

# Factors Affecting Isfahanian Mobile Banking Adoption Based on the Decomposed Theory of Planned Behavior

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## Abstract

Mobile banking is considered a new era in banking, in which banks are spending considerable amount of money to have it available to their customers and to cut their operations costs. 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 Decomposed Theory of Planned Behavior model (DTPB) by additionally examining the effects of trust and perceived risk as components of attitude 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. Results of the study discovered that the decisive or crucial factors influencing mobile banking adoption are attitude and perceived behavioral control, However, social norms were the only factor found insignificant. The perceived usefulness, perceived ease of use ,compatibility, and trust under 'behavioral attitude' have positive effect on behavioral attitude; while perceived risk under 'behavioral attitude' has negative effect on behavioral attitude. the influence of the interpersonal influence under 'subjective norms' was also evident, while self-efficacy and facilitating condition under 'perceived behavioral control' are significant influential factors.

**Keywords:** Adoption of mobile banking, Decomposed Theory of Planned Behavior (DTPB), 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 Decomposed Theory of Planned Behavior.

## **2. Literature Review**

### **2.1. Mobile banking**

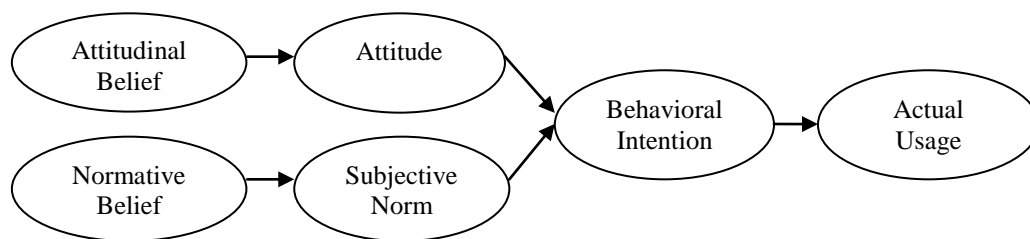
Mobile Commerce (m-commerce) is defined as a business transaction conducted through mobile communication networks or the Internet (Siau and Shen, 2003). M-commerce can offer value to consumers through convenience and flexibility by enabling time and place independence (Kim et al, 2009; Venkatesh et al, 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), Theory of Planned Behavior (Ajzen, 1991), and Decomposed theory of Planned Behavior (Taylor and Todd, 1995).

### 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.

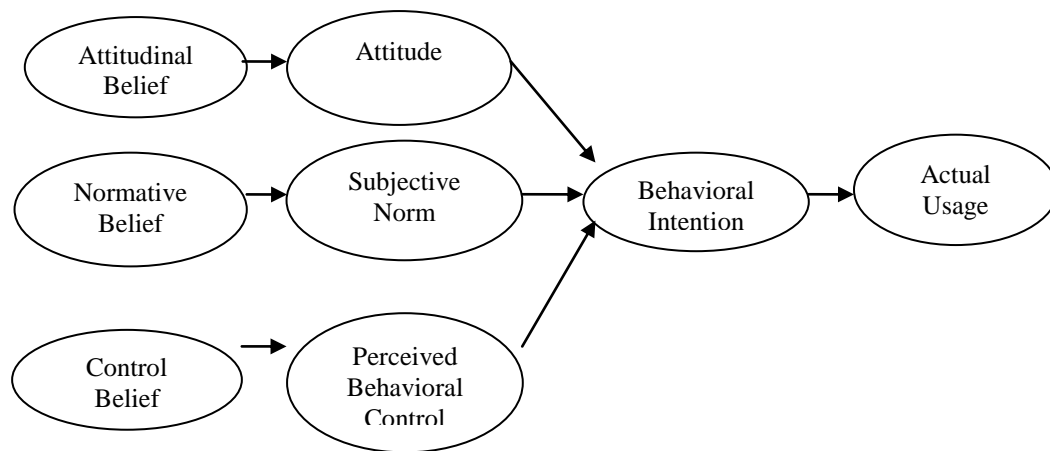


**Figure 1: Theory of Reasoned Action (TRA)**

### 2.3. Theory of Planned Behavior (TPB)

Ajzen (1991) developed the theory of reasoned action through adding construct "perceived behavioral control" into the model as a determinant of behavioral intention and behavior, and called it as "theory of planned behavior". This social-psychological theory with regard to perceptions of performance control, attempts to predict involuntary behaviors, too. It determines the impacts of three factors, i.e. "attitude", "subjective norms" and "perceived

behavior control" on tend to behave (Riivari, 2005). In fact, attitude is the general feeling of people about the desirability or undesirability of a particular issue or behavior (Ajzen, 1991). Subjective norm refers to individual's perception of important people's opinions about doing or not doing the behavior. In other words, subjective norm is the perceptions related to opinions of society about doing or not doing the behavior by individual (Taylor and Todd, 1995). The construct "perceived control of behavior" is the individual's perception about ease or difficulty of doing behavior and indicates the individual's perceptions about required skills, resources, and opportunities in doing the behavior (Ajzen, 1991). This model is shown as in figure 2.

