Factors Affecting Isfahanian Mobile Banking Adoption Based on the Technology Acceptance Model

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Abstract

With the convergence of banking services and mobile technologies, users are able to conduct banking services at any place and at any time through mobile banking (Gu, Lee and Suh, 2009). The term "Mobile Banking" refers to application of cell phone as a channel to provide and deliver the bank services which include both traditional services such as cash transferring and new services such as online or electronic payments. Mobile Banking services got a growing trend ahead so that economic experts predict that by 2013, 300 billion transactions worth over 860 billion dollars will be done through mobile banking (Rogers, 1983). The current exploratory study is an attempt to investigate the factors that influence Isfahanian’ intention to adopt mobile banking by extending the renowned framework of Technology Acceptance Model (TAM) by additionally examining the effects of compatibility, trust and perceived risk on behavioral intention. A self-administrated questionnaire had been developed and distributed in Isfahan city. Out of 400 questionnaires that have been distributed, 315 are returned (78.0%). Of these, five(5) responses had to be discarded due to invalid or incomplete data entries. Thus the sample comprising of a total of 310 respondents was used for analysis. The data was analyzed by AMOS software. In the survey, factors that may affect Isfahanian mobile phone users' to adopt mobile banking services were examined. Factors such as perceived usefulness (PU), perceived ease of use (PEOU) and compatibility were found positively related with the intention to adopt mobile banking services. Compatibility not only had a strong direct effect but was also identified as an important antecedent for perceived ease of use and perceived usefulness. However, trust was the only factor found insignificant. As expected, perceived risk (PR) was negatively associated with the mobile banking adoption. The research findings provide several important implications for banks, service developers, and software engineer with better strategic insights to design and implement mobile banking services to yield higher consumer acceptance towards mobile banking in Isfahan city.

Keywords: Adoption of mobile banking, TAM, Compatibility, Trust, Perceived risk
1. Introduction

Technology has become an increasingly vital element in the competitive landscape of the financial services industry. Recent innovations in telecommunications have enabled the launch of new access methods for banking services; one of these is mobile banking; whereby a customer interacts with a bank via mobile phone (Barnes and Corbitt, 2003). In service use, mobile phones are no longer used as they have typically been used before. Talking and text messaging (SMS) will remain, but extensive service use is expected to grow. Mobile Bank is a service provided by the bank that enables the user to receive information on the accounts and make monetary payments based on orders sent via mobile phone and sms service. It allows its customers to receive information on: account balances of the customer; transactions on the customer's accounts and currency exchange rates. The opportunity to use advanced technologies in service delivery have created challenges to developers of financial services; competitive advantage can be gained in form of costs reduction or customer satisfaction increase or lost investing in wrong technologies. In order to rise to the challenges service providers are even more interested to enhance their understanding of consumer behavior patterns (Salim Khraim et al, 2011). Mobile banking has a long way to go as majority of customers prefer banking in the traditional ways (Ashta, 2010; Wang et al, 2003). Key question is why customers are not adopting mobile banking. Various factors may influence customers’ adoption. There is a need, therefore, to understand users' acceptance and adoption of mobile banking and to identify the factors affecting their intentions to use mobile banking. This information can assist developers in the building of mobile banking systems that consumers want to use, or help them to discover why potential users avoid using the existing system. Therefore, with the aim of identifying factors related to customers' behavioral intentions to use mobile banking services, this paper attempts to study the expanded model of Technology Acceptance Model.

2. Literature Review

2.1. Mobile banking

Mobile Commerce (m-commerce) is defined as a business transaction conducted through mobile communication networks or the Internet (Siau and Shen, 2003). M-commerce can offer value to consumers through convenience and flexibility by enabling time and place independence (Kim et al, 2009; Venkatesh et al, 2003). Mobile banking is an application of m-commerce which enables customers to access bank accounts through mobile devices to conduct and complete bank-related transactions such as balancing cheques, checking account statuses, transferring money and selling stocks (Kim et al, 2009; Tiwari and Buse, 2007). Luo et al (2010), defined mobile banking as an innovative method for accessing banking services via a channel whereby the customer interacts with a bank using a mobile device (e.g. mobile phone or personal digital assistant (PDA)).

