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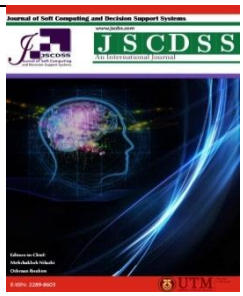

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A Model for Customers Satisfaction and Trust for Mobile Banking Using DeLone and McLean Model of Information Systems Success

Mohammad Damabi [a], Mohsen Firoozbakht [b,*], Azam Ahmadyan [c]

[a] Faculty of Engineering and Technology, Electronic Branch, Islamic Azad University Tehran, Iran
[b] Department of Computer engineering, South Tehran Branch, Islamic Azad University, Tehran, Iran
[c] Faculty of Monetary and Banking Research Institute, Central Bank of Iran, Tehran

*** Corresponding authors email addresses**: firoozm@azad.ac.ir

Abstract

The aim of this study is to present a new model for customer satisfaction and trust with the mobile banking services. We employ DeLone and McLean model of Information Systems success to develop our model. The model included three main factors, information quality, service quality and system quality, of DeLone and McLean model and investigated the impact of these factors on customer trust and satisfaction. The data is collected by the use of 5 point Likert scale survey questions from the customers of City Bank in Iran. The data was analysed by structural equations modelling in SmartPLS software. The results of this study show that trust in mobile banking has a positive impact on the customer satisfaction. In assessing the system quality and the information quality with the mobile banking, it was determined that system quality and information quality have positive effects on the customer trust and satisfaction. The results also demonstrated that there is no significant relationships between the system quality, the information quality and customer satisfaction. The results of this research can be used by the banks' managers and policy makers to better understand the customers' need in the mobile banking services.

Keywords: DeLone and McLean, Satisfaction, Trust, Mobile banking services

1. Introduction

According to Lee & Chung (2009), mobile banking is defined as "banking transactions using mobile devices such as cellphones, PDAs (Personal Digital Assistants), smart phones and other devices (except for laptops). It can be considered a type of Internet banking because it requires Internet access". Mobile banking as an innovative technology has provided considerable benefits to both customers and service providers (Lee & Chung, 2009; Lin, 2011; Zhou, Lu, & Wang, 2010). It has contributed to the online business at anyplace and at anytime and provided for the customers facilities to connect banking service easily and quickly with through wireless technologies by mobile devices (Gu, Lee, & Suh, 2009; Luarn & Lin, 2005).

Customer trust has been always important in online business and marketing (Garbarino & Johnson, 1999; Ranaweera & Prabhu, 2003; Selnes, 1998). According to Sirdeshmukh, Singh, & Sabol (2002), the customer trust is defined as "the customer expectation that a service provider is responsible and reliable in fulfilling its promises". This factor has been found to be an important driver for mobile commerce (Lee, 2005; Siau, Sheng, Nah, & Davis, 2004) and mobile banking (Lee & Chung, 2009; Luo, Li, Zhang, & Shim, 2010). Many studied in the literature have found that trust can be one of the main determinants of customer satisfaction (Lee, Jeong, & Choi, 2014; Venkatesh, Thong, Chan, Hu, & Brown, 2011; Yang & Lay, 2011). These studies further reveal that the increase of customer trust will accordingly lead to customers' satisfaction with the online services.

This research focuses on the main factors that influence the customers trust and satisfaction in mobile banking. The researchers try to identify the main factors from the literature to develop a model based on DeLone and McLean model of Information Systems success (DeLone & McLean, 1992). We incorporate three main factors (system quality, information quality and interface design) (Baraka, Baraka, & El-Gamily, 2013) into the model which are considered in the DeLone and McLean model. Accordingly, the impact of these factors is investigated on the customers trust and satisfaction in mobile banking in City Bank, Iran.

The reminder of this study is organized as follows. In Section 2, the related work is presented. In Section 3, we present the proposed model and develop the research

hypothesis. In Section 4, the results of this study are presented. Finally, the conclusion is presented in Section 5.

2. Related work

There are several studies in the literature which investigate the role of system quality, information quality and service quality in online services. In this section some of these studies are introduces.

