

# The Impact of Customer Trust and Perception of Security and Privacy on the Acceptance of Online Banking Services: Structural Equation Modeling Approach

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*Abstract*— The present study aimed to investigate the impact of security and privacy perceptions on bank customers' trust to accept and adopt online banking services. Specifically, the investigation in the study focused on the factors affecting customers' trust to accept and use online banking services. In order to achieve this, a survey was administered to a number of 198 participants from Jordan for collecting the data. A Structural Equation Modeling (SEM) approach was utilized for analyzing the respondents' responses to the survey. The results showed that trust positively affected customers' behavioral intention to adopt online banking services. Moreover, the customers' perception, including their perceived usefulness, security and privacy had a significant impact on their trust. However, users' perceived ease of use failed to predict the customers' intention to use online banking services. Based on these results, a research model that accurately reflects the factors affecting customers' trust to accept and use online banking services was developed.

*Keywords*— *Online Banking Services, Perceived Ease of Use, Perceived Usefulness, Structural Equation Modeling*

## 1. INTRODUCTION

Recently, within the speedy revolution and advances of information and communication technology (ICT), almost all aspects of human lives have been affected by this technological revolution. To be more specific, the revolution of the Internet revolution has been evolving rapidly and significantly since 1990s. This has showed a radical change in all aspects of our lives. Whereas the radio took 38 years and television 13 years in order to reach almost 50 million users, the Internet just took four years and iPod three years to do so. In addition, the recently emerging social networks (SNs) have attracted a wider number of users. For instance, Facebook attracted almost 100 million users in less than nine months and iPhone applications hit one billion downloaders only in nine months [1, 2].

Such speedy technological innovations have even penetrated many sectors, including banks. Banks realized the importance of technology adoption as the main driver in promoting banking activities and services. Therefore, the need for adopting technology in a variety of workplaces, including banking is motivated by the role of technology in offering various banking services, accelerating the performance of banks, reducing unnecessary expenditure and achieving efficient productivity. As an important result of technology adoption in banking, online banking has showed a rapid growth in the last few years. This rapid growth of online banking is attributed to some features, including its providence of customers' banking services, its efficient cost, its achievement of a brand name, its competitive advantages and its easy access by customers from distanced geographical location [3, 4]. Although online banking is beneficial for both customers and banks, there are still several challenging issues, including trust among customers that should be considered. Previous studies in online banking stressed the need for establishing trust among online banking consumers in order to gain their acceptance and use of such online banking services [5, 6]. Therefore, the present study aimed to investigate the effect of security and privacy perceptions on the issue of trust to accept and use online banking services among banks customers in the context of Jordan. In order to achieve this aim, the study tested the following research hypotheses:

- H1: Perceived ease of use will have a positive effect on perceived usefulness to use online banking services.*  
*H2: Perceived Usefulness from online banking will have positive effect on customer's trust in online transactions.*  
*H3: Perceived security for online banking will have positive effect on online banking customers trust.*  
*H4: Perceived privacy for online banking will have positive effect on online banking customers trust.*  
*H5: Perceived ease of use will have a positive effect on behavioral intention to use online banking services.*  
*H6: Perceived Usefulness will have a positive effect on behavioral intention to use online banking services.*  
*H7: Trust in online banking has positively contributes for intention to accept and use online banking services.*

## **2. REVIEW OF PREVIOUS STUDIES**

This section provides a review of previous studies on online banking and factors associated to trust in adopting online banking as follows:

### *A. Online Banking*

Online banking has been labeled using various terms, some of which are "Electronic Banking, Remote Electronic Banking, Home Banking, Internet Banking, Self Service Banking, Tele-banking, Mobile Banking and Web Banking" [7] yet, these various terms underlie one function, which is providence of access to banking transactions to customers in a convenient fashion. Thus, online banking refers to technology or Internet-based systems that can be used by customers to access bank accounts and obtain general information on bank products and services such as balance reporting, inter-account transfers, bill-payment, and others. This is accessed using the Internet without the intervention or inconvenience of sending letters, faxes, original signatures and telephone confirmations [8, 9] or even using a personal computer or other devices connected to the Internet [10]. As pointed out by [11], online banking enables consumers to perform various electronic banking transactions by accessing the website of the bank anytime and anywhere. This can be performed faster and more cheaply than using conventional banking services. Thus, online banking as one of the most recent and innovative services as well as a modern trend, it offers an efficient delivery channel for the products and services of conventional banks [8, 12].

