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Mobile Banking Adoption

A novel model in the Portuguese context

Miguel Garrana Faria

Dissertação apresentada como requisito parcial para
obtenção do grau de Mestre em Estatística e Gestão de
Informação

Instituto Superior de Estatística e Gestão de Informação
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MOBILE BANKING ADOPTION

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por

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Dissertação apresentada como requisito parcial para a obtenção do grau de Mestre em
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DEDICATED TO

Para a minha Avó Cristina.
Descansa em paz...

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RESUMO

Mobile Banking (MBanking) é um método inovador para aceder aos serviços bancários que permite ao cliente interagir com o banco via um dispositivo móvel (como por exemplo, um telemóvel ou um *personal digital assistant*). Este trabalho tem como objetivo entender a importância da relação entre o conhecimento racional, usando para esse efeito o modelo *task technology fit* (TTF), o conhecimento empírico, usando para esse efeito o modelo *unified theory of acceptance and use technology* (UTAUT) e as primeiras impressões pessoais, usando para esse efeito um modelo com base na confiança inicial. Os resultados indicam que os constructos *facilitating conditions*, *behavior intention*, *task technology fit*, *technology characteristics*, *performance expectancy* e *initial trust* têm um efeito significativo na adoção de MBanking. Os resultados indicam, também, que o efeito total dos constructos *technology characteristics*, *performance expectancy* e *initial trust* na intenção de usar MBanking suplanta o efeito dos constructos *effort expectancy* e *social influence*. A importância do uso de um modelo integrado entre TTF, UTAUT e confiança inicial é, por isso, provada. O nosso modelo explica 66.7% da adoção de MBanking. As implicações teóricas e práticas dos resultados são discutidas.

PALAVRAS-CHAVE

Sistemas de informação; *mobile commerce*; *mobile banking*; TTF; UTAUT; confiança inicial.

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ABSTRACT

Mobile banking (MBanking) is an innovative method for accessing banking services via a channel whereby the customer interacts with a bank via a mobile device (e.g. mobile phone or personal digital assistant). This paper attempts to understand the importance and relationship between the rational knowledge, using the task technology fit model (TTF), the empirical knowledge, using the unified theory of acceptance and use technology model (UTAUT) and individual first impressions beliefs, using an initial trust model, on the adoption of MBanking. We found that facilitating conditions, behavior intention, task technology fit, technology characteristics, performance expectancy and initial trust have a significant effect on MBanking adoption. In addition, we found that the overall effect of task technology fit, technology characteristics, performance expectancy and initial trust on behavior intention have an overpowering effect on effort expectancy and social influence. Hence, the importance of the development of a conceptual model that integrates TTF, UTAUT and initial trust to explain MBanking adoption was proven. Our model explained 66.7% of MBanking adoption. The theoretical and managerial implications of these results are discussed.

KEYWORDS

Information systems, mobile commerce, mobile banking, adoption, TTF, UTAUT, initial trust.

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LISTA DE SIGLAS E ABREVIATURAS

Adopt	Adoption
ANACOM	Autoridade Nacional de Comunicações
ATM	Automated Teller Machine
BI	Behavioral Intention
CDMA	Code Division Multiple Access
EE	Effort Expectancy
EU	European Union
FC	Facilitating Conditions
FR	Firm Reputation
GPRS	General Package Radio Services
IDT	Innovation Diffusion Theory
ITrst	Initial Trust
ITU	International Telecommunication Union
MCommerce	Mobile Commerce
MBanking	Mobile Banking
PDA	Personal Digital Assistant
PE	Performance Expectancy
PLS	Partial Least Squares
PPT	Personal Propensity to Trust
SA	Structural Assurances
SI	Social Influence
SMS	Short Message Service
TaskC	Task Characteristics
TAM	Technology Acceptance Model
TC	Technology Characteristics
TRA	Theory of Reasoned Action
TTF	Task Technology Fit
UTAUT	Unified Theory of Acceptance and Usage Technology
WAP	Wireless Application Protocol

1. INTRODUCTION

Technology has been one of the greater allies to the banking industry being one of the means to redirect and reinvent the business. It can be speculated, even, that it is the front line solution to reach the less available and more demanding clients. If we can observe the evolution of the banking industry, it is obvious that banks make an enormous effort to evolve the communication channels through where they may reach the client. From the phone banking to the internet banking and mobile banking (MBanking) the objective is to facilitate business outside of the traditional and conservative banking model. MBanking makes it possible for a client to have financial resources in the palm of the hand through mobile devices, mobile phones and Personal Digital Assistances (PDA), which use technologies as Short Message Services (SMS) and Wireless Applications Protocols (WAP). The offer is substantial and it can include services as SMS alerts and mobile browsing application services (Kim, Shin, & Lee, 2009; Mallat, Rossi, & Tuunainen, 2004; Venkatesh, Morris, Davis, & Davis, 2003). With the evolution of 3G mobile phones, smartphones and the new 4G technology, the spectrum for new and improved MBanking models keeps growing. This phenomenon is so important that information systems professionals have it as one of the most promising and important developments of the mobile commerce (MCommerce) and because of that it is a key solution for the banking business in the years to come (Lin, 2011). Hence, in this paper, we consider the following Luo et al. (2010), page 222, MBanking definition:

“Mobile banking is an innovative method for accessing banking services via a channel whereby the customer interacts with a bank via a mobile device (e.g mobile phone or personal digital assistant).”

Portugal is known has one of the European Union (EU) countries with the highest mobile phone adoption. According to 2009 Eurostat data, Portugal has one of the highest percentages of mobile phones per habitant in the EU with 151 mobile phones per 100 inhabitants, in comparison with the EU average of 125 per 100 inhabitants (Eurostat, 2010). In fact, the 2010 annual statistical report from ANACOM, the Portuguese regulator entity for the communications, states that in the end of 2010 there were about 154,9 mobile phone cards for each 100 citizens (ANACOM, 2011). The international telecommunication union (ITU) (2011) revealed that Portugal has about 72.5% of active mobile broadband subscriptions per 100 inhabitants, which is considerably higher to Europe's broadband connectivity, with a penetration of 54%. In fact, smartphones and tablets are set to become the new hardware for the everyday,

meaning a greater and fastest demand from the consumers for more mobile solutions (DBResearch, 2011a, 2011b). Portugal with its unique liking for mobile devices and its broadband coverage, makes this country a very likely one in leading an early new mobile technology adoption niche (ANACOM, 2011). In a 2010 report from the International Finance Corporation, the subject of MBanking in Portugal is approached as being a natural response to guaranty access to the financial services to a group of clients characterized by having only a current account and no active mean of transaction, the “marginally banked” (Matos & D’Aguiar, 2010). A recent study by TNS (2012) revealed that although MBanking users Europe’s average (17%) is higher than the one from Portugal (4%), 35% of the Portuguese population is interested in using MBanking which a slightly higher percentage than Europe’s average of 29%. The Portuguese non stopping curiosity of mobile phones and the so needed evolution for banking communications models make the starting point for this work.

The objective of this work is to understand what might influence the adoption of MBanking, approaching it in a way that the question “what drives a client to adopt MBanking?” can be answered. For that we developed a conceptual model and an empirical test in the Portuguese context, aiming to observe the relation between rational knowledge, empirical knowledge and individual first impressions beliefs in MBanking, assuming that this service is a new IS technology. Furthermore, we try to establish a relation between these three factors with the behavioral intention to adopt and the adoption of MBanking. As a consequence, it is also the objective of this paper, to understand if there is a relation between the behavioral intention and the effective adoption of the MBanking.

MBanking adoption is the subject of many (Gu, Lee, & Suh, 2009; Kim, et al., 2009; Luarn & Lin, 2005; Medhi, Ratan, & Toyama, 2009; Zhou, Lu, & Wang, 2010); nevertheless it seems, as far as we know, that the relation between rational knowledge/empirical knowledge/individual first impressions beliefs together on the MBanking technology has not been studied yet. In other words, academically this work brings a new perspective to the already published papers, establishing a relationship between the non – based – experience – opinion about the service and factual assurance that this technology will accomplish the daily tasks. The results of this work aim to present the technology and marketing departments of banks a complete overview of the factors that may influence the MBanking adoption so they will be able to optimize their MBanking projects implementation and maintenance. Following this introduction, the concept of MBanking and the adoption models used will be approached in the theoretical background. After this, the research model chosen will be presented, as will the methodology, results, their discussion and conclusion.