In a study by Gorla, Somers, & Wong (2010), the authors provided a model for the organizational impact of system quality, information quality, and service quality. They found that IS service quality is the most influential variable in their model, followed by information quality and system quality. Pitt, Watson, & Kavan (1995) developed a model to measure the user perceived service quality of information in web portals. They incorporated five main dimensions, usability, adequacy of information, accessibility, usefulness of content, and interaction into the model. Landrum & Prybutok (2004) provided a model of service quality for the information service industry. They used modified version of the SERVQUAL instrument to determine the effectiveness of service quality within the information service industry. They collected the data from 385 end users at two US Army Corps of Engineers libraries through a mail survey. The results of their study indicated that service quality is best measured with a performance-based version of SERVQUAL. Lee & Chung (2009) developed a comprehensive framework for customer trust and satisfaction for mobile banking in Korea. Their model was based on DeLone and McLean model of Information Systems success. They incorporated three main factors, system quality, information quality and interface design quality, into the model. They collected the data from the 276 customers of mobile banking through survey questionnaire. The results of their study revealed that system quality and information quality significantly influence customers' trust and satisfaction. They also found that interface design quality has no positive effect on customers' trust and satisfaction. Wang & Liao (2007) developed a framework for mobile commerce user satisfaction. Their model was based on Content quality, Appearance, Service quality and Ease of use. Zhou (2013) developed a model for continuance intention of mobile payment services. Their model was based on DeLone and McLean model of Information Systems success. They investigated the role of information quality, service quality and system quality on customers trust and satisfaction.

3. Research model

As mentioned in the previous section, our model is based on DeLone and McLean model of Information Systems success. Similar to the model proposed by (K. C. Lee & Chung, 2009), our model includes three main factors, system quality, information quality and interface design quality, for customers' trust and satisfaction with the mobile banking for City Bank in Iran. Accordingly, our model proposes seven hypotheses for model development. As shown in the proposed model in Fig. 1, we first investigated the impact of system quality, information quality and interface design quality on the customers, trust and satisfaction. Then, we try to find the relationship between the trust and satisfaction.

The first hypothesis enables us to trace the effects of customers' trust on the customers' satisfaction within the mobile banking services. Trust and satisfaction have been always two main drivers for the users' acceptance of the new technologies and common measures of IS success (Lee & Chung, 2009). Customer satisfaction is defined by Oliver (1980) as "a pleasurable level of consumption-related fulfillment". Customer satisfaction has traditionally been found to be as a fundamental determinant of long-term customer behavior. Past research identifies the positive relationship of these two factors in different context (Choi & Park, 2015; Lee & Chung, 2009). The results of the study by Choi & Park (2015) revealed that trust is positively associated with satisfaction in the hotel industry. Kim, Lee, Chung, & Kim (2014) found the positive relationship between trust and satisfaction. Xu, Goedegebuure, & Van der Heijden (2007) showed that trust has a positive impact upon customer satisfaction from senior managers and branch managers' perspectives. Accordingly, we propose the following hypothesis:

H1: Trust will positively influence customers' satisfaction within the mobile banking services.

The second and third hypotheses investigate the impact of system quality on the customers' trust and satisfaction in mobile banking. According to Delone & Mclean (2004), system quality in an e-commerce context is defined by the availability, reliability, adaptability, usability and fast response time of the system. This factor is widely used in e-commerce context for measuring the systems success (Chen, Yen, Pornpriphet, & Widjaja, 2015). Song (2010) has found that system quality positively influences the customers trust perception of internet banking. In addition, Chen et al. (2015) confirm the importance role of system quality on the customers' trust. Moreover, (Lee & Chung, 2009) revealed that system quality of mobile banking can positively contribute to the customers' trust. The role of information quality on the customers' satisfaction has been also investigated in the literature. Chen & Cheng (2013) found that that there is a positive relationship between system quality and the customers' satisfaction. In addition, the positive impact of this factor on the customer' satisfaction has been found by Poelmans, Reijers, & Recker (2013). According to the above discussion, we also propose that:

H2: System quality will positively influence customers' trust within the mobile banking services.

