security risk is much higher using m-banking services than using real banks.	
Lack of Inform.	FI1	Advertising m-banking is not sufficient.	Sripalawat et al., 2011)
	FI2	M-banking guidance information is not enough.	
Perceived Usefulness	UP1	Performing transactions via mobile gives more advantages than via other channels.	(Sripalawat et al., 2011)
	UP2	Performing transactions via m-banking are finished immediately, without queuing.	
	UP3	Performing transactions anywhere, anytime, via m-banking brings convenience to you.	
	UP4	M-banking makes performing transactions easier.	
	UP5	Performing transactions via m-banking lets you manage your financial resources better.	
Perceived Ease of Use	FU1	Learning how to access m-banking is easy.	(Sripalawat et al., 2011)
	FU2	It would be easy to find out how to use m-banking.	
	FU3	It would be easy to be knowledgeable in m-banking uses.	
	FU4	Using m-banking is uncomplicated.	
	FU5	You can simply find what you want in m-banking.	
P.Behav. Control	CC1	I think I can use the m-banking services effectively.	(Shen et al., 2010)
	CC2	Using the m-banking service is entirely within my control.	
M-banking Behaviour Intention	IC1	You intend to use m-banking in the near future.	(Shen et al., 2010; Sripalawat et al., 2011)
	IC2	You have great intentions to introduce m-banking to others.	
	IC3	You intend to perform transactions via m-banking, such as checking account balance.	
	IC4	You intend to use m-banking more in the future.	
	IC5	I am highly interested in trying out the m-banking system.	
	IC6	I think I will use m-banking very often, even more so than real banks.	
	IC7	I am willing to use m-banking, as long as the cost is reasonable.	
	IC8	I will use m-banking when it is popular.	
	IC9	I am among the first ones to employ m-banking services.	
	IC10	I want to be among the first ones to experiment m-banking services.	
	IC11	Whenever possible, I use m-banking services, rather than traditional banking services.	
Social Influence	NS1	People who use m-banking would much rather look good, than those who do not use it.	Sripalawat et al., 2011)
	NS2	M-banking use could be considered as a symbol of status among your group.	
	NS3	People who are important to you think that you should use m-banking.	
	NS4	Friends think that you should use m-banking.	
Relative Advantage	CV1	I value the convenience of using m-banking.	(Shen et al., 2010)
	CV2	Using m-banking is an efficient way to manage my time.	
	CV3	I think the convenience m-banking can help me avoid many unnecessary hassles.	
M-banking actual use	UR1	Inquiry about balance and transactions	*Adapted from (Ventakesh et al. 2012)*
	UR2	Inquiry BIN/IBAN	
	UR3	Checking the stock exchange (quotes)	
	UR4	Top-up your mobile phone	
	UR5	Money Transfers	
	UR6	Portfolio (list of investments)	
	UR7	Payments	
	UR8	Credit Payments	
	UR9	Order cheques from the bank	
E-bk use	IB1	How often do you access your bank though Internet banking?	**New**

Note: All variables except M-banking Use and e-banking use were measured in a 5-point Likert scale.

M-Banking usage: How often each functionality is used in m-banking – daily, several times per week, weekly, several times per month, rarely, never; E-banking usage: daily, several times per week, weekly, several times per month, rarely, never.