2. THEORETICAL BACKGROUND

2.1 THE CONCEPT OF MBANKING

MBanking is one of the applications from mobile MCommerce. It is a channel through which banks interact with customers via mobile devices and in its simplest form. MBanking services enable users to receive their bank updates via SMS. Nevertheless, the fact is that mobile communications technology is always evolving, so it can also be generally defined as any direct or indirect transaction with monetary value done by the wireless telecommunications network (Mallat, et al., 2004; Shih, Hung, & Lin, 2010; Wu & Wang, 2005). MBanking gives the client the possibility to reach his/her accounts simply by using a mobile device as a mobile phone or a PDA. In fact, with this service it is possible to get SMS alerts about current account movements, do transfers, have stock trade information and transact simple and complex financial products (Kim, et al., 2009; Luarn & Lin, 2005). Tiwari and Buse (2007) categorize MBanking services as mobile accounting (cheque book requests, blocking lost cards, money transfers or insurance policies subscription), mobile brokerage (selling and purchasing financial instruments) and mobile financial information (balance inquiries, statement requests, credit card information, branches and ATM locations, foreign exchange rates or commodity prices). Hence, mobile financial services are more extensive than traditional online banking. The fact that it is centered on mobile applications for mobile devices, frequently smartphones and tablets, improves the accessibility to internet-based consumers, boosting the clients' quality of life (DBResearch, 2012).

Future MBanking services will provide the customer with service and information along the value creation network of a bank (DBResearch, 2012). In fact, MBanking has been considered as a service with great profit margins in the years to come not only for the banks but also for the telecoms (Nysveen, Pedersen, & Thorbjornsen, 2005), although the business models between banks, telecoms and third-party providers have yet to be worked out. Nevertheless, MBanking innovation is already occurring worldwide, for example Lloyd's TSB used nearfield communication for contactless payments at the 2012 Olympics. ING Direct offers mobile payments that happen as costumers bump their phones together. American Express has reward programs offering mobile users discounts when they "check in" via mobile geo-location at participating merchants. Nigerian banks are using mobile to bank the unbanked. Commonwealth Bank of Australia allows account applications started in one channel to be completed in another (Capgemini Consulting, 2012).

2.2 ADOPTION MODELS

MBanking services adoption is studied to understand which factors might influence the intention of using and the actual use. Models as the Technology Acceptance Model (TAM) (Davis, 1989), Innovation diffusion Theory (IDT) (Rogers, 1995), Unified Theory of Acceptance and Usage of Technology (UTAUT) (Venkatesh, et al., 2003) or Task Technology Fit (TTF) (Goodhue & Thompson, 1995) are used to grasp an understanding on MBanking intention to adopt and/or adoption. Table 1 reveals some of the extended work done in this field of research, emphasizing the data gathering, relations between constructs and conclusions. Table 1 also shows that there is a comprehensive work on explaining the behavioral intention to use MBanking here with final results between 31% and 83.9% and on explaining the use of MBanking here with final results between 38.7% and 65.1%. From the researches from Table 1, it can also be observed that the most important variables in the models constructed tend to be perceived ease of use, perceived usefulness/performance expectancy/relative benefits of MBanking and initial trust/trust.

Reference	Context	Methodology	Major Findings
(Luarn & Lin, 2005)	An MBanking adoption questionnaire was submitted in an e-commerce exposition and symposium held in Taiwan.	Extended TAM.	- Behavioral intention is positively affected by perceived self-efficacy ($\beta = 0.18$), perceived credibility ($\beta = 0.36$), perceived ease of use ($\beta = 0.33$) and perceived usefulness ($\beta = 0.31$). - Behavioral intention is negatively affected by perceived financial cost ($\beta = -0.19$). - Behavioral intention to use MBanking is explained in 82%.
(Laukkanen, 2007)	A qualitative in-depth interviewing design was submitted to experienced electronic banking customers to determine the factors that create value perceptions in fund transfer service via personal computer and mobile phone.	Means-end approach.	- The most important characteristics of Mbanking are the ability to use the service wherever wanted, saving time and being an immediate service. - The inhibitors of MBanking are the display of the device.
(Morawczynski & Miscione, 2008)	A questionnaire was submitted about trust in mobile transactions with focus on M-Pesa, a MBanking system in Kenya.	N/A (theoretical approach).	Customers use M-Pesa services because they believe that their money will be kept safe by Safaricom, the mobile service provider.
(Gu, et al., 2009)	An MBanking adoption web – questionnaire was submitted to customers who use MBanking within WooriBank in Korea.	Extended TAM.	- Behavioral Intention is positively affected by perceived ease of use ($\beta = 0.38$), perceived usefulness ($\beta = 0.21$) and trust ($\beta = 0.35$). - Behavioral intention to use MBanking is explained in 79.7%.

Reference	Context	Methodology	Major Findings
(Kim, et al., 2009)	A MBanking adoption questionnaire was submitted to customers from the three biggest mobile telcos in Korea.	Initial trust approach.	- Usage intention is positively affected by relative benefits of MBanking ($\beta = 0.18$) and initial trust in MBanking ($\beta = 0.33$). - Usage intention of MBanking is explained in 31%.
(Yang, 2009)	A questionnaire was submitted to university students to understand the adoption and resisting factors of the MBanking technology.	Rasch measurement model.	- MBanking adoption is encouraged by the speed of transactions and special reductions in transaction service fees, including rapid transaction reply speed, advantageous transaction reply fees, practical banking services and reduced banking transaction fees. - The Factors inhibiting MBanking adoption are related to system configuration safety and system basic fees.
(Luo, et al., 2010)	A survey was conducted at an Eastern U.S. university to conjointly examine the multi-dimensional trust and multi-faceted risk perceptions in the initial adoption stage of MBanking.	Multi-dimensional trust approach, multi-faceted risk perception approach and UTAUT.	- Behavioral intention is positively affected by performance expectancy ($\beta = 0.49$). - Behavioral intention is negatively affected by perceived risk ($\beta = -0.23$) - Behavioral intention to use MBanking is explained in 50.9%.
(Wessels & Drennan, 2010)	A national web-based survey was submitted to understand the costumers MBanking perceptions in Australia.	Extended TAM.	- Intention to use MBanking is positively affected by compatibility ($\beta = 0.29$) and attitude toward MBanking ($\beta = 0.27$). - Intention to use MBanking is negatively affected by cost ($\beta = -0.12$) - Intention to use MBanking is explained in 83.9%.

Reference	Context	Methodology	Major Findings
(Koenig-Lewis, Palmer, & Moll, 2010)	An online-survey was submitted to understand the young consumers MBanking adoption in Germany.	Extended TAM.	- Behavioral intention to adopt MBanking is positively affected by perceived usefulness ($\beta = 0.39$) and compatibility ($\beta = 0.39$). - Behavioral intention to adopt MBanking is negatively affected by risk. - Behavioral intention to adopt MBanking is explained in 65.1%.
(Zhou, et al., 2010)	A questionnaire was conducted in universities and service halls of China Mobile and China Unicom branches to examine the factors affecting MBanking integrating a TTF and an UTAUT model.	TTF and UTAUT.	- User adoption is positively affected by task technology fit ($\beta = 0.3$), performance expectancy ($\beta = 0.37$), social influence ($\beta = 0.22$) and facilitating conditions ($\beta = 0.24$). - User adoption is explained in 57.5%.
(Zhou, 2011a)	A questionnaire was conducted in two halls of the largest mobile telecommunication operator in China to examine the effect of initial trust on MBanking user adoption.	Initial trust approach.	- Usage intention is positively affected by initial trust ($\beta = 0.42$) and perceived usefulness ($\beta = 0.37$). - Usage intention is explained in 52.5%.
(Lin, 2011)	A questionnaire was conducted to potential and repeat customers to examine the effect of innovation attributes and knowledge-based trust on attitude and behavioral intention about adopting (or continuing to use) MBanking.	Innovation diffusion theory and knowledge based trust approach.	- Behavior intention about adopting MBanking is positively affect by attitude toward adopting MBanking ($\beta = 0.2$). - Behavior intention about using MBanking is positively affect by attitude toward using MBanking ($\beta = 0.07$).

Reference	Context	Methodology	Major Findings
(Zhou, 2012)	A questionnaire was conducted in the service halls of two Chinas telcos to examine the factors affecting MBanking user adoption integrating the perspective of trust and flow experience.	Trust and experience approach.	- Usage intention is positively affected by trust ($\beta = 0.39$). - Usage intention is positively affected by actual usage ($\beta = 0.69$). - Actual usage is explained in 38.7%.
(Yu, 2012)	A street questionnaire was conducted in the Taipei downtown areas to investigate what makes an individual adopt MBanking using the Unified Theory of Acceptance and Use of Technology (UTAUT).	UTAUT.	- Usage is positively affect by facilitating conditions ($\beta = 0.56$) and behavior intention ($\beta = 0.72$). - Usage is explained in 65.1%.

Table 1 - MBanking adoption research.

2.1.1. Task Technology Fit

The TTF adoption model considers that the user will only adopt a new technology if it will be good enough to execute the daily task efficiently. Hence, the adoption to a new information system will depend greatly on the users' daily tasks (Goodhue & Thompson, 1995). This model explains the adoption by creating a relation between four constructs (task characteristics, technology characteristics, task technology fit and use): task characteristics and technology characteristics that combined will explain the task technology fit which affects directly the adoption and use of the system in study. Thus, in this paper we consider that this model gives us an Mbanking rational knowledge point of view.