Concerning the types of online banking, there are several types which should be understood in order to assess or evaluate the products and services as well as the risks involving both banks and customers. According to [8, 10] there are three kinds of online banking; informational, communicative and transactional. The first type, informational, refers to online banking that relies on the website of a particular bank where only information concerning banking products and services on a stand-alone server is produced. The risk involved in using this kind of online banking is very low since it is a one way service channel (from bank website to customers). Regarding the second type of online banking, the communicative type or simple transactional website, it refers the website of a given bank which allows customers to interact with the bank, specifically making an inquiry about accounts, filling form applications or updating static files using the email. However, the risk involved in adopting this type of online banking is higher than that of the informational type. The final type of online banking, the transactional types or advanced transactional website, refers to the website of a bank that enables users or customers to engage in performing various electronic banking transactions or operations, including checking accounts, money withdrawal and transfer from and to their bank accounts and applications for loans and even payment of bills as well as other related transactions. Thus, these online banking services in addition to others such as debit cards, funding, treasury bonds and management of portfolios can be performed by customers fast, easily and without any time and location constraints. They can be beneficial for both parties: customers and banks [13]. For banks, they become able reach a wider number of customers and offer them with various banking services with a good quality, while for customers, they become able to access such banking services easily, meet their needs and preferences, and obtain competitive advantages [14].

### *B. Trust in Adoption of Online Banking Services*

As previously discussed, in spite of the benefits of online banking for customers and banks, the issue of trust and other related factors such as privacy and security concerns have been reported to affect customers' acceptance of adoption and use of online banking services. This is because people may not accept to adopt or use online banking without having their uncertainty reduced [15]. Thus, previous research indicates that customers' trust has an important role in developing or even strengthening their satisfaction and expectations of positive outcome from their use of online banking. In general, trust has been documented as one of the most critical factors affecting the success of any online environments or applications [16, 17]. Studies focusing on users' trust issue in an online environment in general have looked at this issue among users or adopters of different online applications, especially at the initial stages of their electronic applications[18].

As pointed by [19], the majority of previous studies on users' focused on e-commerce, but only a few relative studies examined trust among customers' of online banking. In financial transaction research, researchers have paid more attention of trust since it is regarded as a crucial topic, particularly in online banking services [5] . In online banking, trust seems a new and emerging area of interest. For instance, in a previous study, trust was identified as one of the most critical factors to succeed in any online environments [5, 20]. Another previous study reported the important role of customers' continuous trust in affecting their behavioral intention to adopt online banking services [21] because the results indicated that trust significantly contributed to

customers' intention to use online banking. The importance of trust and its associated factors such as privacy and security in establishing a successful long-term relationship with the customer found in e-commerce research can also apply to the adoption of online banking. In other words, this importance of trust can be also true for online banking services because of customers' perceived risks in the online environment. Similarly, the success of adoption of online banking relies on customers' acceptance which can be affected by trust and its associated factors [22]. The current study adopted the original Technology Acceptance Model (TAM) [23] [18] as the research model. This is because it is the most widely used models in predicting the adoption of the individual of new technologies. The TAM also posits that the individual's perceived usefulness (PU) and perceived ease of use (PEOU) determine his/her behavioral intention to use new innovative technologies. Thus, this model aims at better understanding and predicting the use of technological innovations [23, 24]. Several previous studies using this model have reported its value in investigating users' acceptance and use of Internet banking services [3-5, 25, 26]. As pointed out by [27], the primary application of the TAM is to investigate the adoption of Internet banking services. It was also used to examine the role of expectations in adopting and using online banking services among customers in the United States of America [17]. However, an additional construct was added to the original TAM, which is trust including privacy and security concerns. Thus, the study aimed to investigate the effect of Perceived security (PS) and Perceived Privacy (PP) on customers Perceived trust (PT) to accept online banking services.