Iran is considered a young country in the field of mobile banking and need to grow and promote in this section. Although mobile banking services are offered in most public and
private banks, but still many customers have not welcomed to these services because they are not familiar with the way using these services and most important is the lack of confidence to electronic systems (Pedersen, 2005). Obviously, if customers not welcome mobile banking systems, providing these services will fail. Today, despite the late acceptance of mobile banking in Iran, the banks seem to be aware of opportunities that the technology is provided for them. In fact, they are moving very fast towards a modern mobile banking and providing services to customers in higher levels (Fishbein and Ajzen, 1975). On the other hand, despite the great investments made in the field of mobile banking, reports indicate that some users not use this technology, though they have access to it. So, studying behavioral factors influencing customer adoption of mobile banking will make the banking system to identify factors related to adoption of the technology and to strengthen relevant factors in order to encourage customers to use this service and thus develop the electronic banking. This reveals the need to perform investigations to identify factors determining adoption of the mobile banking system and customers attitude toward it (Laukkanan, 2007). Several theories are offered in order to identify factors that cause people accept new technologies and information systems and use them (Rao and Troshani, 2007), such as Theory of Reasoned Action (Fishbein and Ajzen, 1975) and Technology Adoption Model (Davis et al, 1989).

2.2. Theory of Reasoned Action (TRA)
This theory which is developed by Fishbein and Ajzen (1975), perhaps is one of the most important theories that are used to explain the human behaviors (Puschel and Mazzon, 2010). According to their theory, behavioral intention (use technology), is explained by people's attitudes toward that behavior and subjective norms. People's attitude toward a behavior includes behavioral beliefs; assess the consequences of behavior, subjective norms, normative beliefs and motivations that must be answered (Riivari, 2005). This theory, as long as the behavior is voluntarily controlled by the individual, can accurately explain the factors influencing technology adoption (Laukkanen and Cruz, 2009). This model is shown as in figure 1.

![Figure 1: Theory of Reasoned Action (TRA)](image)

2.3. The Technology Acceptance Model (TAM)
TAM was developed by Davis (1989) based on the theory of reasoned action (TRA) (Fishbein and Ajzen, 1975) to explain computer usage behavior. TAM posits that the intention to use an information system is determined by perceived usefulness (PU) and perceived ease of use (PEOU). PU is defined as “the degree to which a person believes that using a particular system would enhance his or her job performance” while PEOU refers to “the degree to which a person believes that using a particular system would be free of effort” (Davis, 1989). This model is shown as in figure 2.
Figure 2: Technology Acceptance Model (TAM)

(Mathieson, 1991) argued that it is insufficient to rely only on both constructs of perceived usefulness (PU) and perceived ease of use (PEOU) in investigating user’s technology acceptance. (Hsu and Lu, 2004) in their study supported that both factors of TAM model were not exactly reflecting the acceptance of mobile banking. Hence, (Riquelme et al, 2010)suggested there are other possible factors that might affect mobile banking adoption such as perceived risk (Chung and Kwon, 2009; Donner and Tellez, 2008; Luo et al, 2010). In view of the different constructs being used, this paper extends the TAM by including, compatibility, perceived risk, and trust in which these constructs are believed to affect the behavioral intention to adopt mobile banking.

The proposed research framework is shown as in Figure 3. One advantage of using TAM or extended TAM is that they have been extensively tested and validated and are widely accepted models which can be modified or extended using other theories or constructs (Taylor & Todd, 1995; Wu & Wang, 2005; Luarn and Lin, 2005; Zhang et al, 2008; Yen et al, 2010).

