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Examining the role of trust and quality dimensions in the actual usage of mobile banking services: An empirical investigation

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ABSTRACT

Mobile banking (m-banking) has emerged dynamically over the years due to consumers' increased use of mobile technologies, their ever-growing lifestyle choices and also the several different economic factors. This paper proposes a new research model by extending the DeLone & McLean information systems (D&M IS) success model to understand users' actual usage of m-banking. The research model was tested and validated using data collected by survey from 227 Omani residents. This study employed a two-staged analytical approach by combining structural equation modeling and neural network analysis. The results divulge that satisfaction and intention to use stand as two important precedents of actual usage, and the satisfaction also mediates the relationship between service quality, information quality and trust with intention to use m-banking and negates with that of system quality. We have provided the theoretical as well as practical implications of the findings.

1. Introduction

The recent decade has witnessed one of the most imperative technological breakthroughs in the form of m-banking leading to the rapid public usage of mobile phones for various personal and professional activities apart from regular conventional usage of the device (Alalwan, Dwivedi, Rana, & Williams, 2016; Lee, Harindranath, Oh, & Kim, 2015). Mobile phones have certainly changed the conventional channels of communication between customers and companies. Researchers have widely captured this phenomenon and sensed that the widespread penetration of mobile payment (MP) systems would radically change the methods of purchase and deliver the unique value to both consumers and service providers by offering the first ubiquitous payment solution (De Kerviler, Demoulin, & Zidda, 2016; Mallat, 2007; Slade, Dwivedi, Piercy, & Williams, 2015). The customers would enjoy the fast and convenient services and the service providers will gain customer loyalty with the added advantage of a reduction in the transaction costs (Johnson, Kiser, Washington, & Torres, 2018; Slade, Williams, & Dwivedi, 2013). In this context, a mobile payment via mobile banking is a much-advanced versatile application that includes elements of mobile transactions (Liebana-Cabanillas, Sanchez-Fernandez, & Munoz-Leiva, 2014) and therefore, mobile banking is seen as one of the most revolutionary mobile technology breakthrough in the banking sector as it enables the customers to independently bring financial transactions through their mobile devices (Alalwan, Dwivedi, & Rana, 2017; Laukkanen, 2016) and these developments unfold lucrative opportunities to merchants and service providers (Iman, 2018). Banks, thereby not only seem to be gearing up to incorporate the mobile banking channels in their logistical structure to provide their customers better service but also enhance their effectiveness and efficacy (Alalwan et al., 2017; Lin, 2013). On the other hand, even though mobile payment alternatives such as mobile banking have been emerging as the favored choice for many years, it remains a niche product. Nonetheless, there has been an increasing popularity for MPs over the years and it took a major leap from the year 2016 onwards (Laukkanen, 2016) as the year 2015–16 saw the maximum innovations by most of the mobile payments players such as Samsung pay, Apple pay, and Android pay (Meola, 2016).

In the same context, the Timetric research recently projected the value of MP transactions in the Asia Pacific (APAC) region to touch approximately $301 trillion by 2020. The Juniper Research (KPMG Analysis, 2015) predicted that 1.8 billion people will be using mobile banking worldwide by 2019. The mobile banking usage directly depends on dissemination rate of a smartphone in everyday usage. For that record, the report published in Statista (2018) details that the mobile users' population stands at 3.7 billion as of January 2018 across the globe. Although Asia and Africa lead the pack in terms of existing users but America records the highest penetration rate of mobile

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subscribers at around 78.2 percent followed by Europe at 76.6 percent. Apart from the increasing trend in the Mobile banking acceptability in the APAC region and European countries, the other regions of the globe have also depicted the growing possibilities for the m-banking usage. While, in the case of Middle East, the number of mobile connection has reached 263 million by the year 2016 culminating into over 70% adoption rate in Kuwait, Israel and Oman (GSMA, 2016). More specifically in Oman, the total mobile phone subscriptions have been recorded as 150% of total Omani residents (www.yStats.com, 2016).

With the encouraging trend of increasing mobile phone subscription worldwide, there is no denying the fact that mobile users might show an inclination of switching from the other forms of cashless transactions such as credit cards and online payment options towards the mobile banking. However, challenges lie in the retaining existing and attracting potential m-banking users as they may face several hurdles like technical specifications, the emergence of competing brands, education of consumers, security concerns and synchronization between enabling entities, to name a few. In spite of these concerns, all the stakeholders must recognize that millions of users around the globe are dependent on their sophisticated mobile devices. Thereby, it is important to bridge the gap to facilitate and enhance the m-payment usage with the efficient and effective mobile banking.

Dwivedi, Shareef, Simintiras, Lal, and Weerakkody, (2016) suggested that mobile service system should reflect a country's cultural attributes. A few studies have been conducted in Oman in order to observe the use of m-services from various dimensions. One such study by Belwal and Belwal (2009) studied consumers employing the mobile services for traditional uses such as making calls, exchanging SMSs, navigating through GPS systems. Researchers (Riffai, Grant, & Edgar, 2012; Sharma, 2017) focused on m-banking with reference to the determination of behavioral intention. In addition, those studies focused on m-services being used for paying parking fee via SMS and students receiving grades etc. However, none of these studies has paid attention to the user intention of continuing the mobile services and the factors contributing thereafter on account of the low usage rate (Riffai et al., 2012: Sharma, 2017) for m-banking services in Oman. Service providers, therefore, need to address key reasons influencing the behavior of users and integrate strategic actions in order to bring satisfaction and hence promote the further use of mobile banking.

This research therefore is an attempt towards bridging the gap in the extant literature by extending the DeLone & McLean (Pitt, Watson, & Kavan, 2013) IS success model in order to understand users' intention for the decision to accept m-banking and to derive satisfaction in the reference of this work. Firstly, the proposed work extends the D&M IS model by adding trust as another important variable in the context of Oman, a Middle Eastern country. Secondly, this research focuses on the conversion into actual usage of m-banking via intention to use and satisfaction of m-banking usage. Finally, a two staged analytic approach was implemented for the testing and validation of the model proposed. Structural equation modeling (SEM) was employed to test the proposed research model and establish key hypothesized predictors with the help of goodness of fit model and then those key variables derived from SEM analysis were further passed into the input layers of the neural network structure to compute the ranking of predictors and thereby predict the actual usage of m-banking adoption. The sequential multi-method research design derives its rationalization from the fact that consumers tend to judge alternatives based on only a few attributes and therefore the process of evaluation may not always be compensatory (Chiang, Zhang, & Zhou, 2006; Johnson, Meyer, & Ghose, 1989). Thereby the use of neural network model will bring the reliability in the validation of the constructs even for the non-compensatory decision of the users.

The paper is further organized as follows. The Section 2 reviews the literature related to the constructs of m-banking and describes the theoretical base of this study and presents proposed hypotheses and subsequent research model. Section 3 presents research methodology and Section 4 summarizes data analysis and subsequent results. In Section 5, we present discussion with implications for theory and practice of the results thus obtained. Finally, Section 6 concludes the work with some limitations and explores the further research dimension in this area.