### 3. METHODOLOGY

The present study used a quantitative research design, specifically, survey design. The samples of the study are Jordanian bank customers who were randomly selected. In order to collect the data and test the research model, a survey was adopted from previous Information System studies related to online banking acceptance and use [23, 28-30].

The survey consists of an overall number of 25 items which were modified in a way to suit the purpose of the present study. These items were translated into Arabic language with some modifications that suit the Arabic language and culture of the target population. The respondents had to respond to the items of the questionnaire using a five-point Likert scale: (1) strongly disagree, (2) disagree, (3) neutral, (4) agree and (5) as strongly agree. Then, electronic and paper questionnaire distributed to a number of (273) participants who are bank customers in Irbid City in Jordan. However, only 198 completed questionnaires were received from the participants and used for the analysis in the current study. The data was analyzed using the SEM approach through AMOS .21.

### 4. RESULTS AND DISCUSSION

The results of the study obtained from the SEM approach or analysis comprise two major models: the measurement model and the structural model. While the measurement model identifies and explains the relationships between the latent variables and the observed variables, the structural model provides an explanation of the path strength and the directions of the relationships among the latent variables. Figure (1) shows the confirmatory factor analysis (CFA) used for testing the measurement model of the study. This is discussed in further details as follows:

#### A. *The measurement mode*

The CFA that used AMOS was performed for the purpose of testing the measurement model. Specifically, this aimed to test whether this model had a satisfactory level of validity and reliability prior to testing the levels of significance in the relationships among the tested variables in the structural model. Thus, the results of the CFA concerning the psychometric properties of the measurement model, especially the reliability, convergent validity and discriminant validity are presented in Table 1. In this study, composite reliability (CR) was utilized for measuring the reliability of each tested construct in the measurement model. This is because as reported in previous research, CR provides a more retrospective approach to the overall reliability and it can provide an estimation of the consistency of the construct itself, including its stability and equivalence [31]. Thus, a value of .70 or greater indicates that the reliability of the scale is good. Based on the above results in Table (1), it is clear that CR of each construct in the measurement model was supported. In other words, the value of CR for each construct or latent variable is estimated above 0.70, thus suggesting that all these latent variables have good reliability.

Referring to the results of the CFA shown on Figure (1), convergent validity is known as the degree to which indicators of a given tested construct converge or have a high proportion of variance in common [31]. Based on those results shown on Table (1), it is evident that the standard factor loadings of the observed variables are all adequate. They range from 0.71 to 0.97. Such results imply that the above constructs of the measurement model conform to the construct convergent validity.

Concerning the discriminant validity, it refers to the degree to which a construct is truly distinct from other constructs [32]. Thus, the Average Variance Extracted (AVE) values with the squared root of the correlations represent a common statistical measure of discriminant validity. As seen from the results of the results of the average AVE and the square root of the latent variable correlations in Table 2, the squared correlation for each construct was less or lower than the AVE. Such results indicate that the discriminant validity of these constructs in the measurement model is adequate. In total, the results underlie the adequate convergent validity and discriminant validity demonstrated by the measurement model of the study.