Dishaw and Strong (1999) used an integrated TTF model with TAM to explain the relationship between the use of softwares and the performance of the user. Klopping and Mckinney (2004) studied the e-commerce adoption using a hybrid model between TTF and TAM. Zhou et al (2010) studied the MBanking adoption using an integrated model of TTF and UTAUT. This study underlines the fact that the two adoption models used have a significant effect on the use of MBanking.

2.1.2. Technology Acceptance Model and the evolution to Unified Theory of Acceptance and Usage of Technology (UTAUT)

TAM (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) is adapted from the theory of reasoned action (TRA) (Ajzen & Fishbein, 1980) that hypothesizes that the adoption of information systems is determined by the user's intention to use the application which, in consequence, is determined by the idea that the users have about the technology. TAM completes this chain of thought suggesting that the user's ideas are decomposed into 2 variables, perceived ease of use and perceived usefulness (Davis, 1989; Davis, et al., 1989; Venkatesh, et al., 2003). It is quite common for TAM to be used with other constructs because of the fact that this adoption model cannot explain specific influences (Davis, et al., 1989). For that reason, it is used with constructs as trust (Gefen, Karahanna, & Straub, 2003), perception of credibility (Y. S. Wang, Wang, Lin, & Tang, 2003) or compatibility (Chen, Gillenson, & Sherrell, 2002).

UTAUT has been proposed as an extension of TAM, in fact, it is the most well-known modified TAM based model. The unified theory is based on studies of eight prominent models in IS adoption research. The model has been empirically examined and found to outperform the eight individual models, including the TAM model. It aims to explain user's intention to use an IS and their subsequent behavior. The theory

states that there are three antecedents to the intention to adopt an IS (performance expectancy, effort expectancy and social influence). All three relationships are of positive effect and can be influenced by age and gender. Furthermore, the link between effort expectancy and behavioral intention can be moderated by experience. Experience and voluntariness of use also have a positive relationship between social influence and behavioral intention. The intention to use and the facilitating conditions are the constructs that influence the actual use of the IS. This model also proposes that the relationship between facilitating conditions and user behavior is influenced by age and experience (Venkatesh, et al., 2003). Thus, in this paper we consider that this model gives us the MBanking empirical knowledge point of view.

Luo et al. (2010) analyzed the integrated role of trust versus risk and the impact of trust, risk, self-efficiency and performance expectancy in MBanking adoption. They concluded that the performance expectancy is the most significant determining factor in the MBanking services acceptance.

2.1.3. Initial Trust Model

Initial trust is understood as consumer confidence at the beginning of a customer – business relationship with no prior interaction history (McKnight & Chervany, 2001). So it is a concept used when studying new services where the person's perceptive and possibility irrational forces, such as cognitive cues, will play an important role in the decision (Koufaris & Hampton-Sosa, 2004) in relation to knowledge – based trust that normally develops through iterative interactions (McKnight, Choudhury, & Kacmar, 2002a; McKnight, Cummings, & Chervany, 1998). Hence, while trust is a dynamic concept that develops over time, researchers have noted that the importance of studying initial trust, especially in cases of new technologies where users must overcome perceptions of risk and uncertainty before using the technology (Li, Hess, & Valacich, 2008; McKnight, Choudhury, & Kacmar, 2002b).

Initial trust may be affected by structural environmental conditions and situational normality, frequently termed as institution-based trust factors (McKnight, et al., 2002a). It can also be influenced by the user personality, including his/her propensity to trust (Gefen, 2000). The firms' characteristics as size, capability, integrity, role in the market, benevolence, reputation or brand can also represent a significant role in the development of initial trust (Fuller, Serva, & Benamati, 2007; McKnight, et al., 2002a). Lastly, the structural assurances of a service as availability of service guarantees, privacy policies, endorsements and third party recognition do have an

important role in the initial trust (Benamati, Fuller, Serva, & Baroudi, 2010; Nicolaou & McKnight, 2006). Kim et al. (2009), using this theoretical background, established a model where initial trust in MBanking is explained by trust propensity, structural assurances, firm reputation and relative benefits. Thus in this paper we consider that this model gives us the MBanking individual first impressions beliefs point of view.

3. RESEARCH MODEL

New services and technologies have a similar effect to a surprise to the new users. Relying on this, there is a very close relation between the trust to use and the adoption of the new (Kim, et al., 2009). As MBanking is a fairly new service, we propose a model that tries to mitigate the difficulty of studying new IS technology adoption by creating a relation between the rational knowledge (TTF), the empirical knowledge (UTAUT) and the personal first impressions beliefs (initial trust model). Knowing that the use of the UTAUT and the TTF gives two different perspectives, a behavioral and a rational outlook (Dishaw & Strong, 1999; Zhou, et al., 2010), this study identifies the impact of the initial trust model, UTAUT and TTF in the behavioral intention of MBanking and in the actual use of this service. This explains the use of initial trust besides the UTAUT and TTF in our model, as it can be seen in Figure 1. The UTAUT moderators are reduced to gender and age because, since MBanking is a very new bank service, experience has to be residual and only clients who want to use may consider it and so voluntariness is also not used, because Mbanking decision is not mandatory. Hence, this research attempts to understand the importance and relationship of practical knowledge (TTF), empirical knowledge (UTAUT) and beliefs (initial trust) on the behavioral intention and adoption of MBanking, in an individual perspective, without ever neglecting the fact that MBanking is a new service. The research model is depicted in Figure 1.

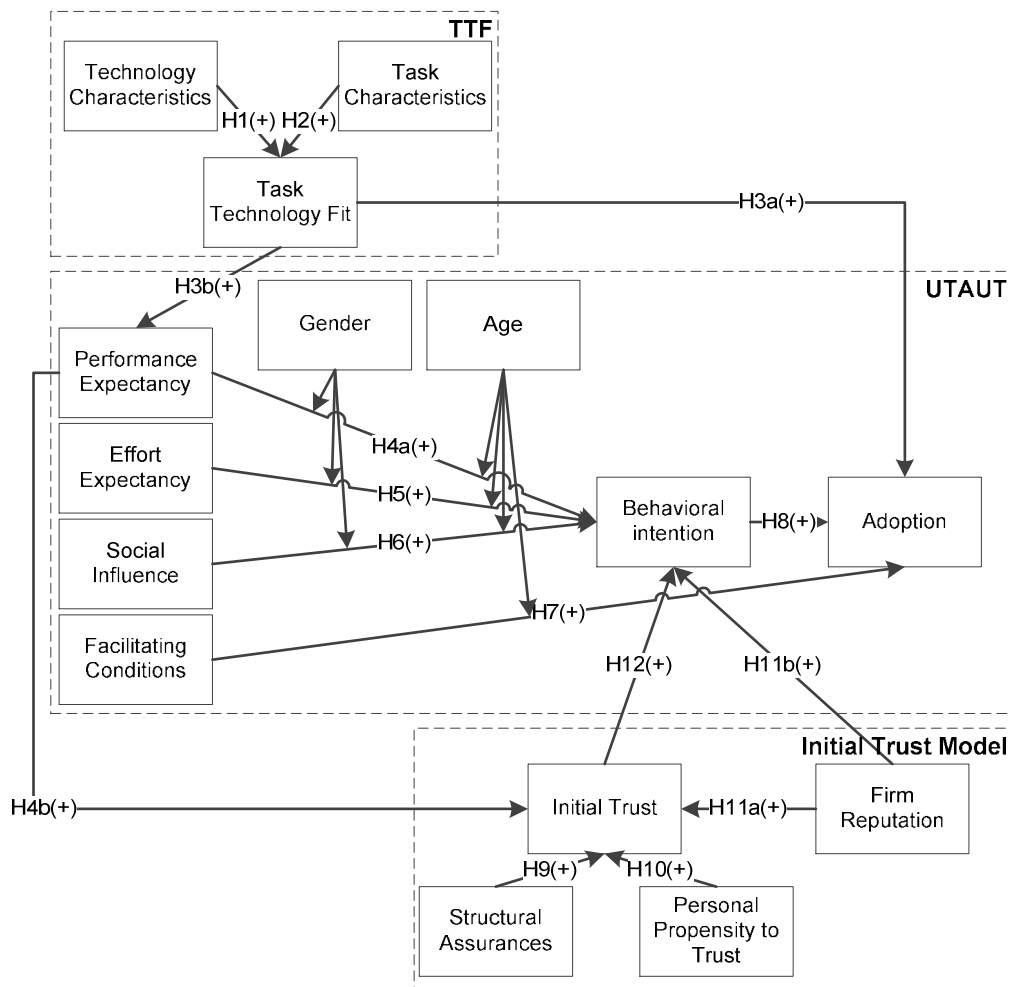


Figure 1. Research model

3.1 TTF

MBanking uses the wireless technologies to provide users with an ever-present, real-time service with the help of such protocols as general package radio services (GPRS) and code division multiple access (CDMA). For that reason, if compared to the more traditional offline service, it gives its users a readiness that cannot be supported by any other, which means that it is more advantageous to the users who are constantly on the go, resulting in a higher task technology fit. On the other hand, because of the small equipments used in MBanking, if the user needs to execute several orders with many details it might be useful to engage with another service (Dishaw & Strong, 1999; Zhou, et al., 2010). Consequently we hypothesize:

H1- Technology characteristics of MBanking positively affects the Task Technology Fit.