H3: System quality will positively influence customers' satisfaction within the mobile banking services.

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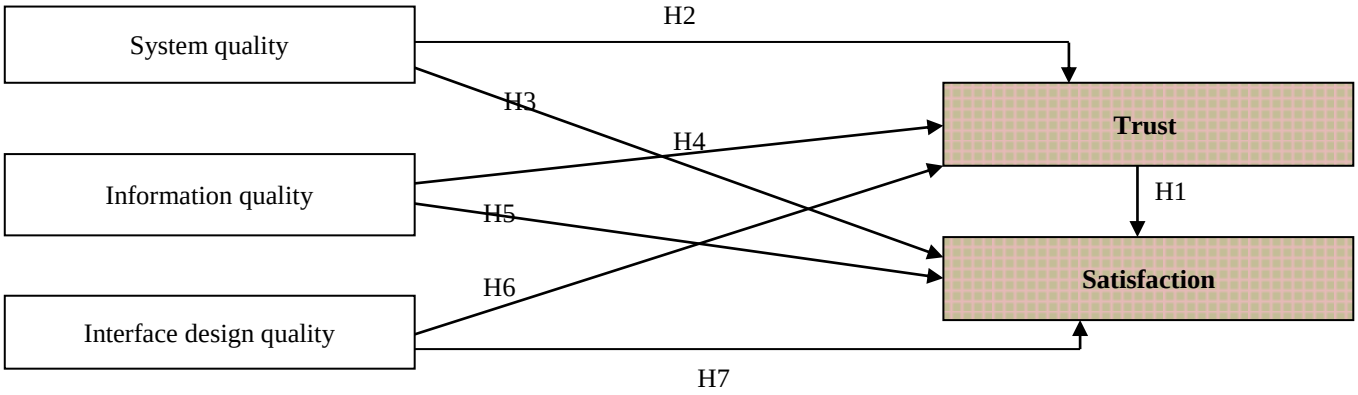

Fig. 1. Conceptual Framework

The fourth and fifth hypotheses investigate the impact of information quality on the customers' trust and satisfaction in mobile banking. According to (Chen et al., 2015), information quality refers to "the generation of relevant and accurate information on e-commerce websites". This quality dimensions mainly includes the measures of currency, precision, accuracy, timeliness, and conciseness. The previous research has also focused on this factor for the customers trust with online services (Chen et al., 2015; Mun, Yoon, Davis, & Lee, 2013). Chen et al. (2015) showed that information quality has a positive effect on trust towards an e-commerce system. Kim, Xu, & Koh (2004) has also found that there is a significant relationship between the information quality trust for both potential and repeat customers. Some works have studied the role of information quality on the customers' satisfaction. A study by (Chen & Cheng, 2013), the authors showed that there is a positive relationship between these two factors. According to the above discussion, we also propose that:

H4: Information quality will positively influence the customers' trust within the mobile banking services.
H5: Information quality will positively influence the customers' satisfaction within the mobile banking services.

The sixth and seventh hypotheses focus on the interface design quality dimension. These hypotheses try to find the relationship between this quality dimension and customers' trust and satisfaction. According to Lee & Chung (2009), this factor indicates how the information in the online system for the customers is displayed (Bharati and Chaudhury, 2004). The interface design has been important as it forms the customers impressions based on the initial information presented in the system. Several studies have found that the interface design (e.g., display formats, colors, and graphs versus tables) can influence the customers' trust and satisfaction with the online services (Everard & Galletta, 2005; Lee & Chung, 2009). Accordingly, we propose the following hypotheses:

H6: Interface design quality will positively influence customers' trust within the mobile banking services.
H7: Interface design quality will positively influence customers' satisfaction within the mobile banking services.