2. Literature review

2.1. Mobile banking in Oman: The current scenario

The Government of Oman has been among the first to give attention to the growth of mobile technology by, setting up the IT task force, introducing the e.oman strategy, forming the ITA (Information Technology Authority) Portal and advancing internet payment gateway as a move towards digital society (ICT sustainable development report, 2015; Riffai et al., 2012). The MpClear system was launched in Oman in July 2017. This system promises interoperability and an integrated clearing and switching service between mobile banking systems. With this launch, Oman is credited to be the first country among the GCC countries to execute such a system (Oman Economic Review, 2017). Given the ubiquity of the mobile, Omani government aims to address financial inclusion with the introduction of the mobile based payment systems. These initiatives show the positive intention on the part of Government to escalate and promote the implementation of m-services among the consumers in Oman as many of them are still not verse with the mobile payment services and subsequent benefits.

2.2. Theoretical development and formation of hypotheses

The D&M model has widely been used to study user adoption of numerous information systems (Zhou, 2013). The original D&M model (De Kerviler et al., 2016) established "six factors for the success of IS, as system quality, information quality, system use, user satisfaction, individual impact and organizational impact". Based on the observation of Pitt et al. (1995), the original D&M success model got updated with the inclusion of service quality along with the existing system quality and information quality to measure the effect on IS use as well as user satisfaction (DeLone & McLean, 1992). Since then a substantial work has been carried out in the IS domain based on D&M IS success model. The researchers have subsequently combined the D&M model with the other models such as task technology fit (TTF) to measure individual performance in the context of mobile banking (Tam & Oliveira, 2016); the integration of trust with D&M IS success model to estimate repurchase intention using e-services (Hsu, Chang, Chu, & Lee, 2014); D & M with the users' perceived benefits (Gao & Bai, 2014; Gao & Waechter, 2017); D&M predicting user intention to carry out online shopping (Chen & Cheng, 2009); D&M with the satisfaction for mobile banking (Lee & Chung, 2009). Some prominent studies have explained users' behavioral intention and satisfaction with another commonly used models such as a unified theory of acceptance and usage of technology (UTAUT), revised UTAUT among others in IS studies (Dwivedi, Rana, Jeyaraj, Clement, & Williams, 2017; Rana, Dwivedi, Williams, & Weerakkody, 2016; Rana, Dwivedi, Lal, Williams, & Clement, 2017).

This research, however attempts to extend the DeLone & McLean (Petter, DeLone, & McLean, 2013) IS success model to understand users' intention to adopt m-banking and also derive satisfaction in the reference of this work. The current study after due consideration and observation with Omanis proposes to add one more dimension to D&M model as Trust. It has been observed that natives of GCC countries share a strong bond of trust with the Government initiatives and schemes. For that matter, the initiative of mobile banking, which has recently been introduced in Oman, may perplex the prospective users regarding the privacy and security dimensions. Hossain and Dwivedi (2014) also emphasized that the agencies should also publish and provide a detailed privacy statement while collecting data which may develop the trust among users. While, many researchers (Wu, Chen, Chen, & Cheng, 2014; Zhou, 2014) have already established user trust as a significant

adoption factor in the context of multiple information system (IS), it has not satisfactorily been tested from m-banking perspective (Chandra, Srivastava, & Theng, 2010). Initial trust takes place at the first time interaction of the user with m-banking (McKnight, Choudhury, & Kacmar, 2002; Zhou, 2014). Thus, it is critical to establish users' initial trust developed thereby for m-banking adoption (Gao & Waechter, 2017). Therefore, it is argued that Trust as a significant construct may further enhance the intention to use as well lead to satisfaction. Since the study not only tries to understand the intention to use and user satisfaction, it also wishes to comprehend whether these factors lead to continuous usage which may be estimated via the frequency of actual usage of m-banking. Thereby the intention to use and satisfaction lay the foundation of this study as to mediate the effect of service quality, information quality, system quality and trust to encourage the actual usage of the m-banking in Oman.

2.2.1. Service quality (independent variable I)

Service quality traditionally has been defined as "the quality of the support which is received by the users from the IS department and IT support system" (Chatterjee, Kar, & Gupta, 2018; DeLone & McLean, 2003; Petter, DeLone, & McLean, 2008; Sharma, Gaur, Saddikuti, & Rastogi, 2017; Veeramootoo, Nunkoo, & Dwivedi, 2018). Pitt et al. (1995) emphasized on including service quality as an important measure of IS effectiveness so as to ensure the quality of the service provided apart from that of product. Moreover, Gefen (2002) noted that the m-banking gateway particularly presents several issues due to the physical constraints of a mobile device such as usability and comprehension problems and thus as observed by Kuo, Wu, and Deng, (2009), service quality may therefore affect user experience of m-banking as users' perceived enjoyment from mobile payment systems may decrease due to unreliable system and slow responses. Thereby, if the service personnel are available and trained to listen, understand and address the problems of the users, the service quality may be enhanced and may lead to satisfaction in terms of experience in the form of their interaction with the service personnel and will also positively influence their intention to use if their usage problems are well received and taken care of just at a call away. Thus it is estimated that focus on the service quality of the m-banking system can increase the user satisfaction and experience as a whole which leads to the formation of the following hypotheses:

H1a. Service quality has a positive relationship with the intention to use m-banking

H1b. Service quality has a positive relationship with the satisfaction of m-banking

2.2.2. Information quality (independent variable II)

Information quality encompasses the system characteristics such as relevance, sufficiency, accuracy and timeliness (Chatterjee et al., 2018; Dwivedi, Kapoor, Williams, & Williams, 2013; Petter et al., 2013; Sharma et al., 2017; Veeramootoo et al., 2018; Zhou, 2013). Akter, D'Ambra, and Ray, (2013) observed that information quality is one of the key determinants that influences the attitude among users towards technology they use. Thus information quality can be considered as the main construct bringing along satisfaction (Urbach, Smolnik, & Riempp, 2010) as it influences certain behavioral beliefs which may lead to the intention to use mobile banking (Wixom & Todd, 2005). Jung, Perez-Mira, and Wiley-Patton, (2009) added that the user experience may be affected by content quality. Zhou (2013) further pointed out that in the absence of good information quality much effort will be required on the part of users in information dissection which will increase their operational difficulty. Gao and Bai (2014) further experienced that in the absence of good information quality, users' satisfaction may decrease for not being able to meet expectations of having quality information from the usage of m-banking. Therefore, we propose the following:

H2a. Information quality has a positive relationship with the intention to use m-banking

H2b. Information quality has a positive relationship with the satisfaction of m-banking