H2- Task characteristics positively affects the Task Technology Fit.

Task technology fit is the rational perspective of what a new tool will bring to optimize a certain job. As seen above, it is affected by the type of task done and the characteristics of the tool. Hence, it is the first formulation of knowledge a user has when assessing new equipment. As discussed by Dishaw & Strong (1999), knowledge is the support of the beliefs that will influence the user attitudes. As seen previously, in the UTAUT model the individual beliefs can be translated to performance expectancy (Venkatesh, et al., 2003). In other hand, the fact that task technology fit is so directly implied to the practicability of a new tool, the chances of it having a direct effect on the final user adoption are particularly relevant. In the MBanking context, this might be implied by the fact that if an user sees the service as a practical way of controlling his/hers accounts, transfers and even the stock market anywhere and anytime, his/hers beliefs in this tool will change as well as his/hers opinion about the usage:

H3a- Task Technology Fit has a positive effect on user adoption of MBanking.

H3b- Task Technology Fit positively affects performance expectancy of MBanking.

3.2 UTAUT

The UTAUT aims to explain the user's intention to use an IS and their subsequent usage behavior. The performance expectancy is defined as the degree to which an individual believes that using the system will help him/her to attain gains in job performance (Venkatesh, et al., 2003). Luo et al. (2010) concluded that performance expectancy is a key factor on the contribution for a user to accept the MBanking technology. So, in the case of MBanking, performance expectancy means that users find the tool useful to their transactions and consequently developing trust for the new with this belief. Thus:

H4a- Performance expectancy has a positive effect on user intention to adopt.

H4b- Performance expectancy of MBanking positively affects a person's initial trust in it.

Effort expectancy is defined as the degree of ease associated with the use of the system (Venkatesh, et al., 2003). In other words, it is how easy the user thinks that it will be to use an IS and it can be seen as having a positive impact on the behavioral intention, just like its analogous TAM construct, perceived ease of use (Kuo & Yen, 2009; Luarn & Lin, 2005; Y. S. Wang, Lin, & Luarn, 2006). In the case of MBanking, the

fact that there are very user friendly interfaces may influence the intention to use MBanking. Thus:

H5- Effort expectancy has a positive effect on behavioral intention to use.

Social influence has a direct determinant effect on behavioral intention as it is the degree to which an individual perceives that it is important for others to believe he/she should use the IS (Venkatesh, et al., 2003). Thus:

H6- Social influence has a positive effect on behavioral intention.

Facilitating conditions is the UTAUT construct that is considered to have a direct effect on the adoption itself. It is defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (Venkatesh, et al., 2003). In the case of MBanking, the fact that there is a support line to the service may influence positively the adoption. So:

H7- Facilitating conditions have a positive effect on the adoption of MBanking.

As Venkatesh (2003), we hypothesize that age and gender may positively influence behavior intention because of their possible moderator effect on performance expectancy (H4m), effort expectancy (H5m) and social influence (H6m). Also, as Venkatesh (2003), we hypothesize that age may moderate the positive relation between facilitating conditions and MBanking adoption (H7m).

It is the intention of this work to understand if the intention to adopt MBanking means its adoption. So, it is essential to understand if the intention to try MBanking may lead to its use. Thus:

H8- Behavioral intention to use MBanking has a positive effect on user adoption.

3.3 INITIAL TRUST

Institution – based trust among transaction parties may be fortified by such provisions as contract terms and conditions, agreements, regulations and third-party guarantees (Kim, et al., 2009). Being a very young service, MBanking incurs in the risk of the unknown and consequently, this brings to the table matters as protection of the information, financial transactions, individual privacy and transactional confidentiality and due to the lack of experience with the service, users may rely in the structural assurance offered to build their initial trust. This is supported by McKnight et al. (1998) that said that providing structural assurance is an effective mechanism to increase institution-based trust. So:

H9- Structural assurances provided by services firms contribute positively to the formation of a person's initial trust in MBanking.

Trust propensity reflects a user's natural tendency to trust other people (McKnight, et al., 2002a). This means that when adopting new technologies, users with higher propensity to trust tend to more readily build the trust in its usage. Thus:

H10- A person's propensity to trust positively affects the formation of his/her initial trust in MBanking.

A firm's reputation reflects its reliability in business engagements. It increases customer's recognition, plays a role in forming their initial confidence and helps to maintain their confidence in future transactions (Kim, et al., 2009). Hence the firm reputation is a significant factor in the user's confidence in a new service and as demonstrated by Pavlou (2003), it strongly affects the intention to use a service. Consequently, we hypothesize:

H11a- A service firm's reputation is positively associated with a person's initial trust in MBanking.

H11b- A service firm's reputation is positively associated with a person's intention to adopt MBanking.

When a new service is introduced to the user there is no previous experience to relate it with. This is the case of MBanking, and because of that it is necessary to understand the first stage of trust development, initial trust. Kim et al. (2009) found that a person's initial confidence in MBanking to offer accurate, stable and safe financial services is vital to his/her intention to embrace it. In the same line of thought we hypothesize:

H12- The level of initial trust a person has in MBanking is positively associated with his/her intent to adopt it.

4. RESEARCH METHODOLOGY

4.1 MBANKING TECHNOLOGY

Our target population was the general population, whether MBanking users or non-users. The study was conducted in Portugal and in the context of the consumer, the bank client. MBanking is a MCommerce application that gives the consumer the opportunity to make the everyday bank transactions like balance inquiries, cheque book requests, transfers or even financial applications possible using a mobile phone or a PDA. The consumer's decision to adopt MBanking is voluntary and it is not a widespread product.

4.2 MEASUREMENT

To validate our research hypotheses, a group of questions was developed and adapted to the present work context in a way that the individual perceptions could be gathered. All scales were adapted from previous researches. The items and the scales for the TTF constructs were adapted from Zhou et al. (2010) and Goodhue and Thompson (1995), respectively. The items and scales for the UTAUT constructs were adapted from Zhou et al. (2010) and Venkatesh et al. (2003), respectively. The items and scales from the initial trust model were both adapted from Kim et al. (2009). The individual was the unit of analysis and the responses were measured by a 7 point Likert Scale – items are displayed in the Appendix – being 1 “strongly disagree” and 7 “strongly agree”. The moderator age was measured in years and gender was coded using a 0 or 1 dummy variable where 1 represented men.

A questionnaire in English was created and reviewed for content validity because the target answers were from the Portuguese general population who uses a mobile phone and so, it was necessary to administrate the questions in Portuguese rather than in English. Hence, following Brislin (1970) the English questionnaire was translated to Portuguese and then back to English to ensure the translation equivalence. A professional translator and a IS professional translated the question items from English to Portuguese and then a second professional translator translated it back to English.

4.3 DATA

Mobile phones in Portugal are quite widespread throughout all country and there is evidence that it is common for a Portuguese to have two mobile phone as

there are about 154,9 mobile phones per 100 citizens (ANACOM, 2011). To get an advantage of this fact, it was important for this research to reach the general population in an effort to gather answers from the most plural backgrounds possible. For that, an online survey was conducted through a popular questionnaire web site.

To test the questionnaire, it was submitted in March 2012 as a pilot to a group of 30 college students, who were not included in the main survey. We found preliminary evidence that the scales were reliable and valid, with only three exceptions that were removed from the questionnaire due to their low loadings (an item from the variable social influence (SI4), an item from the variable personal propensity to trust (PPT4) and an item from the variable behavioral intention (BI6)).

Following the pretest, the survey was open to the general population and a total of 730 e-mails were sent in the beginning of April 2012 using personal links that could be used only once, preventing repeated respondents. A follow up was done four weeks after. At the end of eight weeks, there were 284 answers, making a response rate of 38.9%, from which 90 had to be removed because of their incompleteness. 194 (42 after one follow-up) validated responses were obtained. To test for nonresponse bias, we compare the sample distribution of the first and second respondents groups. We used the Kolmogorov-Smirnov (K-S) test to compare the sample distributions of the two groups (Ryans, 1974). In Table 2, the K-S test suggests that the sample distributions of the two independent groups do not differ statistically (Ryans, 1974). This means that there is no nonresponse bias. Further, we examined the common method bias by using Harman's one-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). These tests found no significant common method bias in our dataset.