4. Research model

4.1. Data collection procedure

The present study is an applied research and is conducted based on the DeLone and McLean model of Information Systems success. Customer trust and satisfaction have been measured through the level of quality services of mobile banking. Accordingly, the statistical population of this research is the customers who have experience with the mobile banking. The City Bank in Iran is selected as the case study. The experience of respondents was important as we measure two important elements in the proposed model, trust and satisfaction. To determine the sample size, we used Cochran formula (Cochran, 1977) as presented in Eq. (1). In Eq. (1), n is the sample size, N is the population size, e is the level of precision, z is the selected critical value of desired confidence level, p is the estimated proportion and $q = p - 1$.

$$n = \frac{n_0}{1 + \frac{(n_0 - 1)}{N}}, \qquad n_0 = \frac{z^2 pq}{e^2} \tag{1}$$

The result of Cochran formula showed that n=155 was the best sampling size for data collection. In Table 1, demographic and general characteristics of the respondents are presented.

4.2. Data analysis

In this study we used Structural Equation Modeling (SEM) to find the relationships between the factors of the models and confirm the developed hypothesis. Specifically, we run the SmartPLS software (https://www.smartpls.com) to analysis the data. As stated in the SmartPLS website, the SmartPLS software "is a milestone in latent variable modeling. It combines state of the art methods (e.g., PLS-POS, IPMA, complex bootstrapping routines) with an easy to use and intuitive graphical user interface." In many studies, this software is used for Partial Least Squares (PLS) path modelling (Andreev, Heart, Maoz, & Pliskin, 2009; Sarstedt, Henseler, & Ringle, 2011; Wong, 2013). By

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the use of this software, we also could analyze the measurements and structural models of this study.

Table 1
Demographic and general characteristics of respondents

Information	Frequency	%
Gender		
Female	59	38.1
Male	96	61.9
Age		
21-30	69	44.5
30-40	68	43.9
40-51	14	9
>50	4	2.6
Education		
College and High school	26	16.8
Bachelor	73	47.1
Master	52	33.5
PhD	3	1.9
Other	1	0.6
Experience		
For one week	17	11
For one month	20	12.9
1-6 months	41	26.5
6-12 months	34	21.9
> 1 year	42	27.1
Other	1	0.6
Total	155	100%

Our research includes five constructs and 23 items for the measurement model. In Table 2, these constructs and items are presented. The constructs of this research are System Quality, Information Quality, User Interface Design Quality, Trust and Satisfaction. The items are: Q1-Q4 for System Quality, Q5-Q9 for Information Quality, Q10-Q13 for User Interface Design Quality, Q14-Q18 for Trust and Q19-Q23 for Satisfaction.

In our analysis, the validity assessments of content, discriminant, and convergent validity were applied. We performed the content validity of our survey from the existing literature. The construct validity was established by the researchers in the fields of information systems.

We used Composite Reliability (CR) and Cronbach alpha for constructs reliability assessment. The convergent validity of the survey was evaluated using the significance of t-values for each path coefficient of the Confirmatory Factor Analysis (CFA) model (Fornell & Larcker, 1981). According to Fornell and Lacker (1981), to evaluate the discriminant validity, Average Variance Extracted (AVE) should be calculated for all constructs. For AVE, a score of 0.5 indicates acceptability (Fornell & Larcker, 1981), and for and Composite Reliability above 0.70 indicates acceptability. The results of the AVE, factor loading, constructs reliability, and t-values are presented in Table 2. As can be found in Table 2, all the constructs AVE ranged from 0.517 to 0.568, exceeding the recommended values. In addition, the CR values ranged from 0.700 to 0.700 indicate the acceptable level of the instrument reliability. In Table 2, we present the results of hypotheses testing. Overall, from Table 3 we can see that, five hypotheses are supported in our model. They are Trust→Satisfaction, System Quality→Trust, Information Quality→Trust, User Interface Design →Trust, and User Interface Design →Satisfaction. The two hypotheses are also rejected which are: System Quality→Satisfaction and Information Quality→Satisfaction. The structural path model is presented in Fig. 2.

Hypothesis 1 states that there is a positive relationship between trust and satisfaction. From Table 3, it can be found that there is a significant relationship between these two factors ($\beta = 0.482$, $t = 6.740$, $p<0.01$). The results revealed that trust was significantly related to satisfaction. Hence, Hypothesis 1 was accepted.

Hypothesis 1 states that there is a positive relationship between system quality and trust. From Table 3, it can be found that there is a significant relationship between these two factors ($\beta = 0.203$, $t = 2.454$, $p<0.05$). The results revealed that system quality was significantly related to trust. Hence, Hypothesis 2 was accepted.