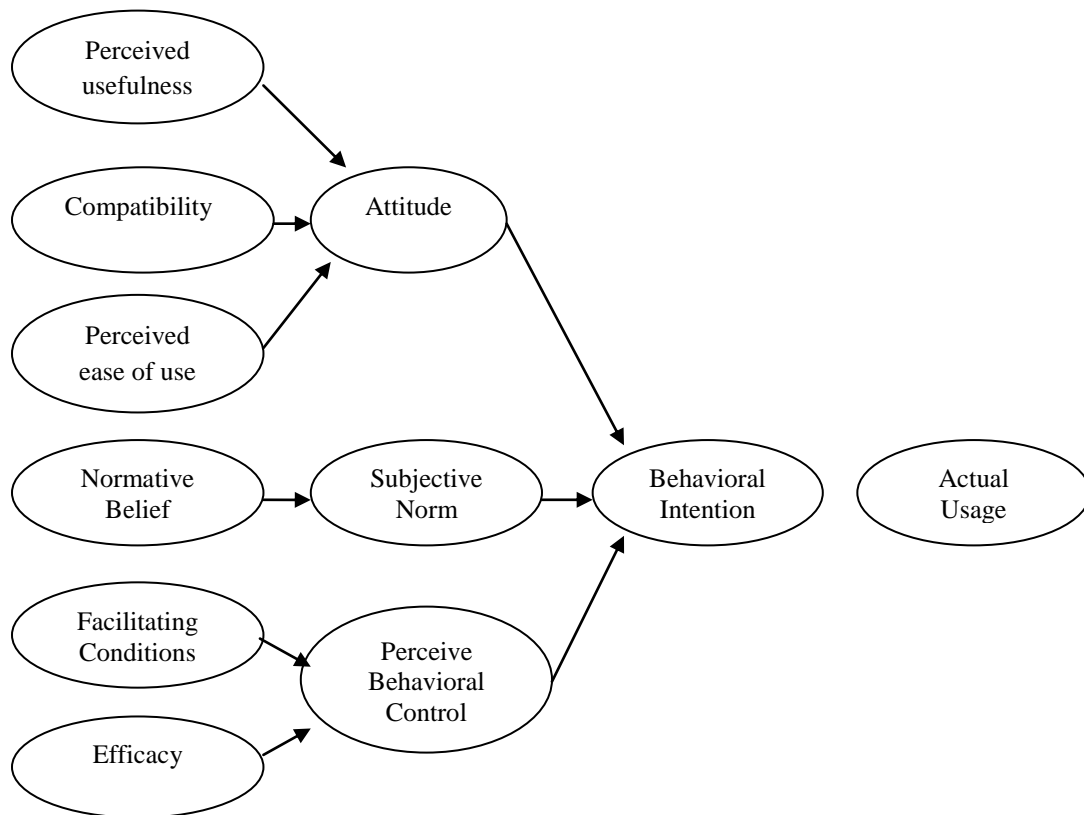


**Figure 2: Theory of Planned Behavior (TPB)**

#### 2.4.Decomposed Theory of Planned Behavior

Decomposed theory of Planned Behavior was raised by Taylor and Todd in 1995. They developed the theory of planned behavior through breaking down structure of attitude, subjective norm and perceived behavioral control (Luarn and Lin, 2005). This resulted in increased power to explain behavioral intentions and accurate understanding of behavioral events (Pedersen, 2005). According to the decomposed theory of planned behavior, the behavior is determined by "intention to use". "Intention to use", in turn, is determined by the attitude toward behavior, subjective norm and perceived behavioral control. Perceived usefulness is an extent to which a person believes using a particular technology will improve his or her job performance (Laukkanen and Cruz, 2009). Perceived ease of use refers to the degree to which a person believes using a particular system does not require a lot of effort (Taylor and Todd, 1995). Perceived compatibility is an extent that an innovation is consistent with existing values, past experiences and current needs of potential adopters (Puschel and Mazzon, 2010).