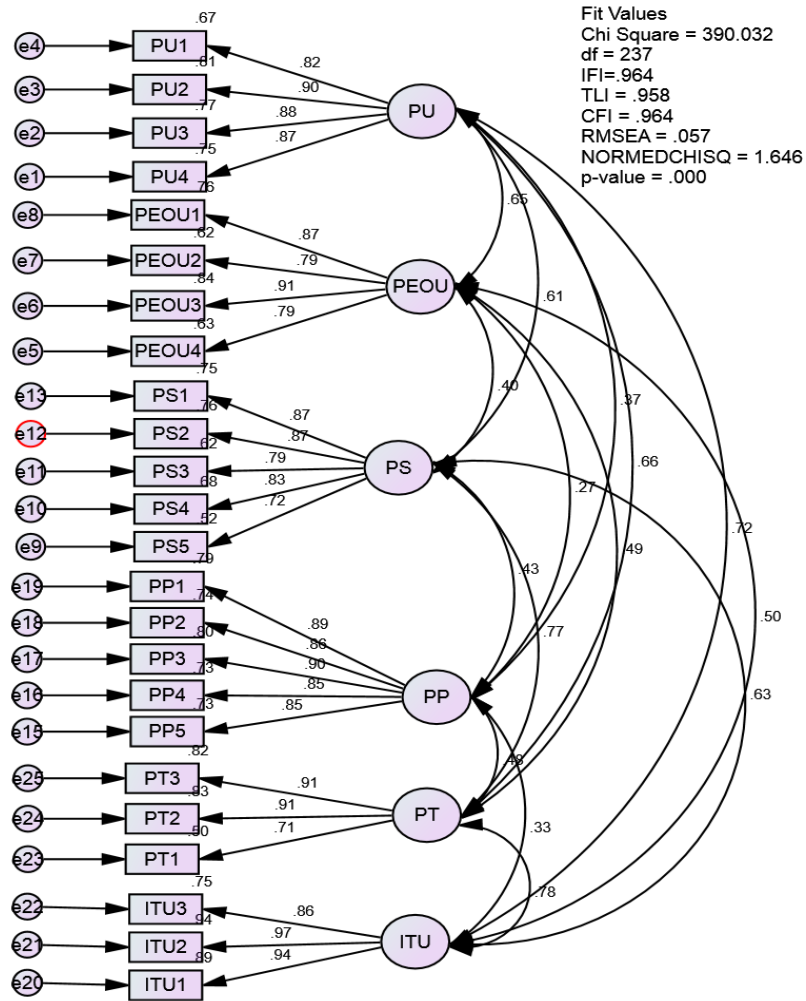


Figure 1. The measurement model

Table 1. Results of measurement model

Constructs	Items	Standardized Loading	Composite Reliability	Average Variance Extracted
PU	PU1	0.82	0.924	0.753
	PU2	0.90		
	PU3	0.88		
	PU4	0.87		
PEOU	PEOU1	0.87	0.906	0.708
	PEOU2	0.79		
	PEOU3	0.91		
	PEOU4	0.79		
PS	PS1	0.87	0.910	0.669
	PS2	0.87		
	PS3	0.79		
	PS4	0.83		
	PS5	0.72		
PP	PP1	0.89	0.940	0.757
	PP2	0.86		
	PP3	0.90		
	PP4	0.85		

	PP5	0.85		
	PP6	*0.37		
PT	PT1	0.91	0.884	0.720
	PT2	0.91		
	PT3	0.71		
ITU	ITU1	0.86	0.946	0.855
	ITU2	0.97		
	ITU3	0.94		

Note: PU = Perceived Usefulness; PEOU = Perceived Ease of Use; PS= Perceived Security; PP=: Perceived Privacy; PT= Perceived Trust, and Intention to Use: ITU, \*: item deleted because factor loading<0.6.

Table 2. Discriminant validity of constructs

Constructs	PU	PEOU	PS	PP	PT	ITU
<b>PU</b>	<b>0.868</b>					
<b>PEOU</b>	0.652	<b>0.841</b>				
<b>PS</b>	0.613	0.402	<b>0.818</b>			
<b>PP</b>	0.369	0.273	0.427	<b>0.870</b>		
<b>PT</b>	0.663	0.490	0.767	0.485	<b>0.849</b>	
<b>ITU</b>	0.721	0.504	0.625	0.326	0.778	<b>0.925</b>

Diagonals (in bold) represent the average variance extracted while the other entries represent the squared correlations