	Full sample (n=194)		Early respondents (n=152)		Later respondents (n=42)		Kolmogorov -Smirnov test p-value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Task Characteristics (TaskC)	4.88	1.57	4.98	1.51	4.98	1.51	0.43
Technology characteristics (TC)	5.33	1.38	5.29	1.38	5.29	1.38	0.61
Task Technology Fit (TTF)	4.81	1.34	4.79	1.34	4.79	1.34	0.71
Performance Expectancy (PE)	5.12	1.47	5.05	1.49	5.05	1.49	0.70
Effort Expectancy (EE)	4.73	1.32	4.66	1.32	4.66	1.32	0.87
Social Influence (SI)	3.04	1.50	3.06	1.48	3.06	1.48	0.99
Facilitating Conditions (FC)	4.84	1.49	4.86	1.46	4.86	1.46	1.00

	Full sample (n=194)		Early respondents (n=152)		Later respondents (n=42)		Kolmogorov -Smirnov test p-value
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Structural Assurance (SA)	4.03	1.38	4.08	1.36	4.08	1.36	0.94
Personal Propensity to Trust (PPT)	3.60	1.58	3.52	1.55	3.52	1.55	0.52
Firm Reputation (FR)	5.52	1.19	5.48	1.16	5.48	1.16	0.34
Initial Trust (ITrst)	4.95	1.28	4.91	1.29	4.91	1.29	0.58
Behavioral intention (BI)	4.58	1.69	4.59	1.63	4.59	1.63	0.70
Adoption (Adopt)	4.10	2.01	4.11	1.92	4.11	1.92	0.58

Table 2 - Testing possible Biases: early respondents vs. later respondents

Table 3 shows that most respondents were women, between 18 and 56, with one mobile phone and more than half uses a Smartphone or a PDA.

Distribution		Frequency total: 194	%
Gender	Male	83	42.8
	Female	111	57.2
Age	18-20	17	8.8
	20-29	101	52.1
	30-39	52	26.8
	>40	24	12.4
Schooling	Lower than BSc	58	29.9
	BSc	93	47.9
	MSc or higher	43	22.2
Number of mobile phones owned	1	128	66.0
	2 or more	66	34.0
Uses a Smartphone or a PDA	Yes	107	55.2
	No	87	44.8

Table 3 - Distribution of survey respondents

5. RESULTS AND DISCUSSION

5.1 RESULTS

To test our model we used a two-step method, beginning the analyses with the measurement model to test the reliability and validity of the instrument and then analyzing the structural model to test our research model (Anderson & Gerbing, 1988). As all items in our data are not distributed normally ($p < 0.01$ based on Kolmogorov-Smirnov's test) and the research model is in an early stage of development and has not been tested in the literature, the PLS is the most adequate method in this case. We opted for PLS also because of the complexity of the model (large number of moderators) as it is less restrictive on sample size and data distribution (Chin, 1998; Chin, Marcolin, & Newsted, 2003). The PLS approach needs ten times the largest number of structural paths directed at a particular construct in the model (Chin, 1998; Gefen & Straub, 2005). This is not a problem for our data.

5.1.1. Measurement Model

Tables 4 and 5 present the measurement model results. Table 4 shows that composite reliability (CR) is always above 0.70, being the minimum CR 0.71, which indicates that scales have internal consistency. To evaluate the indicator reliability, we opted to consider the loadings above 0.70 and so two items, SI3 and FC4, were eliminated. As it can be observed in Table 4, all considered loadings are above 0.70 meaning that in the overall the instrument presents good indicator reliability. For the analyses of convergent validity, the values of average variance extracted (AVE) cannot be below 0.50 and as it can be observed in Table 4 that is our case. In sum, the AVEs, CRs and Alphas shown at Table 4 reveal convergent validity and reliability, as their values are all higher than the recommended thresholds of 0.50, 0.70 and 0.70, respectively (Bagozzi & Yi, 1988; Gefen, Straub, & Boudreau, 2000; Nunnally, 1978).

Factor	Item	Loading	t-value	AVE	CR	Alpha
Task Characteristics (TaskC)	TaskC1	0.90	58.26***	0.78	0.94	0.91
	TaskC2	0.91	60.53***			
	TaskC3	0.90	37.45***			
	TaskC4	0.83	28.15***			
Technology characteristics (TC)	TC1	0.88	32.15***	0.82	0.93	0.89
	TC2	0.93	41.24***			
	TC4	0.91	51.05***			
Task Technology Fit (TTF)	TTF1	0.92	58.65***	0.86	0.96	0.94
	TTF2	0.93	59.24***			
	TTF3	0.94	61.48***			
	TTF4	0.91	43.60***			
Performance Expectancy (PE)	PE1	0.92	45.81***	0.87	0.95	0.92
	PE2	0.93	45.07***			
	PE3	0.94	93.45***			
Effort Expectancy (EE)	EE1	0.91	51.40***	0.80	0.94	0.92
	EE2	0.93	62.75***			
	EE3	0.91	49.98***			
	EE4	0.82	22.95***			
Social Influence (SI)	SI1	0.94	69.43***	0.86	0.92	0.84
	SI2	0.91	33.42***			
Facilitating Conditions (FC)	FC1	0.88	44.96***	0.74	0.90	0.82
	FC2	0.89	37.74***			
	FC3	0.81	22.80***			
Structural Assurance (SA)	SA1	0.86	73.45***	0.69	0.90	0.85
	SA2	0.89	86.90***			
	SA3	0.72	43.92***			
	SA4	0.84	36.09***			

Factor	Item	Loading	t-value	AVE	CR	Alpha
Personal Propensity to Trust (PPT)	PPT1	0.71	8.91***	0.75	0.90	0.83
	PPT2	0.94	53.76***			
	PPT3	0.92	44.54***			
Firm Reputation (FR)	FR1	0.93	106.01***	0.86	0.96	0.94
	FR2	0.94	88.96***			
	FR3	0.92	145.85***			
	FR4	0.90	9.80***			
Initial Trust (ITrst)	ITrst1	0.96	62.14***	0.80	0.94	0.91
	ITrst2	0.94	23.22***			
	ITrst3	0.96	30.73***			
	ITrst4	0.71	31.12***			
Behavioral intention (BI)	BI1	0.91	51.65***	0.78	0.95	0.93
	BI2	0.85	77.78***			
	BI3	0.86	112.59***			
	BI4	0.89	51.82***			
	BI5	0.89	48.90***			
Adoption (Adopt)	ASMB1	0.92	79.97***	0.86	0.95	0.92
	ASMB2	0.95	105.65***			
	ASMB3	0.91	50.21***			

Table 4 - Item loadings, AVE, CR and alfa

Note: *p<0.1; **p<0.05; ***p<0.01.

	TaskC	TC	TTF	PE	EE	SI	FC	SA	PPT	FR	ITrst	BI	Adopt
TaskC	0.89												
TC	0.57	0.90											
TTF	0.55	0.78	0.93										
PE	0.55	0.69	0.70	0.93									
EE	0.48	0.68	0.70	0.68	0.89								
SI	0.28	0.27	0.42	0.47	0.41	0.93							
FC	0.49	0.62	0.64	0.61	0.79	0.35	0.86						
SA	0.35	0.39	0.40	0.42	0.49	0.40	0.43	0.83					
PPT	-0.40	-0.28	-0.32	-0.35	-0.32	-0.20	-0.27	-0.25	0.86				
FR	0.23	0.43	0.39	0.37	0.44	0.15	0.44	0.45	-0.13	0.93			
ITrst	0.42	0.62	0.61	0.66	0.69	0.38	0.70	0.57	-0.27	0.58	0.90		
BI	0.55	0.54	0.55	0.67	0.55	0.42	0.55	0.42	-0.40	0.33	0.64	0.88	
Adopt	0.55	0.50	0.56	0.65	0.60	0.48	0.59	0.42	-0.41	0.23	0.59	0.79	0.93

Table 5 - Correlations and AVEs (square root, shown in bold at diagonal)

Finally, discriminant validity was tested based on two criteria. First criterion, loadings are larger than cross loadings. To secure the models discriminant validity, three items were eliminated (TC3, PE4 and ASBM4) because of their low loadings and high cross loadings. Second criterion, the square root of AVE for each construct should be greater than the correlations with all constructs (Boudreau, Gefen, & Straub, 2001; Fornell & Larcker, 1981). In Table 5, we can see that the square root of AVE (in bold) is higher than the correlation between constructs

The measurement model results indicate that the model has good internal consistency, indicator reliability, convergent validity and discriminant validity. Hence, the constructs from our model are statistically different and can be used to test the structural model.