2.2.3. System quality (independent variable III)

In the case of m-banking, since customers do not directly enter the system for the services, system quality becomes the "online storefront" that leads to usage of the device (Gao & Waechter, 2017). System quality reflects ease of use, response time, user interface and reliability and stability (DeLone & McLean, 1992; Dwivedi et al., 2013; Petter et al., 2008; Sharma et al., 2017; Wu & Wang, 2006; Zhou, 2013). In the absence of these features, users may suspect the ability of the service provider of providing quality service as it might increase their difficulty in using the device and might lead to the possible decrease in the users' intention to use the mobile device for m-banking. Bhattacherjee (2001) in his work had also observed that if the user experiences better performance of the system, it will positively lead to user satisfaction and thereby the continuance intention and the vice-versa holds true as well. On the basis of above arguments, it can be added that higher system quality may increase user satisfaction while compensating for the restricted physical dimensions of a mobile device. Thereby, we develop the following hypotheses:

H3a. System quality has a positive relationship with the intention to use of m-banking

H3b. System quality has a positive relationship with the satisfaction of m-banking

2.2.4. Trust (independent variable IV)

Trust as in this study intends to focus on the reliance and privacy on the part of m-banking application providers to execute m-commerce activities. Chong (2013) felt that security and privacy related risks concerns tend to be higher with monetary transactions through mobile devices as individual and private information is stored on users' mobile phones. The m-banking being a very personalized service, the concern of users generally arises about the confidentiality and security of the data stored on their respective devices. Hence decision makers and service providers are advised to focus on relationship based on trust during the early stage of relationship in order to facilitate the continuous usage (Oliveira, Faria, Thomas, & Ales, 2014; Slade, Dwivedi et al., 2015; Slade, Williams, Dwivedi, & Piercy, 2015; Shareef, Abdullah Baabdullah, Dutta, Kumar, & Dwivedi, 2018). Thereby trust stands as an important construct in order to boost intention to use and bring along the satisfaction among mobile users to conduct the m-commerce activities via m-banking and therefore leads to the formation of following hypotheses:

H4a. Trust has a positive relationship with intention to use m-banking

H4b. Trust has a positive relationship with satisfaction of m-banking

2.2.5. Satisfaction and intention to use (the mediating variables)

Way back, Oliver (1980) observed that satisfaction arises from the various interactions between users and service provider. The updated version of the model (DeLone & McLean, 2003) defined that the construct 'user satisfaction' is preceded by 'use' in a process sense but in an informal sense, 'user satisfaction' is achieved by positive experience with 'use'. Many researchers (Kim, Shin, & Lee, 2009; Kuo, Wu, & Peng, 2012; Liu, Guo, & Lee, 2011) subsequently predicted satisfaction as a strong predictor of continuance usage. Zhou (2013) found that users may not continue with mobile payment services if they are not satisfied. Yiu, Grant, and Edgar, (2007) also investigated that the intention to use can be considered as the major construct for banking transactions. Au,

Ngai, and Cheng, (2008) observed that a satisfied user shows determination towards the intention to use. On which Tam and Oliveira (2016) further built the positive connection between user satisfaction and intention to use m-banking services and they advanced the knowledge base by stressing upon user satisfaction as the outcome of the overall quality provided by the service provider in the context of m-banking. On that premise, we build the following hypotheses:

H5. Satisfaction has a positive relationship with intention to use m-banking

2.2.6. Actual usage (dependent variable)

Tam and Oliveira (2016) observed that it is not only important to attract potential adopters but also retain the existing users. Retaining the user is associated with users' belief for the system as it encompasses the experience cycle of the users. Some of the studies related to satisfaction have provided evidence that there is a positive relationship between customer satisfaction and post-purchase intention or repurchase i.e. continuous usage (Kuo et al., 2009; Moon & Kim, 2001) which has been determined as actual usage in this work. If the users remain unsatisfied, they would be unwilling to repeat the use (Kuo et al., 2009). Many researchers also discovered the strong relationship of satisfaction with loyalty (de Ruyter & Wetzels, 2000; Liu et al., 2011) which might lead to actual usage. Kim, Chan, and Gupta, (2007) emphasized on the involvement of users in continuous usage if they intend to use m-banking as users demand an enjoyable experience apart from being utility-oriented. Zhou (2013) observed that trust leads to flow, which then brings satisfaction and these two factors together influence continuance intention to use m-banking and further suggested that service providers should improve quality dimensions to enhance users' experience, leading to continuance usage Kim, Ferrin, and Rao, (2009) also stressed that purchase intention is a major determinant of actual purchase in e-commerce. Thereby, the intention to use and satisfaction tend to positively and significantly impact the actual usage which leads to the development of the following hypotheses:

H6a. Intention to use has a positive relationship with the actual usage of m-banking

H6b. Satisfaction has a positive relationship with the actual usage of m-banking

2.2.7. Research framework

The theoretical model derived from the above five hypotheses through the conception of studies originated from the extant literatures available along with the integration of the updated IS success D&M model is presented in Fig. 1.

3. Research methodology

3.1. Variable measurement and data collection

The survey items to measure mobile banking users' perception used in this study have been adopted from previous related studies (Ahmad & Khalid, 2017; Alalwan et al., 2017; Al-Somali, Gholami, & Clegg, 2009; Davis, 1989; Sharma, 2017; Zhou, 2013). Saunders, Lewis, and Thornhill, (2007) recommended that the survey questionnaire approach is appropriate to test the proposed hypotheses. The survey questionnaire (see Appendix A) to collect data was developed in the English language and reviewed by five experts who are working in the digital banking sector and universities in Oman. The experts' opinion helped in ensuring readability of survey questions from the perspective of the mobile banking users to assess actual usage. Data were collected with the help of an online survey via Google forms between April and May 2018. Most of the indicators in the survey were measured using a five-point Likert scale, representing from strongly agree = "5" to strongly disagree = "1" except demographic variables. The survey questionnaire was tested by conducting a pilot study with the help of five IS professionals from a national bank and three university professors engaged in research related to the adoption of cutting edge technologies in IS area. A total of 800 emails with questionnaire hyperlink were sent to faculty members, staff and senior students in two universities and three colleges in Oman, a prominent Middle Eastern country. A follow-up reminder email in the first week of May 2018 was sent to participants who did not reply.

3.2. Neural network and structural equation modeling

Haykin (2001) defined the neural network as "a massively parallel distributed processor made up of simple processing units, having a neural propensity for storing experimental knowledge and making it available for use". Using sample data, the knowledge thus obtained is stored by the synaptic weights. The learning algorithm finally modifies the synaptic weights in a systematic manner so as to meet the said objective. The neural network delivers many advantages over the traditionally used statistical methods (Chong, 2013). There is one input layer, a number of hidden layers and one output layer in the neural network model developed in this study. The number of hidden layers may be chosen on the basis of the complexity of the problem. A continuous function can be modelled effectively using one hidden layer whereas a neural network with two hidden layers can model a function which is not even continuous (Negnevitsky, 2011). Chan and Chong (2012) observed a very important advantage of a neural network for its ability to even examine non-compensatory decision process as it can either be linear or non-linear. Although linear compensatory models, normally estimated by the statistical methods (eg. analysis of variance, logistic regression, discriminant analysis, structural equation modeling) are popularly used to predict the consumer behavior, challenges lie in their reliability as they might over simplify the complex decision-making processes (Chan & Chong, 2012; Chong, 2013; Sharma, 2017). Researchers have also argued that consumers tend to judge alternatives based on only one or a few attributes, and thereby the process of evaluation may not always be compensatory (Chiang et al., 2006; Johnson et al., 1989). For example, in the case of m-banking, the users' immediate concern may just be the swift execution of the payment process. This concern, therefore may not be compensated by the