Hypothesis 2 states that there is a positive relationship between system quality and trust. From Table 3, it can be found that there is a significant relationship between these two factors ($\beta = 0.203$, $t = 2.454$, $p<0.01$). The results revealed that system quality was significantly related to trust. Hence, Hypothesis 2 was accepted.

Hypothesis 3 states that there is a positive relationship between system quality and satisfaction. From Table 3, it can be found that there is no significant relationship between these two factors. The results revealed that system quality was not significantly related to satisfaction. Hence, Hypothesis 3 was rejected.

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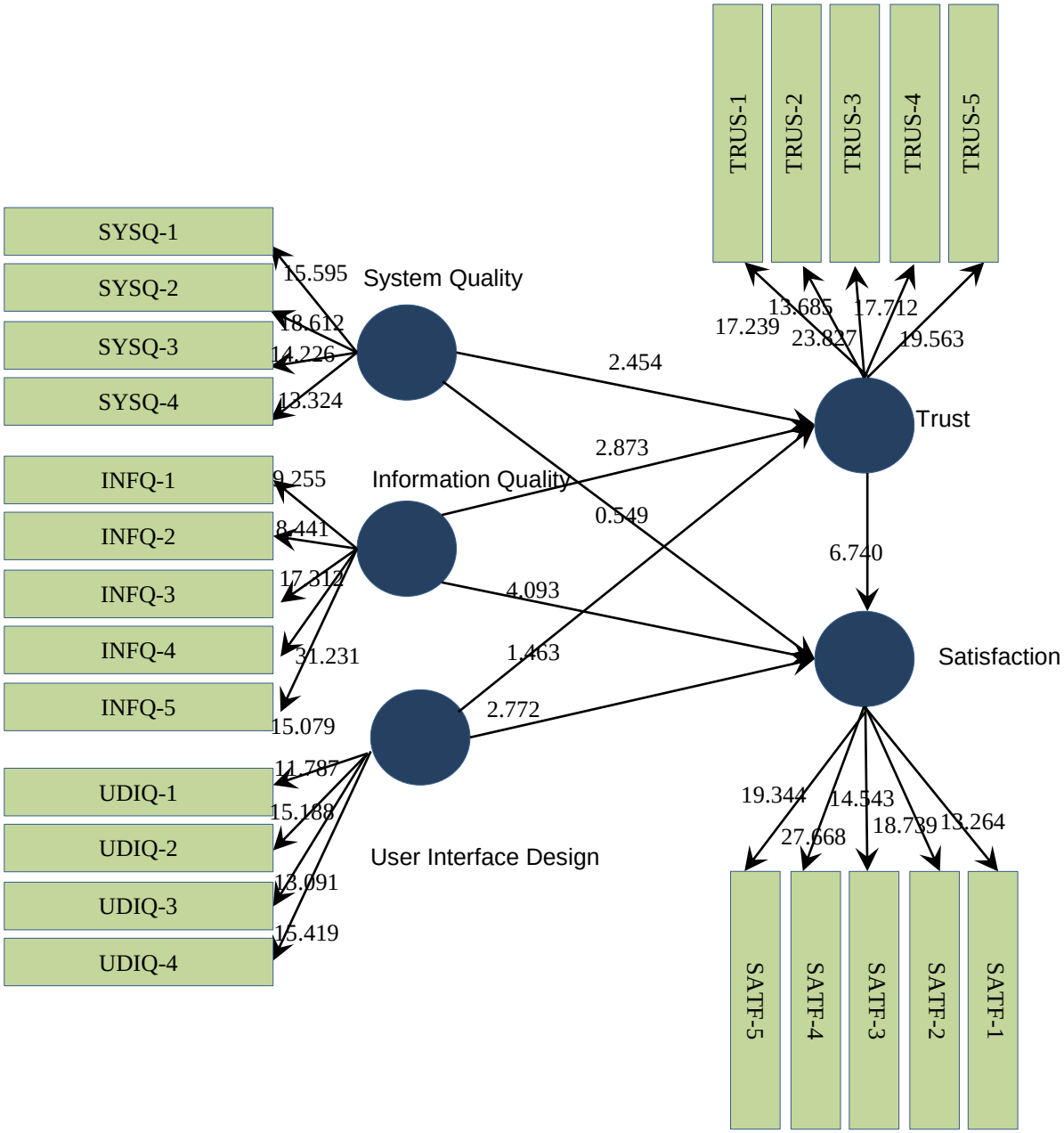