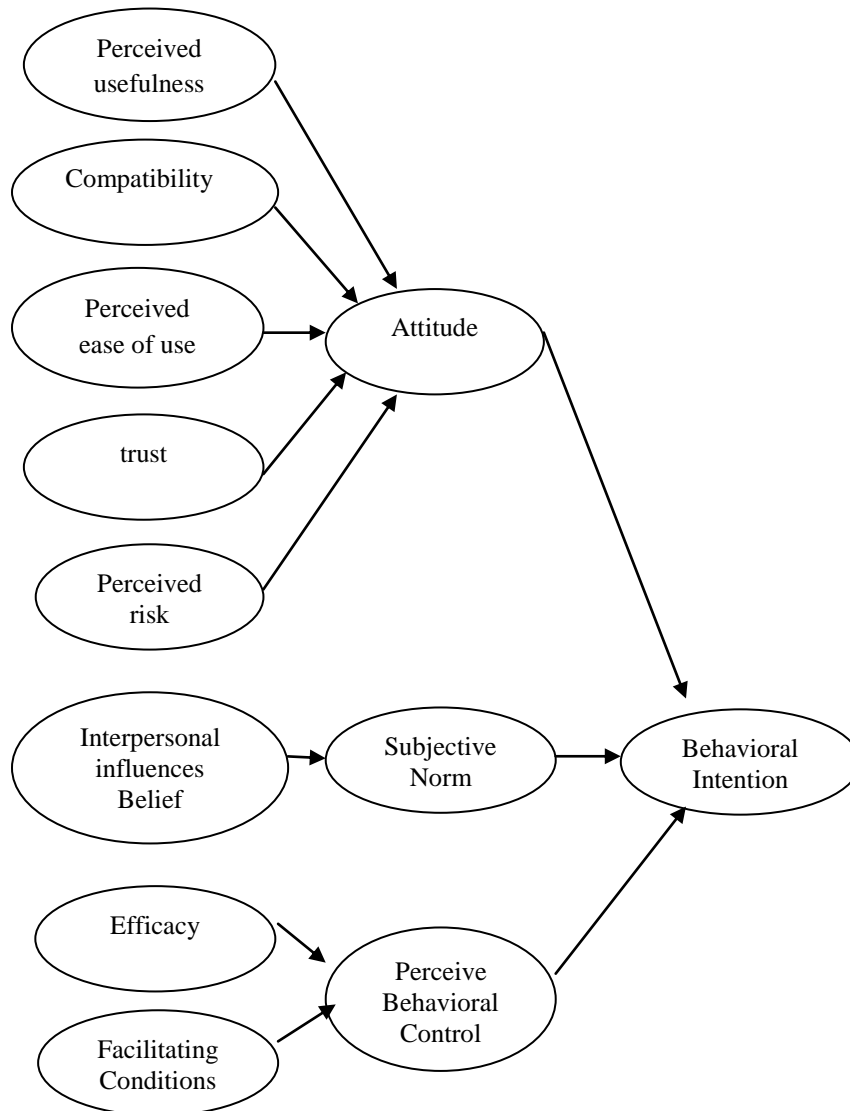
While the theory of planned behavior simply explains the relationship between structure of beliefs and the prerequisite of intention, in brief, decomposed theory of planned behavior, offers a comprehensive approach to understanding the factors affecting a person's decision to use technology information (Suoranta and Mattila, 2004). This model is shown as in figure 3.



**Figure 3: Decomposed Theory of Planned Behavior**

Fig.4 illustrates a research model for mobile banking adoption, a comprehensive theoretical model is proposed based on the DTPB with addition of trust and perceived risk as components of attitude. This model decomposes the perceived behavioral control component into self-efficacy and Facilitating Conditions, the subjective norms component into interpersonal influences, and the attitude component into perceived usefulness, perceived ease of use, compatibility, trust, and perceived risk. Eleven hypotheses and their supporting studies are summarized in Table 1. The rationale for choosing DTPB as theoretical foundation is as follows: (1) the adoption of mobile banking is not entirely under citizens' control. The condition satisfies core assumption of the DTPB that the presence of constraints can inhibit both the intent to perform a behavior and the behavior itself; (2) Social influence is an important determinant of

behavior; (3) individual's self-efficacy and facilitating resources are possible barriers to user adoption of mobile banking; and (4) This model is an appropriate model for providing concrete managerial implications for practitioners. This model can effectively elicit mobile banking users' salient belief structure and acquire stable, easily understood, and managerially relevant factors.