B. The structural model

In this study, after testing the measurement model, the structural model (Figure 2) that describes the relationships among the proposed latent constructs or that tests the proposed research hypotheses was also tested. This was achieved using the SEM techniques through AMOS software. The results of goodness-of-fit indices suggested the adequacy of the hypothesized model with: ( $\chi^2 = 437.697$ ,  $df = 242$ ,  $\chi^2/df = 1.809$ ,  $CFI = 0.954$ ,  $TLI=0.947$ ,  $IFI=.954$ ,  $RMSEA = 0.064$ ). Yet, all these fit indices meet the threshold requirements because these values were found to be higher than the suggested threshold value indexed by [31].

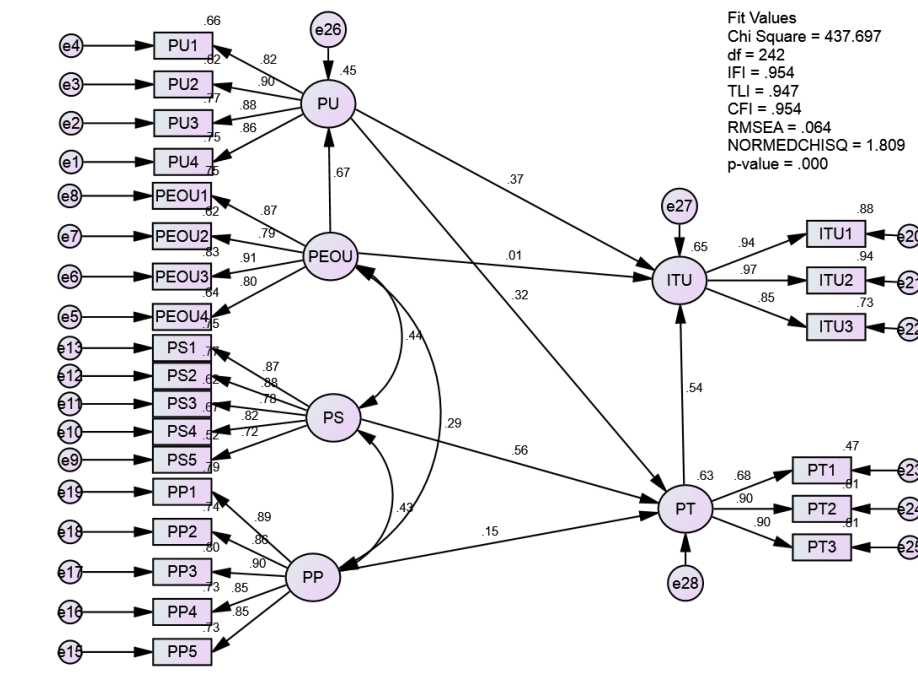


Figure 2. The structural model

C. Research Hypotheses Testing

In this study, the proposed research hypotheses were tested and the results are presented in Table (3) and Figure (2). For the first research Hypothesis 1: the PEOU has significant and positive influence on PU, the results in Table (3) indicate that the

participants' PEOU of online banking significantly and positively influenced their PU ( $\beta = 0.671$ ). Therefore, this research hypothesis is supported. In addition, the second research hypothesis 2: PU has significant and positive influence on PT was also supported ( $\beta = 0.319$ ). The results also show that the participants' PS had a significant and positive influence on their PT ( $\beta = 0.559$ ), thus supporting the third research hypothesis. Regarding the fourth research hypothesis assuming that PP significantly and positively influences PT, it was also supported ( $\beta = 0.151$ ). However, the results did not support the fifth research Hypothesis 5: PEOU has significant and positive influence on ITU. This is because the critical ratio (t-value) less than 1.96. Based on these results, the participants' PU significantly and positively influenced their ITU and there is a significant and positive influence of PT on their ITU, thus supporting both research hypotheses (6 & 7), respectively.

