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# **Examining the role of consumer satisfaction within mobile eco-systems: evidence from mobile banking services**

## **1. Introduction**

The financial sector has over the last ten years gone through a process of significant disruption, changing consumer behaviour, creating new technologies and providing customers with new products and services (Baptista & Oliveira, 2016; Malaquias & Hwang, 2016). As part of this change consumers have started to move towards e-banking to carry out common money transactions and account features. However, research suggests, especially in developing countries there are still issues around consumer satisfaction in relational to the utilisation of e-banking services within mobile eco-systems (Al-Otaibi, Aljohani, Hoque, & Alotaibi, 2018; Baabdullah, Alalwan, Rana, Kizgin, & Patil, 2019; Sampaio, Ladeira, & Santini, 2017; Tam & Oliveira, 2016b). Thus, in this paper we investigate the mechanism of customer satisfaction enhancement in mobile banking (MB), focusing on the role of trust. This is primarily discussed within the context of mobile ecosystems. For clarity we define MB as the accessing of banking networks and conducting transactions and other banking services remotely via mobile phone devices (Tam & Oliveira, 2016b). This we argue is a growing area of importance which has had little attention in the literature, we identify a significant gap where the majority of the research has focused on the adoption and behavioural intention towards MB (Alalwan, Dwivedi, & Rana, 2017; Choudrie, Junior, McKenna, & Richter, 2018; Oliveira, Faria, Thomas, & Popovič, 2014) while very little research has been conducted in post-adoption behaviours such as satisfaction.

Satisfaction has been widely accepted as a key measure of continuous use and success in the information systems and e-commerce contexts. A number of studies have used the information system success model (DeLone & McLean, 2003) to investigate customer satisfaction with MB (Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Motiwalla, Albashrawi, & Kartal, 2019; Tam & Oliveira, 2016b). We intend to utilise this model and expand on the discussion on this area and consider the mediating impact of trust on customer satisfaction, this is a significant shift away from previous research which has a focus on trust as an independent variable or outcome. In addition, we add nuance to the research area by including task characteristics and structural assurance along with the quality factors in the model of DeLone and McLean (2003). This was done to include all aspects of customer trust and satisfaction building on the recommendations of Petter, DeLone, and McLean (2013) who proposes the

need for including other multiple factors in the model. Our research suggests that trust fully mediates the relationships between (service quality and structural assurance), and customer satisfaction. From our research we also find that trust partially mediates the relationships between (system quality, information quality and task characteristics), and customer satisfaction. Our results make an important contribution to knowledge and enhance our understanding on the aspects of trust that need to be taken into account to enhance MB customer satisfaction.

Thus, in differentiating this paper from previous research we carry out the following; firstly we build on the DeLone and McLean (2003) advocating continuous testing and refinement by extending the range of factors supplementing with task characteristics and structural assurance (Malaquias & Hwang, 2016; Zhou, 2012) alongside the three quality factors in the DeLone and McLean (2003) model. Secondly, we extend the research by including trust as a mediator, this provides a better understanding of customer satisfaction in MB satisfaction as an indicator of MB success. Thus, in this area of research we put forward number of contributions. First, conceptualising and enhancing the understanding of the impact of trust in the MB post-adoption behaviours in particular customer satisfaction. Second, investigating of the indirect effects of MB quality factors, task characteristics and structural assurance on customer satisfaction through trust.

In developing this paper, we structure it as follows, we start by discussing the study problem and providing context to the study. We then proceed to review the literature regarding trust and satisfaction within MB, we further explore the role of the (DeLone & McLean, 2003) model within MB. We then present our hypotheses and outline our results from the data collection process, this allows the authors to discuss and provide some managerial implications, limitation and future research direction.