2.4.Compatibility

Compatibility is an important aspect of innovation that can be defined as the extent to which a new service is consistent with users’ existing values, beliefs, previous experiences, habits (Chen et al., 2002). Innovations conforming with an individual user’s lifestyle will result in a faster rate of adoption (Rogers, 1995). Compatibility has thus been integrated into the TAM model in the context of a virtual store (Chen et al., 2002), m-payment (Chen, 2008) and m-commerce (Wu and Wang, 2005). Research has shown that compatibility will lead to higher perceived ease of use as less effort is required (Agarwal and Karahanna, 1998; Wu and Wang, 2005).

2.5. Perceived Risk

Perceived risk is the “uncertainty about the outcome of the use of the innovation” (Gerrard and Cunningham, 2003). In fact, perception of risk among individuals has been proved in technology adoption literature as an important element in acquiring new technology or services(Laforet and Li, 2005). A recent studies conducted by Luo et al (2010) found that user’s perception of risk is a crucial driver to determine innovative technology acceptance. The findings show that perceived risk has negative significant relationship towards behavioral intention on mobile banking adoption.
2.6. Trust in mobile banking

Customer trust is recognized as a critical factor for the success of mobile banking. With the surge of both electronic commerce (e-commerce) and mobile commerce (m-commerce), more studies have been conducted on the conceptual structure, formation of the mechanisms of trust and effects of trust (Kim et al, 2009). In a study by Kim et al (2009) which examined the effect of initial trust in mobile banking user adoption, trust was defined as a psychological expectation that a trusted party will not behave opportunistically.

According to the theoretical literature, the hypotheses of this research are:

H1: Compatibility has positive effect on Perceived ease of use (PEOU).
H2: Compatibility has positive effect on the adoption of mobile banking.
H3: Compatibility has positive effect on Perceived usefulness (PU).
H4: Perceived ease of use (PEOU) has positive effect on the adoption of mobile banking.
H5: Perceived usefulness (PU) has positive effect on the adoption of mobile banking.
H6: Perceived ease of use (PEOU) has positive effect on perceived usefulness (PU).
H7: Perceived risk has negative effect on the adoption of mobile banking.
H8: Customers’ trust in mobile banking service providers has positive effect on the adoption of mobile banking.

![Figure 3: Research Framework](image-url)
3. Methodology

Table 1: overall indexes of fit in measurement models:

<table>
<thead>
<tr>
<th></th>
<th>Compatibility</th>
<th>Perceived risk</th>
<th>Perceived ease of use</th>
<th>Perceived usefulness</th>
<th>Trust</th>
<th>Behavioral intention</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMIN/DF</td>
<td>2.957</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2.610</td>
</tr>
<tr>
<td>RMR</td>
<td>0.010</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.011</td>
</tr>
<tr>
<td>GFI</td>
<td>0.992</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.993</td>
</tr>
<tr>
<td>AGFI</td>
<td>0.971</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0.974</td>
</tr>
<tr>
<td>IFI</td>
<td>0.996</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.997</td>
</tr>
<tr>
<td>NFI</td>
<td>0.993</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.994</td>
</tr>
<tr>
<td>CFI</td>
<td>0.996</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>1.000</td>
<td>0.997</td>
</tr>
</tbody>
</table>

Table 2:

<table>
<thead>
<tr>
<th>RMR</th>
<th>IFI</th>
<th>CFI</th>
<th>NFI</th>
<th>AGFI</th>
<th>GFI</th>
<th>RMSEA</th>
<th>CMIN/df</th>
<th>df</th>
<th>CMIN</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.020</td>
<td>0.979</td>
<td>0.979</td>
<td>0.978</td>
<td>0.97</td>
<td>0.983</td>
<td>0.064</td>
<td>2.4</td>
<td>36</td>
<td>91.965</td>
</tr>
<tr>
<td>Close to zero</td>
<td>0.90&gt;</td>
<td>0.90&gt;</td>
<td>0.90&gt;</td>
<td>0.90&gt;</td>
<td>0.90&gt;</td>
<td>0.08&lt;</td>
<td>1&gt; 3&lt;</td>
<td></td>
<td>Reception area</td>
</tr>
</tbody>
</table>