Table 3. Summary of Hypotheses and path coefficient -Testing Result

Hypothesis	Path	Estimate ( $\beta$ )	S. E.	C.R.	P value	Results
H1	PEOU $\rightarrow$ PU	0.671	.093	9.004	***	Supported
H2	PU $\rightarrow$ PT	0.319	.050	4.503	***	Supported
H3	PS $\rightarrow$ PT	0.559	.076	6.442	***	Supported
H4	PP $\rightarrow$ PT	0.151	.035	2.474	.013	Supported
H5	PEOU $\rightarrow$ ITU	0.010	.099	0.137	.891	Not Supported
H6	PU $\rightarrow$ ITU	0.372	.094	4.454	***	Supported
H7	PT $\rightarrow$ ITU	0.540	.122	7.048	***	Supported

## 5. CONCLUSION

The present study aimed to investigate the effect of Jordanian customers' security and privacy perceptions on the issue of trust to accept and use online banking services. The results provide evidence supporting the value of the extended theoretical model, the TAM. This model is valuable in explaining the role of PU, PEOU, PS and PP as variables that predict PT and ITU among users of technology, specifically users or customers of online banking. All the proposed hypotheses tested in this study were supported except for H5 (PEOU-ITU). Thus, such results supporting these research hypotheses empirically and satisfactorily support our extended TAM through the SEM analysis. Therefore, this valid research model can be applied to other information system research areas. In particular, future research could be conducted on the acceptance of cloud computing applications among individual users. This is because we anticipate that the use of this model in future studies will increase its validity and enrich our understanding of the research domain. The results of the study have also meaningful implications. As implied by these results, bank sector needs to put much effort not only into making online banking a user-friendly system, but also into establishing and strengthening trust between such online banking services and their consumers. This can be achieved by increasing the public awareness of the usefulness of online banking services.

## REFERENCES

- [1] R. T. Kreutzer and K.-H. Land, *Digital Darwinism: Branding and Business Models in Jeopardy*: Springer, 2014.
- [2] F. Herzallah and M. Mukhtar, "Organization Information Ecology and E-Commerce Adoption: Effect on Organizational SMEs Performance," *Journal of Computer Science*, vol. 11, p. 540, 2015.
- [3] A. R. Montazemi and H. Qahri-Saremi, "Factors affecting adoption of online banking: A meta-analytic structural equation modeling study," *Information & Management*, vol. 52, pp. 210-226, 2015.
- [4] M. A. AL-SHARAFI, R. A. Arshah, E. A. Abo-Shanab, and N. Elayah, "The Effect of Security and Privacy Perceptions on Customers' Trust to Accept Internet Banking Services: An Extension of TAM," *Journal of Engineering and Applied Sciences*, vol. 11, pp. 545-552., 2016.
- [5] S. K. Roy, A. Kesharwani, and S. Singh Bisht, "The impact of trust and perceived risk on internet banking adoption in India: An extension of technology acceptance model," *International Journal of Bank Marketing*, vol. 30, pp. 303-322, 2012.
- [6] E. Abu-Shanab and H. Talafha, "Internet Banking Adoption In Jordan: The SERVQUAL Extension," presented at the 14th International Conference WWW/Internet 2015, 2015.
- [7] A. Hasan, M. A. Baten, A. A. Kamil, and S. Parveen, "Adoption of e-banking in Bangladesh: An exploratory study," *African journal of business management*, vol. 4, pp. 2718-2727, 2010.
- [8] R. Safeena, H. Date, and A. Kammani, "Internet Banking Adoption in an Emerging Economy: Indian Consumer's Perspective," *Int. Arab J. e-Technol.*, vol. 2, pp. 56-64, 2011.
- [9] R. Safeena and H. Date, "Customer perspectives on e-business value: case study on internet banking," *Journal of Internet Banking and commerce*, vol. 15, pp. 1-13, 2010.
- [10] G. Sarma and P. K. Singh, "Internet banking: Risk analysis and applicability of biometric technology for authentication," *International Journal of Pure and Applied Sciences and Technology*, vol. 1, pp. 67-78, 2010.
- [11] A. Sanayei, A. Shaemi, and M. Salajegheh, "Analysis of the factors affecting of Internet banking: Case study of customers of Mellat Bank in Isfahan city," *Interdisciplinary Journal of Contemporary Research In Business*, vol. 3, p. 751, 2011.