5.1.2. Structural Model

Based on the measured model validated, the significance of all the paths of the structural model was tested using a bootstrap with 500 resamples. In order to assess the predictive capacity of the structural model we computed R^2 . The criterion applied by Chin (1998) describes R^2 values of 0.67, 0.33, and 0.19 in PLS path model as substantial, moderate, and weak, respectively. In Table 6, we can conclude that our model explains substantial TTF, performance expectancy (PE), initial trust (ITrst), Mbanking behavioral intention (BI) and Mbanking adoption (Adopt).

Independent Variables	Model with moderators				Model Without moderators			
	Hypothesis	Beta	t-value	R2	Hypothesis	Beta	t-value	R2
	Task Technology Fit			62.9%	Task Technology Fit			62.9%
Task characteristics (TaskC)	H1(✓)	0.15	2.27**		H1(✓)	0.15	2.23**	
Technology characteristics (TC)	H2(✓)	0.70	12.28***		H2(✓)	0.70	12.25***	
	Performance Expectancy			48.5%	Performance Expectancy			48.5%
Task technology fit (TTF)	H3b(✓)	0.70	16.98***		H3b(✓)	0.70	15.96***	
	Initial Trust			60.9%	Initial Trust			60.9%
Performance expectancy (PE)	H4b(✓)	0.43	5.95***		H4b(✓)	0.43	5.69***	
Structural assurances (SA)	H9(✓)	0.26	4.32***		H9(✓)	0.26	4.59***	
Personal propensity trust (PPT)	H10(x)	-0.02	0.23		H10(✓)	-0.02	0.23	
Firm reputation (FR)	H11a(✓)	0.30	4.03***		H11a(✓)	0.30	3.88***	
	Behavioral intention			58.1%	Behavioral intention			53.4%
Performance expectancy (PE)	H4a(✓)	0.35	4.51***		H4a(✓)	0.40	4.90***	
Effort expectancy (EE)	H5(x)	0.02	0.26		H5(x)	0.01	0.14	
Social Influence (SI)	H6(x)	0.09	1.24		H6(x)	0.10	1.52	
Gender		0.24	1.36		-	-	-	
Age		-0.05	0.67		-	-	-	
Gender*Age		-0.15	0.73		-	-	-	
PE*Gender		-0.04	0.17		-	-	-	
PE*Age	H4m(x)	0.09	0.97		-	-	-	
PE*Gender*Age		-0.09	0.37		-	-	-	
EE*Gender		-0.30	1.37		-	-	-	
EE*Age	H5m(x)	-0.12	1.20		-	-	-	
EE*Gender*Age		0.33	1.36		-	-	-	
SI*Gender		0.07	0.36		-	-	-	
SI*Age	H6m(x)	0.00	0.03		-	-	-	
SI*Gender*Age		-0.05	0.27		-	-	-	

Independent Variables	Model with moderators				Model Without moderators			
	Hypothesis	Beta	t-value	R2	Hypothesis	Beta	t-value	R2
Initial trust (ITrst)	H12(✓)	0.41	3.92***		H12(✓)	0.36	2.86***	
Firm reputation (FR)	H11b(x)	-0.05	0.80		H11b(x)	-0.04	0.55	
	Adoption			67.3%	Adoption			66.7%
Task technology fit (TTF)	H3a(x)	0.10	1.45		H3a(x)	0.10	1.33	
Facilitating conditions (FC)	H7(✓)	0.18	2.84***		H7(✓)	0.18	3.12***	
Age		0.04	0.99		-	-	-	
FC*Age	H7m(x)	0.08	1.36		-	-	-	
Behavioral intention	H8(✓)	0.64	8.79***		H8(✓)	0.64	8.77***	

Table 6 - Structural model results

Note: *p<0.1; **p<0.05; p<0.01.

Table 6, shows that the moderator effects are not statistically significant, therefore we choose not to consider moderation variables (age and gender) in our final model (Figure 2).

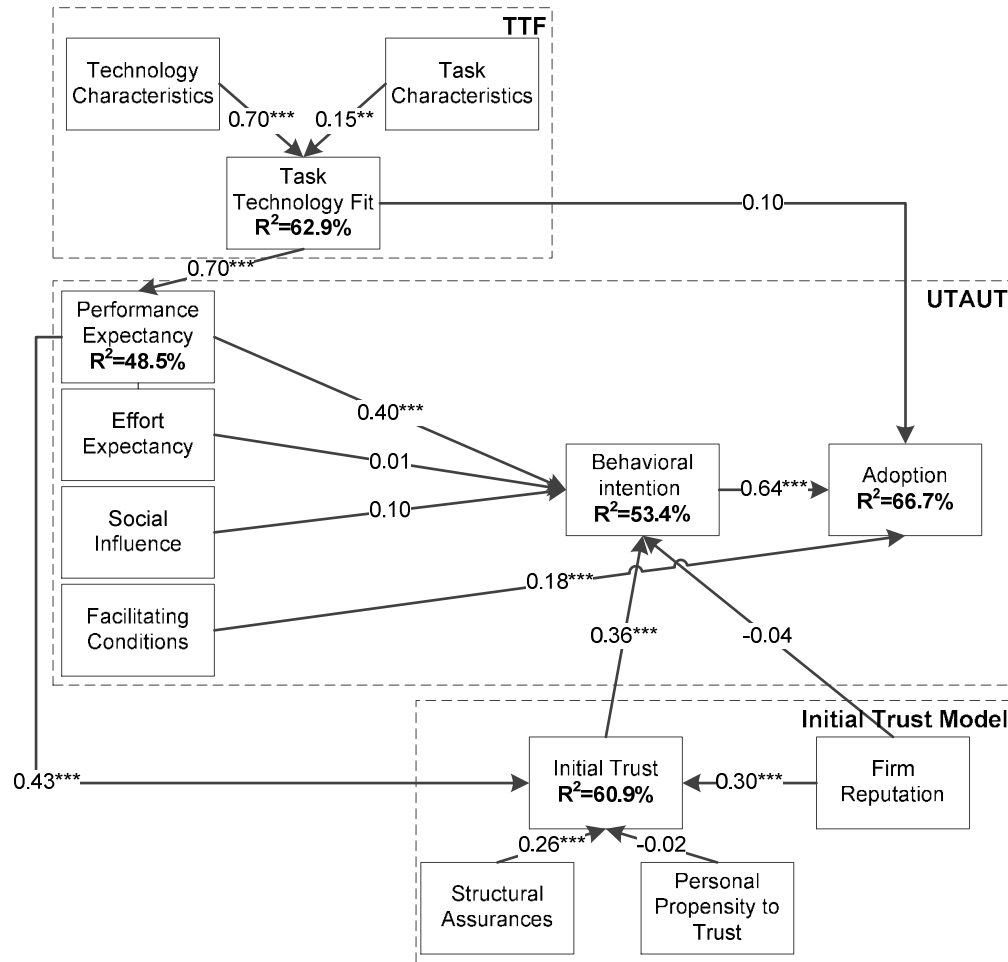


Figure 2- Structural model results

Note: * $p < 0.1$; ** $p < 0.05$; $p < 0.01$.

Technology characteristics (TC) and task characteristics (TaskC) are statistically significant to explain TTF, respectively ($\hat{\beta} = 0.70$; $p < 0.01$) and ($\hat{\beta} = 0.15$; $p < 0.05$), consequently H1 and H2 are confirmed. We would highlight that TC is the most important construct to explain TTF, when TC increases one unit, TTF increases 0.70, *ceteris paribus*. The model explains 62.3% of TTF.

TTF is statistically significant ($\hat{\beta} = 0.70$; $p < 0.01$) to explain performance expectancy (PE), thus H3b is conformed. Our model explains 48.5% of PE. We would highlight the fact that when TTF increases one unit, PE increases 0.70, *ceteris paribus*.

PE, structural assurances (SA) and firm reputation (FR) are statistically significant to explain ITrst, respectively ($\hat{\beta} = 0.43$; $p < 0.01$), ($\hat{\beta} = 0.26$; $p < 0.01$) and ($\hat{\beta} = 0.30$; $p < 0.01$), hence H4b, H9 and H11a are confirmed. Contrarily, H10 (personal propensity to trust) is not confirmed. From these hypotheses we highlight PE as the most important construct to explain initial trust. The model explains 60.9% of initial trust.

PE and initial trust are statistically significant to explain behavioral intention (BI) of MBanking, respectively ($\hat{\beta} = 0.40$; $p < 0.01$) and ($\hat{\beta} = 0.36$; $p < 0.01$), confirming hypothesis H4a and H12. Effort expectancy (EE), social influence (SI) and firm reputation (FR) are not statistically significant to explain BI of Mbanking, consequently H5, H6 and H11b are not confirmed. This model explains 53.4% of MBanking BI.