**Figure 4: Research Framework**

## 2.5. 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.

## 2.6. 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.

**Table 1: Summary of research hypotheses and supporting studies**

	<b>Hypotheses</b>	<b>Supporting studies</b>
H1	<b>Perceived Usefulness → attitude</b>	<b>Davis (1989); Taylor and Todd (1995)</b>
H2	<b>Compatibility → attitude</b>	<b>Taylor and Todd (1995); Mathieson (1991)</b>
H3	<b>Perceived ease of use → attitude</b>	<b>Davis (1989); Taylor and Todd (1995)</b>
H4	<b>Trust → attitude</b>	<b>Gefen et al. (2002)</b>
H5	<b>Perceived risk → attitude</b>	<b>Gefen et al. (2002)</b>
H6	<b>Interpersonal influence → subjective norms</b>	<b>Fishbein and Ajzen (1975); Ajzen (1991); Taylor and Todd (1995); Bhattacharjee (2000)</b>
H7	<b>Self-efficacy → perceived behavioral control</b>	<b>Ajzen (1991); Taylor and Todd (1995); Bhattacharjee (2000)</b>
H8	<b>Facilitating conditions → perceived behavioral control</b>	<b>Bandura (1986); Ajzen (1991); Taylor and Todd (1995); Bhattacharjee (2000)</b>

<b>H9</b>	<b>Attitudes→ behavioral intention</b>	<b>Ajzen (2001); Taylor and Todd (1995); Bhattacharjee (2000); Mathieson (1991)</b>
<b>H10</b>	<b>Subjective norms → behavioral intention</b>	<b>Ajzen (2001); Taylor and Todd (1995); Bhattacharjee (2000); Mathieson (1991)</b>
<b>H11</b>	<b>perceived behavioral control → behavioral intention</b>	<b>Ajzen (2001); Taylor and Todd (1995); Bhattacharjee (2000); Mathieson (1991)</b>

### **3.Methodology**

#### **3.1. Research Population and Sample**

This research, from the viewpoints of practical purposes and methods of data collection is a descriptive survey research. The objective of this study is to identify significant factors in the adoption of mobile banking. For the purposes of this study, the population was a mobile phone owner with a bank account in Isfahan city. Approximately 400 questionnaires were prepared and circulated. A total of 315 responses were received. 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. This exceeded the minimum required sample size of 306 to achieve a 95% confidence level for a population greater than 500,000 (Zikmund, 2003).

#### **3.2. Research Variables Measurement**

Content validity of this questionnaire was approved by Isfahan University authorities and professors. Cronbach's alpha was used to determine the reliability of the test. For this purpose, an initial sample of 60 questionnaires was distributed. By using obtained data, Cronbach's alpha was calculated. Cronbach's alpha for all the questions related to the variables in the research analytical model was calculated as 0.928% which is acceptable. As noted, the research model includes the Decomposed Theory of Planned Behavior (Figure 4). Variables related to the Decomposed Theory of Planned Behavior, including Perceived ease of use, and Perceived usefulness were adapted from Davis (1989), whereas compatibility and items measuring subjective norms, perceived behavioral control, and attitudes were taken from Taylor and Todd (1995). Items assessing perceived risk were adapted from Stone and Gronhaug (1993), and trust was adapted from Gefen et al (2002). Moreover, measurements of behavioral intention were derived from Taylor and Todd(1995). According to Zikmund (2003), using a Likert scale allows the respondents to indicate their attitudes by checking how strongly they agree or disagree with the constructed statements. For the purpose of this study, All items were



measured using a five-point Likert-type scale with anchors ranging from "strongly agree" to "strongly disagree".

#### 4.findings

##### 4.1. Analytical findings of the research conceptual model

In the first step, measurement models get fitted. Models' fit indexes are listed in Table 1:

**Table 1: overall indexes of fit in measurement models:**

	CMIN/DF	RMR	GFI	AGFI	IFI	NFI	CFI
Perceived Usefulness	2.957	0.010	0.992	0.971	0.996	0.993	0.996
Compatibility	-	0.000	1.000	-	1.000	1.000	1.000
Perceived ease of use	2.610	0.011	0.993	0.974	0.997	0.994	0.997
Trust	-	0.000	1.000	-	1.000	1.000	1.000
Perceived risk	-	0.000	1.000	-	1.000	1.000	1.000
Interpersonal influence	-	0.000	1.000	-	1.000	1.000	1.000
Self-efficacy	-	0.000	1.000	-	1.000	1.000	1.000
Facilitating conditions	-	0.000	1.000	-	1.000	1.000	1.000
Attitudes	2.589	0.010	0.994	0.975	0.998	0.995	0.998
Subjective norms	-	0.000	1.000	-	1.000	1.000	1.000
perceived behavioral control	-	0.000	1.000	-	1.000	1.000	1.000
Behavioral intention	-	0.000	1.000	-	1.000	1.000	1.000

Measurement models have a good fit, in other words, overall indexes confirm that models are clearly supported by data.