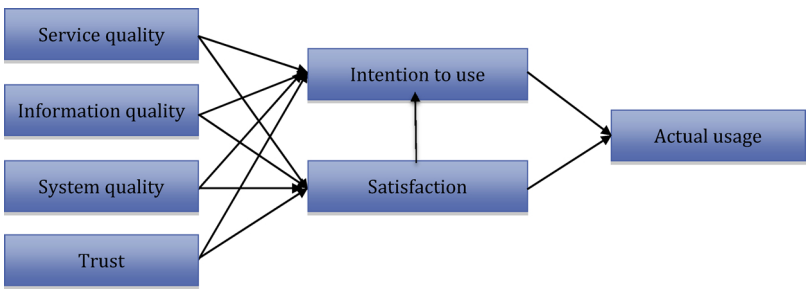

Fig. 1. Research Model.

improvement of other attributes such as convenience to use. Johnson et al. (1989) and Chiang et al. (2006) noted that the traditional statistical models for their inability of not capturing non-compensatory decision processes, may not be much reliable and therefore neural network, being more robust in nature can be used for higher prediction accuracy as compared with the existing linear models (Chong, 2013) and may do better than the statistical techniques (Sharma, 2017; Sim, Tan, Wong, Ooi, & Hew, 2014). Against this backdrop, this paper gets its motivation behind developing neural network model to assess the suggested model for its predictability. This study thereby works with a two staged technique by integrating SEM and neural network analysis as Chan and Chong (2012) also examined that neural networks, due to its "black-box" nature, may not be appropriate for testing of hypotheses and that of examining the causal relationship and require the suitable statistical technique as the precursor. Therefore, this study, on the line of several other researchers (Chong, 2013; Leong, Hew, Tan, & Ooi, 2013; Liebana-Cabanillas, Marinkovic, & Kalinic, 2017; Tan, Ooi, Leong, & Lin, 2014) adopts a two-stage analytical approach: wherein, SEM is applied to test the proposed research model and identify the set of statistically significant predictors and neural network models were used to rank aforementioned significant predictors and validate results obtained from SEM. In contrary, Elman (1993) suggested that a small sample size may lead to the wrong generalization when neural network models are used for prediction purposes only.

4. Data analysis and results

Data analysis in this study was performed in four steps. In the first step, descriptive statistics were computed to understand the structure of the sample. A total of 284 responses were received, which results in a 35.5 percent response rate. In the data pre-processing stage, 57 responses were discarded due to missing data points, resulting in 28.4 percent valid responses. Therefore, this research study examined 227 valid responses, 57.7% from male participants and 42.3% female participants, ensuring the results to be free from gender bias. In addition, most of the participants (63.9%) were from the age group 26–35 years followed by 30% above 36 years and 6.1% below 25 years old. Although the participation of the respondents was from each age group, including the older ones as well however, a major chunk of respondents represented the young people for the obvious reason of their being friendlier with the technology and its usage, which eventually helped in getting the actual feel of the Omani residents towards the m-banking. In this survey there were 67% participants who had a master or higher degree and 33% participants had a bachelor degree. The survey ensured to collect the data from the educated residents of Oman so as to reduce the rate of rejection due to lack of knowledge of the usage of technology in general among the less educated ones and m-banking in particular. Furthermore, there were 19.8% Omani and 80.2% Non-Omani participants from different countries like India, Pakistan, Srilanka, Bangladesh and others.

The research emphasized on the empirical investigation of the constructs influencing m-banking usage among Omani residents' thereby the respondents were limited to Omani residents only however in order to understand the role of cultural diversity in building trust towards a particular technology for the researchers' understanding as this factor has not been included in the final analysis, around 80% Omani residents represented other countries. Table 1 summarizes demographic variables related to the collected and analyzed sample.

Table 1
Sample structure.

Demographic variable	Categories	Number of respondents	Percentage
Gender	Male	131	57.7
	Female	96	42.3
Age group	Below 25	14	6.1
	26-35	145	63.9
	36 and above	68	30
Education level	Bachelor	75	33
	Masters or higher	152	67
Nationality	Omani	45	19.8
	Non-Omani	182	80.2

4.1. Reliability and validity analysis

In the second step of the data analysis, reliability and validity of the constructs were assessed. The assessment of the reliability and validity constructs was done as per the recommendations made by Hair, Black, Babin, and Anderson, (2010). The collected data were processed and analyzed by statistical software packages SPSS 23.0 and AMOS 18. To begin with the data analysis, reliability of all constructs using Cronbach alpha was computed in order to assess the internal consistency of survey items. As per Hair et al. (2010), the internal consistency of constructs is assumed to be good if Cronbach alpha values are more than 0.70 (Service quality = 0.885; Information quality = 0.911; Trust = 0.843; systems quality = 0.967; Intention to use = 0.904; Satisfaction = 0.902; Actual usage = 0.896). Next, the uni-dimensionality of each construct was assessed using confirmatory factor analysis (CFA). The fit measures considered in this study were: goodness of fit index (GFI), adjusted goodness of fit index (AGFI), Tucker-Lewis index (TLI), incremental fit index (IFI), and comparative fit index (CFI). The other fit indices like TLI, IFI, and CFI were chosen as these are not influenced by the sample size. The fit indices obtained from CFA are as follows: Chi-Square/df = 2.09; goodness fit index (GFI) = 0.933; Adjusted goodness fit index (GFI) = 0.927; comparative goodness of fit index (CFI) = 0.955; Tucker Lewis fit index (TLI) = 0.938; incremental fit index (IFI) = 0.948, and RMSEA = 0.046. Since the values of GFI, AGFI, CFI, TFI and IFI are greater than 0.90 and RMSEA is less than 0.08 and hence these results confirm that the proposed research model fits data reasonably.

Furthermore, another key reliability measures namely composite reliability (CR) and average variance extracted (AVE) were also computed for all constructs to assess their internal consistency. The values of composite reliability (CR) for all constructs were greater than 0.845 signifying that the proposed research model has reasonably good internal consistency. In addition to it, the average variance extracted (AVE) and composite reliability (CR) confirmed the convergent validity of the all constructs, as the values of CR are greater than AVE.

Furthermore, the discriminant validity for the determination of the extent of difference among neighboring constructs as defined by Hair et al. (2010) is always an important measure to assess the validity of constructs and thereby discriminant validity was examined by two methods. First, the values of average shared squared variance (ASV) were found to be greater than the maximum shared squared variance (MSV). Second, the values of average variance extracted (AVE) also resulted as greater than average shared squared variance (ASV), confirming the discriminant validity of the constructs. The results of the aforementioned terms such as CR, AVE, ASV and MSV are shown in Table 2.