## **2- Context of the research within mobile eco systems**

Malaquias and Hwang (2016) view MB as a disruptive tool which has the potential to bring significant efficiency to traditional customer tasks, saving time, money and customer service time, freeing up resources to ensure the quality of their mobile service networks. In addition, the positioning of MB within mobile eco-systems specifically mobile devices can reduce the level of financial fees compared with other conventional banking channels (Baabdullah, Alalwan, Rana, Kizgin, et al., 2019). Thus, for many banks the movement towards specific services such as MB which sit within a wider mobile eco systems is a significant part of future

growth strategy (Albashrawi, Kartal, Oztekin, & Motiwalla, 2019). However, developing any such strategy requires significant investment with some researchers (Baabdullah, Alalwan, Rana, Kizgin, et al., 2019) suggesting that banks have invested funds of \$115 Billion worldwide. What is clear from this investment is that banks only recoup costs based on continuous usage, so for many banks the incentive is to persuade consumers to utilise more of the online services. Hence, the challenge in building trust within MB is crucial for long term efficiency and strategy.

However, while there is data to suggest that MB adoption is widespread and commonplace, recent trends and statistics related to MB services suggest that MB customers tend to use limited services of MB which may result in view MB as unsatisfactory. This is summed quite nicely in the following manner:

*“Use must precede user satisfaction in a process sense, but positive experience with use will lead to greater user satisfaction in a causal sense” (DeLone & McLean, 2003, p. 23).*

From an industry perspective Deloitte’s global digital banking survey across 17 countries on e-banking behaviours and channel usage revealed that online banking may remain the main electronic channel for customer’s interactions in the foreseeable future, even among MB users. 73 % of customers globally use online banking at least once a month, compared to 59 % who use MB (Deloitte, 2019). In addition, although MB users are expected to reach over 2 billion in 2021 (Juniper, 2017), most MB customers use it to conduct relatively quick and straightforward transactions, ignoring more of the advanced capabilities available. In 2017, 44% of customer’s worldwide use MB in balance inquiries and only 29% used MB to make payments, and only 22% sent money through MB (Applause, 2017). Furthermore, 53% of people use online banking to transfer money internationally compared to only 24% use MB. Also, while 47% of customers update their account details using online banking, only 26% do the same task through MB (Deloitte, 2019).

Thus, within this paper we focus on Libya for our sample size, a country which spans an area of 1,759,540 square kilometres (index mundi, 2019a), ranks as the 17th nation in the world according to size, with a density of 4 per Km<sup>2</sup> (worldometers, 2019). Due to its sheer size and geography, banks have opened branches in all regions, cities, and remote villages, a costly and expensive undertaking, with many branches not economically feasible. Due to these factors there has been significant growth in the development of MB provision with the Bank of Commerce and Development, a private bank, leading the marketing to initiate e-banking

services in 2006 (CBL, 2019). In addition to this over the last five years internet adoption in Libya has shown a significant increase with internet users increasing from 21.1% in 2016 (internet live stats, 2016) to 74.2% in 2020 (Internet World Stats, 2020). When comparing these numbers to other countries in the MENA region Egypt has an adoption rate of 48.1%, Morocco with 64.3% and Tunisia with 66.8% (Internet World Stats, 2020). Interesting to note that mobile phone penetration has shown similar increases in adoption from one % in 2001 (Jones, Kennedy, Kerr, Mitchell, & Safayeni, 2012) to 172 % in 2019 (Freedom House, 2019) showing significant uplifts as compared to Egypt at 95%, Morocco at 124%, and Tunisia 128% (index mundi, 2019b). Thus, in order to remain competitive and to increase efficiency many banks are implementing MB services as a key aspect of their organisational growth strategies (CBL, 2019). As part of this the Libyan Government and central bank of Libya have invested significant sums by investing in IT infrastructure and payment system that rely on mobile devices to stimulate adoption in this area. (CBL, 2019). Thus, this paper is the first of its kind to investigate the use of MB within a Libyan context and what influences usage of MB devices.