Adoption (Adopt) is explained by TTF, facilitating conditions (FC) and MBanking BI in 66.7%. TTF is not statistically significant ($\hat{\beta} = 0.10$; $p > 0.10$), i.e. H3a is not confirmed. The hypothesis H7 and H8 are confirmed as FC and BI are statistically significant to explain Adopt, respectively ($\hat{\beta} = 0.18$; $p < 0.01$) and ($\hat{\beta} = 0.64$; $p < 0.01$). BI of MBanking is the most important construct to explain Adopt given that when BI increases one unit, Adopt increases 0.64, *ceteris paribus*. Our model explains 66.7% of Adopt.

Overall, of the 15 hypotheses formulated at start, 10 are confirmed by the data. Figure 2 summarizes the empirical results with regard to the research hypothesis.

5.2 DISCUSSION

Our goal was to provide the already existing adoption models for MBanking a new, more complete overview of the factors that might influence the individual decision to adopt the MBanking services, seeing it as a relatively young banking product. This perspective was established by establishing a relation between practical knowledge (TTF), empirical knowledge (UTAUT) and individual first impressions beliefs (initial trust). In this section we will first discuss the theoretical implications of the results, followed by the managerial implications and the limitations and future research.

5.1.3. Theoretical Implications

Although to our knowledge there are no studies that create the relation explained above in MBanking, there are some works that do study parts of it and in our case, the items from Kim et al. (2009) with their study about initial trust in MBanking and the items from Zhou et al. (2010) with their study about adoption of MBanking

using a TTF and UTAUT gave us the background for our model research. So, the first question to be done is if our model provides any benefits to the previous works, and the answer is yes, it might. For one, our model substantially explains the relationship between the behavioral intention (BI) to adopt and the adoption. Furthermore, our model explains 53.4% of the BI to adopt, which when compared with the results from Kim (2009) of 31% is a considerable increase, as well as the 66.7% of the adoption which is a better result than the one from Zhou et al (2010) of 57.5% when TTF and UTAUT were used together. So, we can argue that if this relation is created to understand a IS technology the factors that do explain the final adoption increase. The second question is that of which are the relevant factors to explain MBanking adoption. To answer this question first we must discuss the different constructs and then the factors that might unify them and justify the results.

The task technology fit (TTF) is explained by the task and technology characteristics as already shown in previous works in the mobile adoption research (Gebauer, Shaw, & Gribbins, 2010; Liu, Min, & Ji, 2010; Yen, Wu, Cheng, & Huang, 2010). Furthermore Lee et al (2005), using the TTF model to analyze MCommerce performance, point out the importance of the fit between technologies and user's tasks in achieving individual performance impact from MCommerce and in so many ways this may be argued with our results as well, because the technology characteristics (TC) have a much bigger effect on the task technology fit (TTF) results than the task characteristics. We also argue that as MCommerce, MBanking is a new technology and people do not really know the plenitude of tasks that the service can offer, being forced to make a parallelism between it and other services, hence the small effect of task characteristics (TaskC) on the TTF. Nevertheless, MBanking is seen as a useful banking service and it is fitting for the usual daily tasks in about 62.9%. Our results show that there is a substantial effect of task technology fit (TTF) on performance expectancy (PE). TTF explain 48.5% of PE variation, similar result was obtained in previous work (Zhou, et al., 2010), this indicates that there is a close relation between the TTF model and the UTAUT. This means that there is a common sense relation between what is known about what a technology can do (task technology fit (TTF)) and what that same technology can bring to optimize the tasks in hand (performance expectancy (PE)).

Our model creates a relation between performance expectancy (PE) and initial trust (ITrst) as a parallelism to what Kim et al (2009) have done creating a relation between relative benefits of MBanking and initial trust. Because the relation between

our constructs is bigger than the one from the previous work, we hypothesize that this might indicate that performance expectancy (PE) establishes a more pragmatic relation to initial trust (ITrst). Hence, the fact that an individual might think that a service can optimize his/hers tasks will influence positively his/hers initial trust on a new service. Nevertheless, initial trust (ITrst) is also explained in our model by structural assurances (SA), these results are consistent with previous research (Kim, et al., 2009; Shan & Lu, 2009; Zhou, 2011a, 2011b). As Zhou (2011b), we also found that firm reputation (FR) has a significant effect on initial trust (ITrst). This indicates that an individual will be more willing to trust a new service if there is known assurances that might minimize the risk conciliated with a good reputational firm status and if the service can offer a performance optimization. Personal propensity to trust (PPT) does not have a significant effect on initial trust (ITrst) which seems to indicate that MBanking is not a new concept to people, maybe because it can be compared with other known electronic banking services and for that reason the potential costumer will focus his/hers attention on the insurances and task optimizations MBanking can offer as well as the banks' reputation. On the other hand, firm reputation (FR) does not affect the behavioral intention (BI), as already reported in other research papers (Kim, et al., 2009). This means that this fact might indicate that the behavioral intention (BI) to adopt a new service will not be influenced by the firm reputation (FR) because people tend to approach firms primarily because of their well-known and classic services.

The conceptual model explains 53.4% of MBanking behavioral intention (BI). The most important factors are performance expectation (PE) and initial trust (ITrst). An IS technology, specially a new technology like MBanking, is seen for its usefulness and optimization reasoning added. The gender and age moderation was not confirmed in our results which is not consistence with previous work (Venkatesh, et al., 2003; Y.-S. Wang, Wu, & Wang, 2009; Yu, 2012). We argue that this might be explained by the fact that the mobile phone is widespread in Portugal and everyone uses it on their daily activities and this may also be the reason that explains why the effort expectancy (EE) is of insignificant value to the behavioral intention (BI), because it is easy to use the mobile phone. Also, social influence (SI) has no real effect on the behavioral intention to adopt MBanking which, we think, might be explained by the fact that MBanking provides a service that is personal and very sensitive and so the need to show off, impress to be impressive, is repressed by the need of keeping the personal bank data and actions secure and private. We argue that the overall effect of task technology fit ($0.70 \times 0.40 + 0.70 \times 0.43 \times 0.36 = 0.39$), technology characteristics ($0.39 \times 0.70 = 0.273$),

performance expectancy ($0.40 + 0.43 \cdot 0.36 = 0.55$) and initial trust (0.36) on MBanking BI have an overpowering effect on effort expectancy and social influence. Hence, the most probable reason for the result obtained for the unconfirmed hypotheses H4 and H5.

As reported previously, adoption of MBanking is explained by our model in 66.7% not only because of the relation between behavioral intention (BI) and adoption (adopt), but also due to the positive effect of facilitating conditions (FC) on adoption (adopt). Facing these results, we can argue that the importance of support in IS technologies have a vital role in the adoption, in parallel with the trend of once you try it you will keep using it.

These results bring yet new information to the research if we compare them to the previous studies of Table 1. The fact that our model explains adoption better than the prior ones makes us believe that this might be because we combine constructs from several known adoption models. Moreover, it implies that combining different approaches in a new technology adoption model can be beneficial and might mitigate the difficulty of studying new IS technologies adoption.

Finally, it is important to understand that the relevant constructs for MBanking adoption are not only BI (0.64) and facilitation condition (0.18), but also TTF ($0.70 \cdot 0.40 \cdot 0.64 + 0.10 + 0.70 \cdot 0.43 \cdot 0.36 \cdot 0.64 = 0.35$), task characteristics ($0.70 \cdot 0.35 = 0.25$), performance expectancy ($0.40 \cdot 0.64 + 0.43 \cdot 0.36 \cdot 0.64 = 0.36$) and initial trust ($0.36 \cdot 0.64 = 0.23$). This proves the importance of developing a conceptual model that integrates TTF, UTAUT and initial trust (ITrst) in the same model to explain Mbanking adoption.

5.1.4. Managerial Implications

Our research model creates an interaction between the rational knowledge (TTF), the empirical knowledge (UTAUT) and the personal first impressions beliefs (initial trust model), establishing a significant direct effect of task technology fit on performance expectancy, a significant direct effect of performance expectancy on initial trust as well as behavioral intention and a significant direct effect of initial trust on behavioral intention. This indicates that the IT and marketing bank departments have to take into consideration several aspects of MBanking to improve its implementation and maintenance, the following tries to overview the results in such a way.