##### 4.2. The results of structural equation modeling analysis

After evaluating and verifying the measurement models in the first step, in the second step, to test hypotheses, structural equation model is fitted and analyzed. Overall indexes of model fitness are presented in Table 2.

**Table 2: model fitness indexes**

RMR	IFI	CFI	NFI	AGFI	GFI	RMSEA	CMIN/df	df	CMIN
0.020	0.979	0.979	0.978	0.97	0.983	0.064	2.8	36	91.965
Close to zero	0.90>	0.90>	0.90>	0.90>	0.90>	0.08<	1> 3<		Reception area

Results obtained from the information provided in Table 2 are as follow:

Amos output results in estimating the standard model indicates that path analysis model is an appropriate model. The normal Chi-square value is 2.8 which stands between two values of 1 and 3. RMSEA value is 0.064 which is appropriate, also the values of GFI, AGFI, NFI, CFI and IFI are all above 90%; and finally RMR value is close to zero. All the values of model fitness indexes are in the reception area and these indexes indicate that model has a goodness-of-fit which is obtained by data and model is well supported by collected data. Hypotheses and regression coefficients as well as partial indexes values for each hypothesis are shown in table 3.

**Table3: hypotheses testing results**

Hypotheses	Sample size	Significance number	Corroboration coefficient	Critical ratio	Test result
Perceived Usefulness → attitude	310	0.000	0.44	10.59	accepted
Compatibility → attitude	310	0.000	0.36	8.04	accepted
Perceived ease of use → attitude	310	0.000	0.09	2.40	accepted
Trust → attitude	310	0.000	0.34	12.76	accepted
Perceived risk → attitude	310	0.000	-0.16	-6.24	accepted
Interpersonal influence → subjective norms	310	0.000	0.42	10.63	accepted
Self-efficacy → perceived behavioral control	310	0.000	0.75	20.77	accepted
Facilitating conditions → perceived behavioral control	310	0.000	0.25	7.24	accepted
Attitudes → behavioral intention	310	0.000	0.69	18.22	accepted
Subjective norms → behavioral intention	310	0.508	0.34	0.91	Not accepted
Hypotheses	Sample size	Significance number	Corroboration coefficient	Critical ratio	Test result
perceived behavioral control → behavioral intention	310	0.000	0.20	5.92	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 research was conducted to identify several factors that act as drivers for mobile banking adoption. The results show that of the eleven hypotheses tested, ten of them were supported. The critical factors included perceived usefulness, perceived ease of use, perceived risk, trust, compatibility, self-efficacy, and facilitating condition. Furthermore, the causal relationships among the variables that determine mobile banking adoption were also examined. The results

demonstrated that mobile banking adoption can be explained in terms of attitude and perceived behavior control. However, social norms were the only factor found insignificant.

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, this study provides the following Recommendations :

1- The observation that perceived usefulness had positive effects on attitude toward m-banking adoption has a number of implications for banks. 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.

2- The observation that compatibility had positive effects on attitude toward m-banking adoption has a number of implications for banks. 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. In particular, companies have to emphasize that m-banking fits with customers' lifestyles and that m-banking would work on their mobile phones.

3- The observation that perceived ease of use had positive effects on attitude toward m-banking adoption has a number of implications for banks. Therefore 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.

4- The results show that Customer's trust of mobile banking service providers had positive effect on attitude toward m-banking adoption and intention to use m-banking for adopters. Therefore customers will adopt mobile banking services when the mobile banking service providers (both the banks and mobile network provider) are perceived to be trustworthy

5- The observation that perceived risk had negative effects on attitude toward m-banking adoption has a number of implications for banks. 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.

6- The self-efficacy hypothesis also received positive support and implies the importance of educating consumers.

7- Results show that the increase of facilitating condition towards m-banking services will result in a positive increase of perceived behavioral control and intention to use m-banking for adopters. Therefore banks must increase the availability of necessary hardware and software for m-banking service use.

Finally, in order to enhance m-banking adoption intention, banks must try to build favorable attitude through enhanced perceived usefulness, perceived ease of use, compatibility, and trust as well as security. Perceived behavioral control should also be improved, specifically by enhancing self efficacy and facilitating condition, access to technological facilities and resources, and training.

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).

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