### **3. Literature Review**

#### **3.1 Trust in MB**

Trust has been widely accepted as a key element in human social relationships (Liu, Zhou, Ding, Palomares, & Herrera, 2019), and as a concept is a crucial component in influencing customer behaviour (Dang, Nguyen, & Pervan, 2020). Past research has suggested that the development of trust in the online environment is a precarious event, difficult to obtain but easily lost (Santa, MacDonald, & Ferrer, 2019; Stouthuysen, 2020). Thus, prior e-commerce literature has highlighted that trust positively affects customer behaviour in many ways (Guo, Bao, Stuart, & Le-Nguyen, 2018; Lin, Wang, & Hajli, 2019; Oliveira, Alinho, Rita, & Dhillon, 2017). Trust involves different perspectives and concepts and is underpinned by areas such as psychology, sociology, organisational behaviour, economics, strategy, marketing, decision making and information system (Mayer, Davis, & Schoorman, 1995).

In response to the literature and the detailed work around trust research in e-commerce, trust can be namely broken down into three key areas; *personality-based trust*, *institutional-based trust* and *interpersonal-based trust* (Mayer & Davis, 1999; McKnight, Choudhury, & Kacmar, 2002; Moorman, Deshpandé, & Zaltman, 1993). In the first instance personality-based trust conceptualises trust as a belief that is constructed psychologically in the early development of individuals (Rotter & Rotter, 1967). According to Mayer et al. (1995), individuals are different regarding their willingness to trust based on their characteristics. Therefore, it is challenging to

predict certain behaviours relying on personality in the online business environment (Yousafzai, Pallister, & Foxall, 2009). In the second instance **institutional-based trust** deals with the uncertainty associated with the exchange process (Yousafzai et al., 2009). As a concept this has been investigated in the online business environment, mainly e-finance services using structural assurance (Wang, Guan, Hou, Li, & Zhou, 2019; Wingreen, Mazey, Baglione, & Storholm, 2019; Yu, Li, Li, Zhao, & Zhao, 2018). Structural assurance refers to the extent to which customers believe that institutional structures “like guarantees, regulations, promises, legal recourse, or other procedures are in place to promote success” (McKnight et al., 2002, p. 393). In the third instance **interpersonal-based trust**, is the common type of trust; it considers trust as a social relationship between a specific trustor and the trustee (Mayer et al., 1995). This is made up of three core constructs; ability, integrity and benevolence (Chari, Christodoulides, Presi, Wenhold, & Casaletto, 2016; Choi & Cho, 2019). While ability and integrity are more about the characteristics of the MB, Benevolence reflects the specific relationship between the bank and customers (Choudrie et al., 2018; Zhou, 2012).

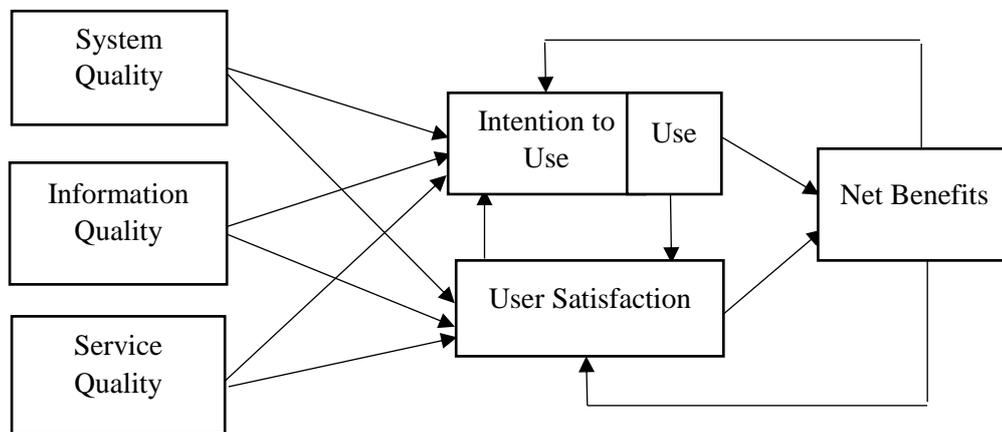
Thus, based on our research we establish that the majority of trust studies in MB have focused on initial trust. Establishing initial trust in the adoption stage is rational, however as the popularity of MB increases it is becoming increasingly necessary to shed light on trust impacts on customer behaviour in the post-adoption stage to evaluate the effectiveness of such systems.