Task technology fit (TTF) has a good total effect on behavioral intention which seems to indicate that for a better service implementation MBanking needs to offer, at least, the bank tasks that are already offered by the other means. Because technology characteristics (TC) is the most important construct to explain task technology fit (TTF), we propose that it might be important for the marketing campaigns to insure that the customers do discover MBanking as a efficient gadget for executing their daily tasks. Following this idea, we also argue that it might be of benefit to magnify the performance optimizations that MBanking can offer because performance expectation (PE) as a significant effect on behavioral intention and so this means that banks need to create the idea that MBanking can improve the daily banking tasks using the quicker access and accessibility as service benefits. This may improve not only the behavioral intention (BI) but also the initial trust (ITrst) in the service as performance expectancy (PE) is the most powerful antecedent of initial trust (ITrst). Moreover, initial trust (ITrst) is also affected by structural assurances (SA) and firm reputation (FR), which might indicate that banks need to keep improving the policies to demise the reputational risk and there is requirement that both IT and marketing departments establish a clean and overwhelming campaign to disclose the security policies of the institution and the service to safeguard customers from financial and information losses. In addition, initial trust (ITrst) has a significant effect on behavioral intention (BI) which confirms that it is important for a marketing campaign to build, at the early stages of the service, a relationship of trust between the customer and MBanking. On the other hand, effort expectancy (EE) and social influence (SI) do not have a significant effect on behavioral intention (BI) mainly because of the overall effect of technology characteristics (TC), task technology fit (TTF), performance expectancy (PE) and initial trust (ITrst), as argued before, which seems to emphasize that the marketing campaigns need to focus on what the service can offer and optimize with a concern regarding the building of trust towards MBanking, confirming what was discussed previously.

Observing what factors do influence the MBanking adoption was the final goal of our research, assuming that IT and marketing bank departments have this same objective. Hence, regarding to the MBanking adoption the most powerful precursor is the behavior intention (BI) which means that banks can improve the implementation of the service if there is a carefully constructed loyalty campaign, as clients who have the intention to try MBanking are also keen to keep using it. Nevertheless, behavior intention is not the only antecedent that needs to be taken into consideration, since

facilitating conditions (FC) have a positive effect on MBanking adoption, which means that for a better and greater service implementation there is the need to generate help by creating micro sites, by having qualified personnel on the call center and by building within the marketing campaigns a view that the service is always accompanied by a “helping hand”. Moreover, as argued previously not only behavior intention (BI) and facilitating conditions (FC) are relevant to MBanking adoption, but also task technology fit (TTF), technology characteristics (TC), performance expectancy (PE) and initial trust (ITrst), and so we defend that the same marketing campaigns dedicated to the release of MBanking, with focus on what the service can offer and optimize with a concern regarding the building of trust towards MBanking, can be used to insure the adoption itself if the MBanking helping resources are created simultaneously to the implementation of the service and also if at the same time an effort for creating loyalty towards MBanking is made in the product marketing campaigns.

In sum, our research has practical implications for identifying competitive strategies for MBanking implementation and maintenance. First, MBanking must give the opportunity to execute all the banking tasks possible to secure a broader spectrum of clients using it and marketing needs to insure that clients know how and what can be done when using MBanking. Second, the marketing campaigns need to reveal the optimization factor of using MBanking, the quicker access and accessibility of service can be sold as a big benefit. Third, a good trust image of MBanking needs to be established by creating security policies and emphasizing the good bank suitability. Fourth, the banks need to create “helping hands” to secure a good understanding of the product by the client and marketing campaigns can use this as a plus service feature. Finally, a loyalty campaign needs to be done to insure a wider adoption of MBanking.

6. CONCLUSION

The objective of this study was to formulate and test empirically a model to explain MBanking adoption at an individual level. For that, we developed a model that created a relation between rational knowledge (TTF), empirical knowledge (UTAUT) and personal first impressions beliefs (initial trust model). Another goal of this paper was to give the IT and marketing bank departments an alternative view of MBanking adoption with focus to the fact that MBanking is a new IS service. Our model explained 66.7% of adoption (adopt). Our research reveals that the most important constructs to explain MBanking adoption are behavior intention (BI), facilitating conditions (FC), task technology fit (TTF), technology characteristics (TC), performance expectancy (PE) and initial trust (ITrst). The significant overall power of task technology fit, technology characteristics, performance expectancy and initial trust on MBanking adoption prove the importance of the developed research model. Hence, it can be concluded that the relation between the models TTF, UTAUT and initial trust is of significant importance for MBanking service implementation and maintenance. Furthermore, we hope that this research model stimulates further research and provides a useful lens for conjointly examining TTF, UTAUT and initial trust in the context of adoption of new IS technologies.

7. LIMITATIONS AND FUTURE RESEARCH

MBanking is a relatively new service not very known and it is very usual for clients to know the concept of it but they do not have any kind of experience and/or factual knowledge about what kind of services are offered. So it is possible that some of the answers are in fact a parallelism with online banking. Hence, it might be interesting to include in future research a study comparing online banking and MBanking and the possible reasons for the transition from one to another using this same adoption model. Another interesting future research would be through a bigger time frame. The evolution of the adoption and of the factual knowledge of the general population about this service could be an interesting study especially for the banks marketing departments. In the future, the study of experience as a moderator can be also an interesting upgrade of the model developed in the present work.

MBanking is a service that will always need telecoms as an intermediary between the bank and the client. This is a limitation of our study as we only observed the relation between the banks and clients. So as for future research, the individual relation between the client and the telecom and the business relation between the banks and the telecoms should also be studied.

MBanking is preferred by people who live in rural areas and that do not have an active relationship with a bank (Matos & D'Aguiar, 2010). Thus, future research could be done with focus in rural areas and also a comparative study between rural and urban areas. Also, it could be of interest to do a cross border study.

8. BIBLIOGRAFIA

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9. APPENDIX – SURVEY

TaskC. Task Characteristics (Zhou, et al., 2010):

TaskC1. I need to manage my accounts anytime anywhere.

TaskC2. I need to do transfers anytime anywhere.

TaskC3. I need to have a real time control in my accounts.

TaskC4. The financial instructions I give can't wait.

TC. Technology Characteristics (Zhou, et al., 2010):

TC1. Mobile banking provides ubiquitous services.

TC2. Mobile banking provides a real time service.

TC3. Mobile banking provides secure services.

TC4. Mobile banking provides a quick service.

TTF. Task Technology Fit (TTF) (Zhou, et al., 2010):

TTF1. Mobile banking payment services are appropriate.

TTF2. Mobile banking account management services are appropriate.

TTF3. Real time Mobile banking services are appropriate

TTF4. In general, Mobile banking services are enough.

PE. Performance Expectancy (Zhou, et al., 2010):

PE1. I gain time using Mobile banking.

PE2. Mobile banking optimizes my financial operations.

PE3. Mobile banking allows me to make my payments quicker.

PE4. I will improve my earnings using Mobile banking.

EE. Effort Expectancy (Zhou, et al., 2010):

EE1. Learning to use Mobile banking is easy.

EE2. It's easy to enter in the Mobile banking page.

EE3. It's easy to use the Mobile banking service skillfully.

EE4. I do not have any doubts about what I'm doing when I'm using the service.

SI. Social Influence (Zhou, et al., 2010):

- SI1. My friends and family value the use of Mobile banking.
- SI2. The people that influence me use Mobile banking.
- SI3. I find Mobile banking trendy.
- SI4. The use of Mobile banking gives me professional status.

FC. Facilitating Conditions (Zhou, et al., 2010):

- FC1. I have all the necessary resources to use Mobile banking.
- FC2. I have the knowledge to use Mobile banking.
- FC3. If I have any doubts about how to use the Mobile banking service I do have a support line to help me.
- FC4. If I have any doubts about how to use the Mobile banking service I do have an account manager that helps me.

PPT. Personal Propensity to Trust (Kim, et al., 2009):

- PPT1. I don't use new Technologies.
- PPT2. I avoid the use of new products like Mobile banking.
- PPT3. I avoid the use of non-classical means to transact money.
- PPT4. I'm cautious with the financial transactions I execute.

SA. Structural assurances (Kim, et al., 2009):

- SA1. I do not incur in the risk of financial losses using Mobile banking services.
- SA2. I do not incur in the risk of personal information theft using Mobile banking services.
- SA3. My banks Mobile banking service has a Client Protection Policy.
- SA4. My personal mobile phone informations are secure when I use the Mobile banking service.

FR. Firm Reputation (Kim, et al., 2009):

- FR1. I trust my bank.
- FR2. My bank is known for its suitability.
- FR3. The services my bank provides are of great quality.
- FR4. My bank is a secure institution.

ITrst. Initial Trust (Kim, et al., 2009):

ITrst1. Mobile banking seems dependable.

ITrst2. Mobile banking seems secure.

ITrst3. Mobile banking seems reliable.

ITrst4. Mobile banking was created to help the client.

BI. Behavioral intention (Davis, 1989):

BI1. I have the intention of making a service payment by mobile phone

BI2. I have the intention of making my mobile phone payments by using the Mobile banking service

BI3. I'm curious about Mobile banking.

BI4. I have the intention of managing my accounts using my mobile phone.

BI5. I have the intention of making a transfer by mobile phone.

BI6. I want to know more about Mobile Banking.

Adopt. Adoption (Goodhue & Thompson, 1995):

Adopt1. I use Mobile banking.

Adopt2. I use Mobile banking to manage my accounts.

Adopt3. I use Mobile banking to make transfers.

Adopt4. I subscribe financial products that are exclusive to Mobile Banking.