- [12] W. Chaouali, I. B. Yahia, and N. Souiden, "The interplay of counter-conformity motivation, social influence, and trust in customers' intention to adopt Internet banking services: The case of an emerging country," *Journal of Retailing and Consumer Services*, vol. 28, pp. 209-218, 2016.
- [13] S. Y. Yousafzai, J. G. Pallister, and G. R. Foxall, "A proposed model of e-trust for electronic banking," *Technovation*, vol. 23, pp. 847-860, 2003.
- [14] E. Abu-Shanab and J. Pearson, "Internet banking in Jordan: an Arabic instrument validation process," *Int. Arab J. Inf. Technol.*, vol. 6, pp. 235-244, 2009.
- [15] A. Akhlaq and E. Ahmed, "The effect of motivation on trust in the acceptance of internet banking in a low income country," *International Journal of Bank Marketing*, vol. 31, pp. 115-125, 2013.
- [16] N. Yousefi and A. Nasiripour, "A proposed model of e-trust for electronic banking," *Management Science Letters*, vol. 5, pp. 1029-1040, 2015.
- [17] I. Benbasat, D. Gefen, and P. A. Pavlou, "Introduction to the special issue on novel perspectives on trust in information systems," *Mis Quarterly*, vol. 34, pp. 367-371, 2010.
- [18] J. Salo and H. Karjaluoto, "A conceptual model of trust in the online environment," *Online Information Review*, vol. 31, pp. 604-621, 2007.
- [19] S. Y. Yousafzai, G. R. Foxall, and J. G. Pallister, "Explaining internet banking behavior: theory of reasoned action, theory of planned behavior, or technology acceptance model?," *Journal of Applied Social Psychology*, vol. 40, pp. 1172-1202, 2010.
- [20] S. G. Yaseen, "Exploring critical determinants in deploying mobile commerce technology," *International Journal of Information Science and Management (IJISM)*, pp. 35-46, 2012.
- [21] H. Hoehle, S. Huff, and S. Goode, "The role of continuous trust in information systems continuance," *Journal of Computer Information Systems*, vol. 52, pp. 1-9, 2012.
- [22] K. Feizi and M. H. Ronaghi, "A Model for E-banking Trust In Iran's Banking Industry," *International Journal of Industrial Engineering*, vol. 21, 2010.
- [23] F. D. Davis, "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS quarterly*, pp. 319-340, 1989.
- [24] P. Luarn and H.-H. Lin, "Toward an understanding of the behavioral intention to use mobile banking," *Computers in human behavior*, vol. 21, pp. 873-891, 2005.
- [25] A. Bhattacharjee, "Understanding information systems continuance: an expectation-confirmation model," *MIS quarterly*, pp. 351-370, 2001.
- [26] B. Suh and I. Han, "Effect of trust on customer acceptance of Internet banking," *Electronic Commerce research and applications*, vol. 1, pp. 247-263, 2003.
- [27] P. Hanafizadeh, B. W. Keating, and H. R. Khedmatgozar, "A systematic review of Internet banking adoption," *Telematics and informatics*, vol. 31, pp. 492-510, 2014.
- [28] L. V. Casalo, C. Flavián, and M. Guinalú, "The role of security, privacy, usability and reputation in the development of online banking," *Online Information Review*, vol. 31, pp. 583-603, 2007.
- [29] K. C. Lee and N. Chung, "Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective," *Interacting with computers*, vol. 21, pp. 385-392, 2009.
- [30] V. Venkatesh and H. Bala, "Technology acceptance model 3 and a research agenda on interventions," *Decision sciences*, vol. 39, pp. 273-315, 2008.
- [31] R. B. Kline, *Principle and practice of structural equation modeling*, 3 ed. New York, NY: The Guilford Press, 2011.