Fig. 2. Structural path model

Hypothesis 4 states that there is a positive relationship between information quality and trust. From Table 3, it can be found that there is a significant relationship between these two factors ($\beta = 0.242$, $t = 2.873$, $p<0.01$). The results revealed that information quality was significantly related to trust. Hence, Hypothesis 4 was accepted.

Hypothesis 5 states that there is a positive relationship between information quality and satisfaction. From Table 3, it can be found that there is no significant relationship between these two factors. The results revealed that information quality was not significantly related to satisfaction. Hence, Hypothesis 5 was rejected.

Hypothesis 6 states that there is a positive relationship between user interface design and trust. From Table 3, it can be found that there is a significant relationship between these two factors ($\beta = 4.093$, $t = 0.331$, $p<0.01$). The results revealed that user interface design was significantly related to trust. Hence, Hypothesis 6 was accepted.

Hypothesis 7 states that there is a positive relationship between user interface design and satisfaction. From Table 3, it can be found that there is no significant relationship between these two factors. The results revealed that user interface design was not significantly related to satisfaction. Hence, Hypothesis 7 was rejected.

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Table 2
The result of confirmatory factor analysis in SmartPLS

Construct	Item	Factor Loading	t-value	Cronbach alpha	Composite reliability	AVE
System Quality	Q1	0.767	18.612	0.767	0.831	0.555
	Q2	0.800	14.226			
	Q3	0.773	13.324			
	Q4	0.714	15.595			
Information Quality	Q5	0.606	9.255	0.747	0.831	0.500
	Q6	0.754	17.312			
	Q7	0.630	8.441			
	Q8	0.808	31.231			
	Q9	0.711	15.079			
User Interface Design Quality	Q10	0.679	11.787	0.700	0.810	0.517
	Q11	0.764	15.188			
	Q12	0.747	13.091			
	Q13	0.680	15.419			
Trust	Q14	0.714	17.239	0.799	0.862	0.555
	Q15	0.701	13.685			
	Q16	0.792	23.827			
	Q17	0.762	17.712			
	Q18	0.751	19.563			
Satisfaction	Q19	0.751	19.344	0.809	0.868	0.568
	Q20	0.823	27.668			
	Q21	0.754	14.543			
	Q22	0.734	18.739			
	Q23	0.701	13.264			

Table 3
The results of hypotheses testing

Hypothesis	Path	t-value	β	Significance level	Result
H1	Trust→Satisfaction	6.740	0.482	p<0.01	Supported
H2	System Quality→Trust	2.454	0.203	p<0.05	Supported
H3	System Quality→Satisfaction	0.549	0.042	–	Rejected
H4	Information Quality→Trust	2.873	0.242	p<0.01	Supported
H5	Information Quality→Satisfaction	1.463	0.118	–	Rejected
H6	User Interface Design →Trust	4.093	0.331	p<0.01	Supported
H7	User Interface Design →Satisfaction	2.772	0.211	p<0.01	Supported

5. Conclusion

The aim of this paper was to develop a model for mobile banking. The proposed model was based on DeLone and McLean model of Information Systems success and included system quality, information quality and interface design quality, for customers' trust and satisfaction within the mobile banking services. The case study was considered City Bank in Iran. The data was collected from the users how had experience with the mobile banking in Iran. The data was analysed by the use of SmartPLS software. We used PLS technique to validate the measurement model. The results showed that there is a significant relationship between the system quality, information quality, interface design quality and customers trust in mobile banking. The results also revealed that trust has a significant impact on the satisfaction. In the future study we aim to further investigate the role of experience as a moderator in mobile banking context from the experts and customers view of points.

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