Table 3: hypotheses testing results

<table>
<thead>
<tr>
<th>Hypotheses</th>
<th>Sample size</th>
<th>Significance number</th>
<th>Corroboration coefficient</th>
<th>Critical ratio</th>
<th>Test result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility → Perceived ease of use</td>
<td>310</td>
<td>0.000</td>
<td>0.271</td>
<td>6.893</td>
<td>accepted</td>
</tr>
<tr>
<td>Compatibility → Usage intention</td>
<td>310</td>
<td>0.000</td>
<td>0.423</td>
<td>14.243</td>
<td>accepted</td>
</tr>
<tr>
<td>Compatibility → Perceived usefulness</td>
<td>310</td>
<td>0.000</td>
<td>0.221</td>
<td>8.266</td>
<td>accepted</td>
</tr>
<tr>
<td>Perceived ease of use → Behavioral intention</td>
<td>310</td>
<td>0.000</td>
<td>0.247</td>
<td>6.597</td>
<td>accepted</td>
</tr>
<tr>
<td>Perceived usefulness → Behavioral intention</td>
<td>310</td>
<td>0.000</td>
<td>0.337</td>
<td>8.529</td>
<td>accepted</td>
</tr>
<tr>
<td></td>
<td>310</td>
<td>0.000</td>
<td>0.687</td>
<td>25.676</td>
<td>accepted</td>
</tr>
<tr>
<td>Perceived risk → Behavioral intention</td>
<td>310</td>
<td>0.000</td>
<td>-0.97</td>
<td>-3.681</td>
<td>accepted</td>
</tr>
</tbody>
</table>
Trust in mobile banking service providers → Behavioral intention | 310 | 0.721 | 0.017 | 0.662 | Not accepted

In the significance level of 0.05, if the table's significance number is smaller than 0.05, relationship between each pair of variables is confirmed

5. Discussion, conclusion and limitations

This study is one of the few, so far, which investigate the factors that affect mobile banking services adoption. In this research we have defined several factors that act as drivers for mobile banking adoption. Based on the literature review and the above empirical results, we manage to outline the factors that influence mobile banking adoption in Isfahan city. The results shows that of the eight hypotheses tested, seven of them were supported.

This study has given new insights into the importance of compatibility, because compatibility not only had a strong direct effect but was also identified as an important antecedent for perceived ease of use and perceived usefulness. The extent to which innovative products fit with the social structure and technological infrastructure of an individual has been inadequately addressed in previous studies of adoption. This study has shown the importance of consumers’ evaluations of the extent to which a new technology will be compatible with their lifestyle and familiarity with established technologies. It demonstrates that if consumers perceive m-banking as consistent with their existing beliefs, values, lifestyle and past experience, they are more likely to use these services.

Hypothesis 4 stated that perceived ease of use (PEOU) is likely to influence the adoption of mobile banking. This is consistent with the prior studies such as Amin et al (2008); Chung and Kwon (2009); and Lee et al (2008). Cohen (2008) argued that “bankers have to move beyond thinking of mobile banking as a subset of transactions from online banking that they can simply move to the mobile phone”. In fact, banks should simplify the usage of mobile banking services and continue to design more user-friendly system interface. In addition, banks should provide adequate information and clearer guidance to encourage user to use the service. For example, the demonstration can be performed by uploading the steps to perform mobile banking services on bank official websites, or social networking sites. Once users have learnt the fundamental skills on how to operate mobile banking, a positive ease of use feeling will be developed among users.

Similarly, the research findings show that Perceived usefulness has positive effect on mobile banking adoption. The findings were consistent with studies from Chung and Kwon (2009); Lee et al (2008); and Luarn and Lin (2005). This result implies that if mobile banking is useful and beneficial, users are more likely to adopt mobile banking services. Therefore, banks should emphasize the benefits in the aspects of cost savings, ubiquity, flexibility, and mobility by using mobile banking services. Eventually, banks might educate users the benefits of using mobile banking services through promotional mix such as personal selling, advertisements, sales promotions, and public relations. In addition, banks may continue to innovate more useful features and services. For instance, Bank Islam launched ‘Transact on Palm (TAP) Mobile Banking-I’, the Malaysia’s First Truly Mobile Banking service that enable users to perform
banking transactions without internet access. Hence, by providing more useful service, thus user will be more attracted to adopt mobile banking.