4.2. Testing of hypotheses

In the third step of data analysis, testing of the hypotheses was performed. The results of the measurement model being assessed and found satisfactory in the previous section, the structural model was examined further. The results of hypotheses testing are summarized in Table 3. As per the recommendations by Hair et al. (2010), the values of NFI, CFI, IFI, and TLI should be greater than 0.90 and the value of RMSEA should be less than 0.08 for satisfactory results. The results of the fit indices were obtained as follows: Chi-Square/df = 2.06; NFI = 0.907; CFI = 0.926; TLI = 0.919; IFI = 0.903, and RMSEA) = 0.03. The testing of hypotheses was conducted using beta values for

Table 2
Reliability and validity of constructs.

Constructs	CR	AVE	MSV	ASV	SYS	IQ	TR	SQ	SAT	AU	INT
SYS	0.969	0.913	0.010	0.005	0.956						
IQ	0.912	0.775	0.210	0.151	0.091	0.880					
TR	0.845	0.578	0.484	0.320	0.084	0.457	0.760				
SQ	0.885	0.659	0.458	0.325	0.080	0.402	0.675	0.812			
SAT	0.903	0.699	0.484	0.334	0.015	0.458	0.696	0.677	0.836		
AU	0.899	0.748	0.456	0.307	0.098	0.332	0.648	0.669	0.675	0.865	
INT	0.905	0.761	0.419	0.294	0.011	0.454	0.586	0.647	0.629	0.634	0.873

Table 3
Hypotheses testing results.

Hypotheses		Estimate	S.E.	P-value	Result
H1a	Service quality → Intention to Use	0.368	0.076	***	Supported
H1b	Service quality→ Satisfaction	0.309	0.045	***	Supported
H2a	Information quality → Intention to Use	0.170	0.060	0.005	Supported
H2b	Information quality → Satisfaction	0.112	0.040	0.005	Supported
H3a	System quality → Intention to Use	0.021	0.039	0.590	Not Supported
H3b	System quality→ Satisfaction	0.029	0.026	0.267	Not Supported
H4a	Trust → Intention to Use	0.183	0.079	0.020	Supported
H4b	Trust → Satisfaction	0.322	0.049	***	Supported
H5	Satisfaction → Intention to use	0.312	0.135	0.021	Supported
H6a	Intention to use →Actual usage	0.332	0.073	***	Supported
H6b	Satisfaction → Actual usage	0.643	0.112	***	Supported

Note: all hypotheses were accepted within 5% level of significance.

hypothesized paths at 5% level of significance. In the first phase of hypotheses testing in SEM analysis, the influence of *service quality*, *systems quality*, *information quality*, and *trust* on *intention to use* and *satisfaction* towards mobile banking usage was analyzed. *Service quality* has positive and statistically significant relationship with the *intention to use* ($\beta = 0.368$, $p < 0.05$) and *satisfaction* ($\beta = 0.309$, $p < 0.05$). Hence, H1a and H1b are supported. Next, *information quality* also has positive and statistically significant relation with *intention to use* ($\beta = 0.170$, $p < 0.05$) and *satisfaction* ($\beta = 0.112$, $p < 0.05$) towards mobile banking usage. Therefore, H2a and H2b are supported. H3a and H3b hypotheses were not supported as *system quality does not* have statistically significant relationship with *intention to use* ($\beta = 0.021$, $p > 0.05$) and *satisfaction* ($\beta = 0.029$, $p > 0.05$) towards mobile banking usage. Finally, in this phase of the hypotheses testing, *trust* shares a positive and statistically significant relation with *intention to use* ($\beta = 0.183$, $p < 0.05$) and *satisfaction* ($\beta = 0.322$, $p < 0.05$) towards mobile banking usage, resulting in the acceptance of H4a and H4b. In the second phase of hypotheses testing, the *satisfaction* has been found to have a positive and statistically significant relationship with *intention to use* ($\beta = 0.312$, $p < 0.05$) towards mobile banking use. Hence the hypothesis H5 is supported. Furthermore, the influence of *satisfaction*, and *intention to use* on *actual usage* mobile banking was analyzed. It was revealed that *satisfaction* ($\beta = 0.643$, $p < 0.05$) and *intention to use* ($\beta = 0.332$, $p < 0.05$) influenced positively the *actual usage* of mobile banking, resulting in the support of the hypotheses H6a and H6b.

The value of the coefficient of determination (R^2) extracted from dependent constructs namely *intention to use*, *satisfaction* and *actual usage* was found at 74%, 66%, and 63% respectively. The current study clearly indicates that service quality, information quality, and trust plays significant role in determining satisfaction and intention to use of users towards mobile banking usage and finally satisfaction and intention to use determine actual usage of mobile banking in the particular context of a developing country like Oman.

4.3. Results of neural network modeling

In the fourth step of the data analysis, neural network modeling was employed. This study used one of the most popular types of the neural networks named the feedback propagation multilayer perception (MLP) (Chong, Liu, Luo, & Keng-Boon, 2015; Liebana-Cabanillas et al., 2017; Negnevitsky, 2011; Sharma, 2017). The proposed feed-forward network fed forwards the signals from the input layer to the output layer through the neural network. The knowledge is then stored in the network in the form of inputs and outputs. The number of neurons in the input layer is equal to independent predictors whereas the neurons in the output layer are equivalent to dependent constructs in the developed neural network model. (Negnevitsky, 2011) argued that the accuracy of the results primarily depends on the number of neurons in the hidden layer. The higher number of neurons might create the concerns pertaining to overfitting and the obtained results may be worth generalizing. (Liebana-Cabanillas et al., 2017). A number of researchers (Chan & Chong, 2012; Chong, 2013; Chong et al., 2015) have recommended the trial and error method to determine the number of hidden neurons as no algorithm is available in the literature to compute an exact number of hidden neurons. However, Liebana-Cabanillas et al. (2017) suggested in their recent work that the neural network model should be chosen on the basis of its performance on the test data set with minimum hidden neurons. For this study, the neural network is modeled using IBM SPSS 23.0 where the number of input layers was equal to the statistically significant independent determinants obtained from the structural equation modeling. The proposed research model (Fig. 1) is being presented in the form of three sub-models (Fig. 2) appropriate for neural network modeling. Model A has three input layers and each layer is represented by factors namely service quality, trust, and information quality and one output layer presented by satisfaction. Next, model B also has three input layers representing independent variables namely, service quality, trust, and information quality, and intention to use represented the output layer. Finally, model C presented two input layers namely intention to use and satisfaction towards mobile banking and actual usage presented the output layer.