Hypothesis 6 stated that perceived ease of use (PEOU) is likely to influence perceived usefulness (PU). The literature describes that the relationship between PU and PEOU is that PU mediates the effect of PEOU on the intention to use (Venkatesh et al, 2003). This means that while PU has a direct impact on intention to use, PEOU influences intention to use indirectly through PU.

Even though several studies found that security issues are not the main inhibitor in mobile banking adoption (Laukkanen and Lauronen, 2005)our findings show that there is negative significant relationship between perceived risk and mobile banking adoption. This implies that individuals perceived higher risk and uncertainty incurred in adopting mobile banking. Significantly, these findings were found to be consistent with Luo et al (2010) and Mitchell (1999) in which perceived risk is one of the critical factors to be focused while designing and developing a mobile banking service. Therefore, it is important for banks and service providers to project higher security when providing mobile banking services in order to yield higher consumers’ acceptance. In fact, banks and service providers should continuously innovate and offer better security and reliable applications to enhance users’ confidence towards mobile banking services. In addition, banks must seek to reduce this perceived risk, for example by offering specific service guarantees protecting adopters from harmful consequences of service failure. There is evidence that guarantees can act as, a risk-reducing attribute as it is an indicator that the firm takes complaints seriously (Lideén and Skalsén, 2003).

There is no main effect for trust to adoption of mobile banking. Hence, the research hypothesis 8: Customers’ trust in mobile banking service providers has positive effect on the adoption of mobile banking; cannot be accepted.

After reviewing the findings of this study, there are several important implications suggested for banks, service developers and software engineers in order to provide better strategic insight to design and implement mobile banking services that yield higher consumer acceptance in Isfahan. As PU, PEOU, PR and compatibility were found to be the factors that influence consumers’ behavior intention in adopting mobile banking, service developers and software engineers should focus on the development of mobile banking facilities. This can be achieved by developing better functions in terms of flexibility, security and accessibility features to enhance consumers’ confidence to adopt mobile banking services. Since the perceived risk greatly influence consumers’ behavioral intention, thus security is one of the important factors to stimulate customers’ confidence level to adopt mobile banking services. The mobile banking service providers should enhance the security features consistently by practicing transparency management during the process of monetary transactions. Lastly, in the views of personal innovativeness demonstrates a positive-significant relationship towards mobile banking adoption; thus the banks can promote and create awareness to the public through highlighting the benefits or advantages that can be gained from the mobile banking services to stimulate the adoption level among the mobile users. Instead, such promotion also provides better exposure and awareness to the non-mobile banking users to have positive impression towards mobile banking.

There are several limitations evidenced in this study. These limitations should be considered for future research and improvement. Firstly, the effect of demographic variables such as race, age,
gender and culture on adoption of mobile banking was not intensively explored. Some demographic variables may have indirect interrelation effects between the variables, for example according to Lee (2009), the cognitive propensity of individuals to risk differs across culture. This means that the customers’ acceptance of mobile banking may be influenced by cultural differences. This phenomenon may require further investigation on a wider scale across various racial groups with cultural differences. Secondly, the measures of constructs are collected at the same point of time in this study. Therefore, individuals’ perceptions and intention to use mobile banking may change over time as an unremitting process due to greater experience and advancement of mobile technologies for the time being. As a result, it is recommended to conduct a longitudinal research to examine the mobile banking adoption at multiple points of time during decision adoption process. Thirdly, this research has a significant limitations shared by many studies of consumer adoption in that it only measured behavioral intention, rather than actual behavior. This is not a serious limitation as there is substantial empirical support for the causal link between intention and behavior (Taylor and Todd, 1995; Venkatesh and Davis, 2000; Venkatesh and Morris, 2000).

References