A sigmoid function was chosen as an activation function in the developed neural network model (Chan & Chong, 2012; Leong et al., 2013). The NN model results were normalized in the range of [0,1] to increase the effectiveness (Negnevitsky, 2011). To avoid concerns of

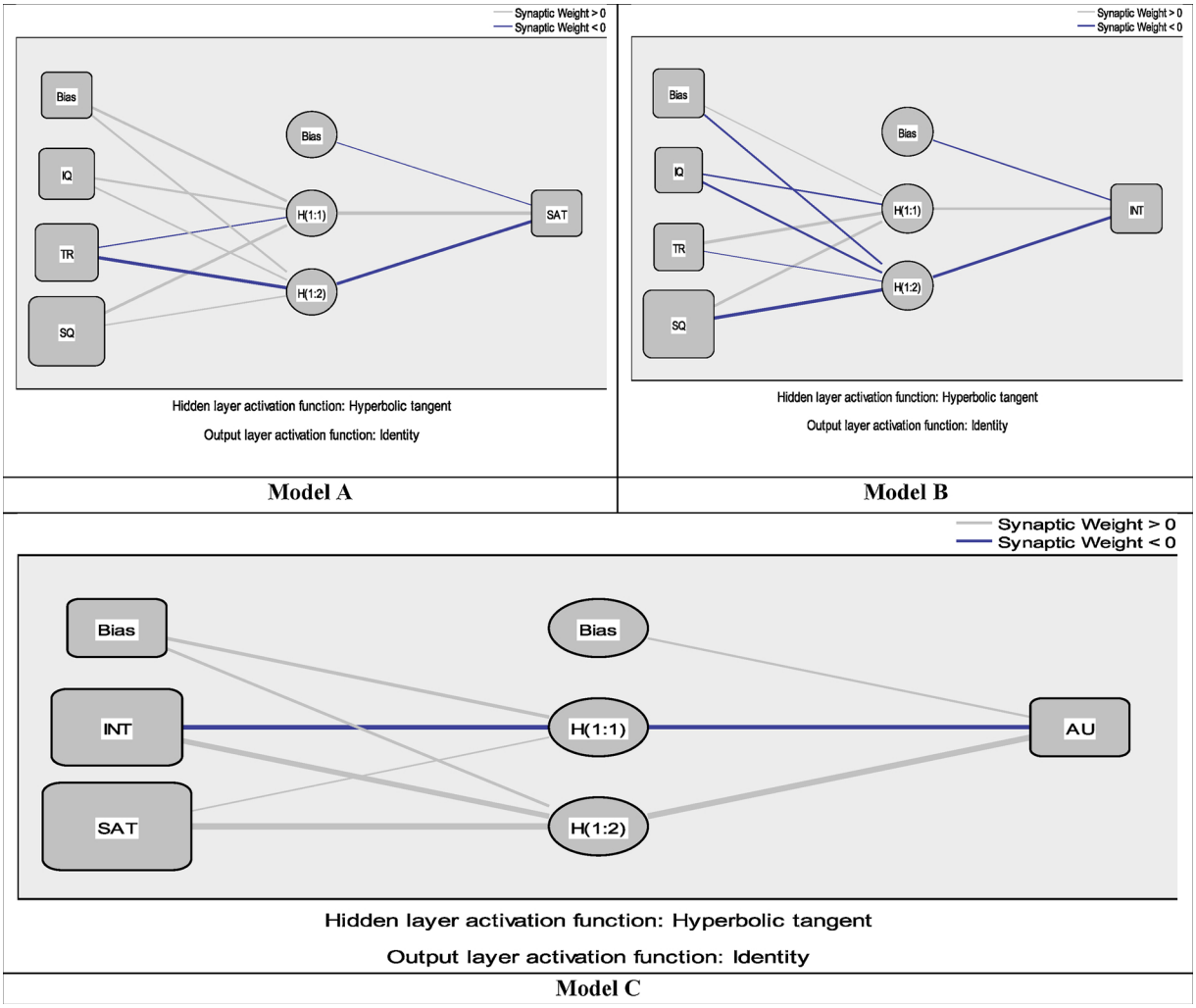

Fig. 2. Neural Network Models.

over fitting, a ten-fold cross validation in the neural network model was performed by choosing 90% data for training and 10% data for testing purposes (Chong et al., 2015; Sharma, 2017). The Table 4 presents the Root Mean Square of Error (RMSE) of all ten neural network models for training and testing data sets to assess the level of accuracy achieved by the model.

The average RMSE of all the neural network models turn out to be quite small in case of three neural network models (0.081, 0.111, and 0.079 for training data set and 0.085, 0.112, and 0.82 for testing data sets) indicating high level accuracy in predicting a number of dependent variables such as satisfaction, intention to use and actual usage of mobile banking in this case.

The normalized importance ratio is calculated as "the ratio of the importance of each predictor to the highest importance value" (Chong et al., 2015). Table 5 summarizes the average relative importance and normalized relative importance in percentage reported by neural network models A, B and C. In neural network model A, service quality is the most important predictor of satisfaction followed by trust and information quality. Next, in neural network model B, trust is the key predictor of intention to use mobile banking followed by service quality and information quality. Finally, in neural network model C the most important predictor of actual usage of mobile banking is satisfaction followed by intention to use. The importance of information quality plays a significant role in determining satisfaction as well as intention to use towards mobile banking but it was at the minimum level.

It is important to report that the trust is the most influential predictor of the satisfaction towards mobile banking, followed by service quality and information quality in the SEM results whereas the neural network results reveal that service quality is the most important predictor of the satisfaction of mobile banking usage followed by trust and information quality. In addition, service quality is the most important predictor of the intention to use of mobile banking followed by trust and information quality in the SEM results whereas the neural network results reveal that trust is the key predictor of the intention towards the usage of mobile banking followed by service quality and

Table 4
RMSE NN modeling.

Network	Model A Inputs:		Model B Inputs:		Model C: Inputs	
	Training	Testing	Training	Testing	Training	Testing
ANN1	0.076	0.085	0.112	0.117	0.068	0.059
ANN2	0.084	0.092	0.108	0.103	0.083	0.089
ANN3	0.069	0.063	0.098	0.106	0.097	0.086
ANN4	0.088	0.097	0.115	0.119	0.072	0.078
ANN5	0.082	0.078	0.121	0.113	0.081	0.091
ANN6	0.075	0.088	0.117	0.109	0.087	0.081
ANN7	0.091	0.082	0.106	0.111	0.079	0.088
ANN8	0.067	0.079	0.123	0.128	0.064	0.075
ANN9	0.102	0.096	0.094	0.086	0.059	0.067
ANN10	0.073	0.087	0.114	0.125	0.096	0.104
Average	0.081	0.085	0.111	0.112	0.079	0.082
S.D.	0.011	0.010	0.009	0.012	0.013	0.013

Table 5
Importance of independent variables.

Networks	Model A : SAT			Model B: INT			Model C: AU	
	IQ	TR	SQ	IQ	SQ	TR	INT	SAT
ANN1	0.272	0.286	0.442	0.198	0.228	0.552	0.442	0.548
ANN2	0.268	0.338	0.455	0.227	0.249	0.531	0.434	0.532
ANN3	0.219	0.327	0.409	0.236	0.253	0.523	0.464	0.526
ANN4	0.282	0.297	0.394	0.205	0.241	0.547	0.472	0.564
ANN5	0.261	0.306	0.397	0.218	0.243	0.539	0.453	0.568
ANN6	0.254	0.309	0.413	0.198	0.238	0.558	0.446	0.554
ANN7	0.226	0.326	0.429	0.242	0.254	0.534	0.448	0.549
ANN8	0.243	0.301	0.448	0.235	0.268	0.527	0.451	0.541
ANN9	0.259	0.295	0.432	0.187	0.245	0.543	0.468	0.556
ANN10	0.276	0.335	0.451	0.214	0.251	0.516	0.432	0.562
Avg. importance	0.256	0.312	0.427	0.216	0.247	0.537	.451	0.550
Normalized importance	59.9	74.2	100	40.3	46.0	100	81.9	100

information quality. This difference in the results of SEM-NN modeling may be supported by the higher order of predictive power and non-compensatory nature of the later model. In case of the results obtained by the neural model C, there is no change in the order of the importance of the predictors of actual usage of mobile banking in SEM and neural network results i.e. satisfaction is the key predictor of actual usage of mobile banking followed by intention to use. This outcome may be considered as the validation of the results.

5. Discussion and implications for theory and practice

According to the results summarized in the aforementioned sections, it shows that the proposed research model examined in this study was able to achieve the satisfactory level in terms of predictive power extracted by dependent constructs: *intention to use (74%)*, *satisfaction (66%)*, and *actual usage (63%)*. In addition to these satisfactory results, reliability and validity of constructs, and fit indices were within the acceptable limits. It is worth mentioning here that the inclusion of trust increased the value of R^2 in *intention to use* and *satisfaction* from 65% to 74% and 61% to 66% respectively which supports the inclusion of trust in the proposed research model in this study. The value of R^2 extracted in the *intention to use* was in the highly acceptable limits and above the recommended value as suggested by researchers (Alalwan et al., 2017; Straub, Boudreau, & Gefen, 2004). In addition, this value of R^2 is close to other studies that employed DeLone and McLean information systems success model. For example, a study conducted by Chatterjee et al. (2018) reported variance explained in intention to use as 72%. Moreover, this study employed predictive modeling approach to predict the ranking of determinants in *intention to use*, *satisfaction*, and *actual usage*. And predictive modeling validated results obtained by structural equation modeling.

In relation to the estimates summarized in Table 3, *service quality* is the key determinant influencing users' *intention to use,* and *satisfaction* towards the usage of mobile baking with the coefficient values of 0.368 and 0.309 respectively. These findings imply that the higher level of service quality provided by service providers increases the level of satisfaction and intention to use towards a useful service like mobile baking in a developing country context. For example, if a customer registers his/her complaint through a call center and it gets resolved within a fixed time frame, it will enhance users' satisfaction level as well as intention to use mobile banking. This finding is consistent with a number of studies conducted in the previous IS studies (2003, Chatterjee et al., 2018; DeLone & McLean, 2002; Dwivedi et al., 2013; Gefen, 2002; Petter et al., 2008; Veeramootoo et al., 2018).

Statistical results support the significant relationship between *information quality* and users' *intention to use,* and *satisfaction* towards the usage of mobile baking with the coefficient values of 0.170 and 0.112 respectively. These findings clearly indicate that information quality is the one of the prime focuses of Omani residents in case of satisfaction and intention to use mobile banking. As a theoretical contribution of DeLone and McLean model, information quality has been one of the key determinant influencing the decision of users towards mobile banking usage. For example, if the information provided by service provider is up-to-date, easy to understand, and complete, it will motivate users to develop their intention to use and satisfaction towards mobile banking. This finding is consistent with a number of previously conducted IS studies (Akter et al., 2013; Chatterjee et al., 2018; Dwivedi et al., 2013; Petter et al., 2013; Veeramootoo et al., 2018; Zhou, 2013).

As for the role of *system quality*, the empirical findings of this study reject the proposed causal path between *system quality* and users' *intention to use,* and *satisfaction* towards the usage of mobile baking with the coefficient values of 0.021 and 0.029 respectively. This finding implies that system quality is not on the priority list of Omani residents while determining their intention to use and satisfaction towards mobile banking. The possible explanation of this outcome is the relatively better telecommunication infrastructure developed by the Omani government. This finding is partly consistent with Chatterjee et al. (2018) and not consistent with Zhou (2013).

The empirical results also provide strong evidence to support the causal relationship between trust and users' *intention to use,* and *satisfaction* towards the usage of mobile baking with the coefficient values of 0.183 and 0.322 respectively. This result implies that trust determines the users' *intention to use,* and *satisfaction* towards mobile banking in case of Oman. The role of trust is not only limited to motivate users to adopt mobile banking but also helps in developing a positive perception towards mobile banking. This result is consistent with the findings reported in the IS literature by multiple researchers (Chong, 2013; Slade, Dwivedi et al., 2015, 2015b; Alalwan et al., 2017; Shareef et al., 2018).

As expected, satisfaction was found empirically significant in influencing Omani users' intention to use mobile banking with the beta value of 0.312. This finding demonstrates that higher level of satisfaction formulates the higher level of intention to use mobile technology. Furthermore, results revealed that satisfaction with beta value 0.643 and intention to use with beta value 0.332 significantly influence the actual usage of mobile banking in Oman. This finding demonstrates that the combined effect of higher satisfaction and higher intention to use formulates the higher actual usage of mobile banking. These results are consistent with a number of previous IS studies (DeLone & McLean, 2003; Dwivedi et al., 2013; Kim et al., 2007; Kim, Shin et al., 2009; Kuo et al., 2009; Kuo et al., 2012; Liu et al., 2011; Tam & Oliveira, 2016; Veeramootoo et al., 2018; Yiu et al., 2007; Zhou, 2013).

5.1. Theoretical implications

The three dimensions of quality namely service quality, information quality, and system quality were used as potential constructs influencing satisfaction and intention to use mobile banking in Oman. It is valuable to note that service quality and information quality influence the users' satisfaction and intention to use mobile banking. These findings are fairly consistent with the previous studies (Akter et al., 2013; Chong, 2013; Oliveira et al., 2014; Petter et al., 2008, 2013; Urbach et al., 2010). The average income of Omani residents is relatively high so residents expect better service quality and up-to-date information pertaining to mobile banking services. The findings reveal that system quality is not statistically influencing users' satisfaction and intention to use mobile banking. The possible reason for this finding is that most of the mobile banking users have high end mobile devices in oil economy like Oman. In this study, a majority of the respondents are expatriates and relatively highly educated so for such respondents the usage of mobile systems is very basic.

It is worth pointing out that trust is one of the key antecedents that determines the satisfaction and intention to use towards mobile

banking. This finding is consistent with a number of studies conducted by researchers (Alalwan, Baabdullah, Rana, Tamilmani, & Dwivedi, 2018; Chong, 2013; Hanafizadeh, Behboudi, Koshksaray, & Tabar, 2014; Liebana-Cabanillas et al., 2017; Luo, Li, Zhang, & Shim, 2010; Slade, Dwivedi et al., 2015, 2015b). Trust in principle plays a key role in relation to the use of new technology where confidential information is requested to pay bills or traffic fines via the third party. In Oman, society is modest at large and in particular, the older generation prefers to visit bank branches for financial transactions. Residents' trust pertaining to the security and accuracy of financial transactions is very important for long term association with new mobile technology.

The study further delves into the finding that satisfaction precedes the intention to use which is in coherence with the previous related studies (Baptista & Oliveira, 2015; Kim, Shin et al., 2009; Kuo et al., 2009; Liu et al., 2011; Slade, Dwivedi et al., 2015, 2015b; Tam & Oliveira, 2016; Zhou, 2013) and also indicates that a satisfied user will again be motivated to use the services in future which has been measured as the actual usage. The results are indicative of the fact that users are expected to continue with the m-banking usage if they are satisfied with the service which comes from the information quality, service quality and trust. Thereby, an integrative methodology has been adopted in this study to understand the factors affecting the actual mobile banking usage.

We believe that scholars working on extended studies on anecdotes towards the enhanced acceptance of mobile banking and ways of doing it may transmit this study with useful directions. This study may provide the foundation to a number of studies to evaluate the deterministic factors in actual usage of mobile banking.

5.2. Practical implications

This study has a number of practical implications for decision makers in banking and telecommunication sectors. Firstly, the proposed research model and understanding of the interrelationships among multiple decision variables provides substantial information for decision makers from banking and telecommunication industry. In Oman, the subscribers of mobile phones have crossed 7 million in 2017 with a penetration rate of higher than 150% as per TOO (2017). The findings of the study are very useful in designing a suitable strategy to attract more number of mobile users to use mobile banking in the offering. It is noticed in the aforementioned studies that the adoption of mobile banking is low among Omani residents. It simply means that residents are not taking full advantage of the mobile banking technology possibly due to due to apprehensions and lack of awareness that m-banking services are reliable, useful, save time, easy to operate. The continued efforts by financial institutions to improve all quality dimensions and trust component will certainly increase the acceptance of mobile banking services in Oman. The decision makers of mobile companies in Oman may find the results valuable in order to develop a better and deeper understandings of the users' perceptions towards mobile banking usage and design the intelligent and effective policy to retain loyal customers by examining and improving upon the anecdotes described in this study to motivate users to use the m-banking services thereby leading to the further adoption and higher mobile banking usage among end users and finally may help in achieving digital strategy at national level.

In the recent times, cybercrime in particular online fraud cases are increasing in Oman and reported as 6% in 2016 in comparison to previous year and majority of these cases were related to transferring of money online and fraudulent use of ATMs in Oman or abroad. (Shaibany, 2017). In the light of same, the Central Bank of Oman has advised national as well as foreign banks to use latest and advanced technology so that rising fraudulent cases related to financial transactions can be reduced to minimum. Thereby banks in Oman not only need to focus towards using more advanced technology for online transactions but also win the trust of the customers and save them from such online frauds which is particularly addressed in this work indicating that apart from providing the superior service quality, and information quality, the mobile companies need to emphasize on building the residents' trust of Oman towards the security usage of mobile banking in particular and mobile services in general. It is important that the citizens feel secured while transacting through their device. Moreover, satisfaction being as the key indicator, it is imperative that mobile companies based in Oman offer customization of the services with the efficient management in order to bring customers' satisfaction which will lead to further usage of services. Finally, as this study was conducted in Oman, one of the fast developing country in the GCC nations, the findings of this study will be handy for the new and existing service providers of mobile banking in all GCC nations in formulating appropriate strategy to tap the potential mobile banking market for actual usage of the innovative mobile technology.

6. Conclusion

This research study presented a new model to predict the actual usage of the mobile banking in Oman, a Middle Eastern country. The main research model was divided into three sub models such as model A (independent variables: services quality, information quality, system quality, and trust and dependent variable: satisfaction), model B (independent variables: services quality, information quality, system quality, and trust and dependent variable: intention to use), and model C (independent variables: satisfaction, and intention to use and dependent variable: actual usage). In this study it was found that service quality and trust are the key determinants influencing satisfaction and intention to use and in turn influence the actual usage of the mobile banking. The obtained results imply that higher level of trust and better service quality in mobile banking will help in retaining old customers and attracting new and potential customers. An amalgam structural equation modeling and neural network modeling is employed which provides an additional originality to this study. In many studies, SEM has been used to test and verify the research hypotheses. It has rarely been combined with machine learning models. SEM is primarily used to test linear models and sometimes oversimplifies the complexities involved in the adoption models in business domains. In this study SEM is used to test research hypotheses and identify statistically significant predictors and neural network model used these predictors as input and ranked them for better decision making insights. This study provides very useful theoretical as well as practical implications for researchers, academicians, banking professionals, and mobile service providers.

6.1. Limitations, and scope for future research

This study has its own set of limitations, which will pave the way for future research. Firstly, the data were collected from academic institutions in Oman only. This limitation hinders the generalization of the results in the context of Oman and other GCC countries. Secondly, there is data imbalance (Mazurowski et al., 2008) with reference to nationality (80% expatriates and 20% local residents), it is hereby recommended to replicate this study with balanced data with reference to nationality in particular. Thirdly, as Oman is a culture dominated country, it is suggested to test the proposed research model for broader and global acceptance under certain cultural orientations (McCoy, Galletta, & King, 2007) such as high/low uncertainty avoidance, high/low power distance, high/low masculinity/femininity, and high/low individualism/collectivism. Therefore, it is suggested to conduct a longitudinal study by employing the proposed research model for long term decision making. Finally, the moderating effect of demographic variables studied has not been taken into account, the finding of effect of demographic variables on actual usage on mobile banking would provide deeper insights.

Appendix A. survey items and sources

Constructs	Survey items	Adapted from
Information quality	The information provided by mobile banking is up-to-date The information provided by m-banking is easy to understand The information provided by m-banking is complete	Urbach et al., 2010; Tam & Oliveira, 2016
Service quality	The call center representatives always help me when I need support with m-banking The call center representatives always pay personal attention when I experience problems with m-banking. The call center representatives have adequate knowledge to answer my queries related to m-banking	Urbach et al., 2010; Tam & Oliveira, 2016
System quality	The mobile banking app is easy to navigate. The mobile banking app is well structured. The mobile banking is easy to use.	Urbach et al., 2010; Tam & Oliveira, 2016
Trust	I trust my bank to offer secure m-banking I find m-banking is secure in conducting transactions I find m-banking is safe for receiving bank statements	Boateng, Adam, Okoe, & Anning-Dorson, 2016 Hanafizadeh et al., 2014
Satisfaction	I am satisfied that m-banking meets my requirements I am satisfied with m-banking effectiveness I am satisfied with m-banking efficiency	Wu & Wang, 2006 Tam & Oliveira, 2016
Intention to use	I plan to use m-banking regularly I intend to recommend m-banking to peers and relatives I intend to use m-banking when the opportunity arises.	Liebana-Cabanillas et al., 2017
Actual usage	I use m-banking multiple times in a week I use m-banking frequently I have many weekly requirements of m-banking	Moon & Kim, 2001

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