### **3.2 DeLone and Mclean Information System Success Model**

A unique attribute of this paper is the application of the DeLone and McLean (2003) information systems success model within an online MB context. The key reason for such an approach is due to its flexible nature in mediating the role of trust in shaping customer satisfaction. The DeLone and McLean (2003) model seeks to provide an understanding of the quality dimensions on satisfaction and in turn the success of information systems. It was initially developed based on the mathematical theory of communication (Shannon & Weaver, 1949), which argue that information systems success can be assessed at three different levels namely the technical, the semantic, and the effectiveness level. In supplementing their model, DeLone and McLean (1992) also adopted the view of Mason (1978), who views the effectiveness of information systems as a series of events from antecedents to outcomes. Reviewing the information systems literature contributed to DeLone and McLean (1992) establishing nine inter-relationships between six interdependent variables (*information quality, system quality, use, user satisfaction, individual impact and organisational impact*). The

taxonomy of variables in D&M model offers a framework to evaluate the success of information systems.

In response to the criticisms that were raised by Pitt, Watson, and Kavan (1995) regarding the evaluating of services quality and by Seddon (1997) about the lack of theoretical clarity, DeLone and McLean (2003) updated their model to integrate services quality (Fig. 1). In the updated model, DeLone and McLean (2003) argue that while information and system quality the most important constructs to measure the success of an individual system, service quality is the most important factor to measure the overall success of information systems. In addition, the updated model combines individual and organisational impacts into the net benefits construct.



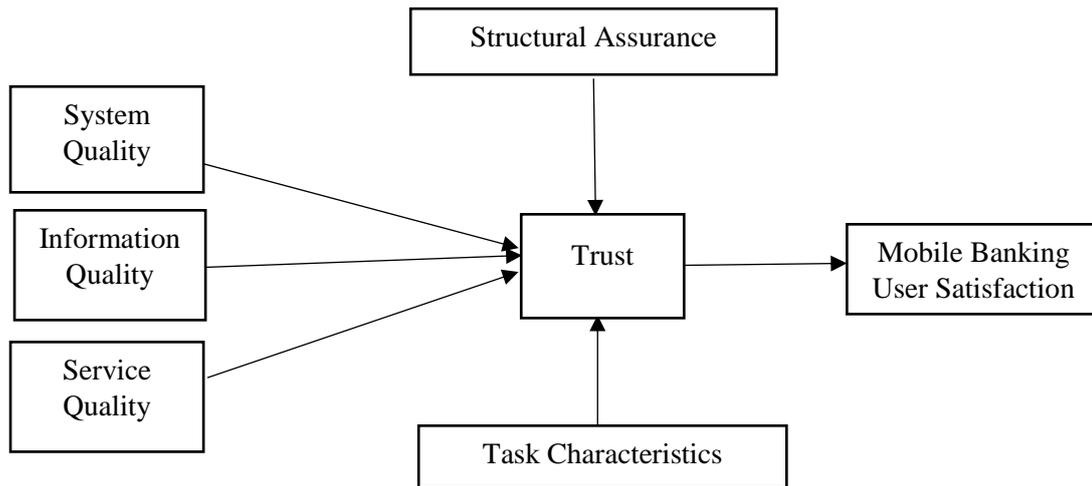
**Fig. 1.** Revised Information systems Success Model adapted from (DeLone & McLean, 2003).

#### **4. Conceptual framework and hypotheses:**

##### **4.1 The Conceptual Model**

In developing our conceptual model, as shown in Fig.2, we draw on and adapt the information system success model (DeLone & McLean, 2003). As part of this we combine five relevant factors to explore the mediating role of trust in enhancing customer satisfaction (system quality, information quality, services quality and task characteristics and structural assurance). The reasoning for the consideration of these five factors are twofold. Firstly, in the conceptualisation of trust, we consider two types of trust which we argue are a key component in understanding customer satisfaction in MB; trust type 1 is *interpersonal-based trust* and trust type 2 is *institutional-based trust*. To investigate interpersonal-based trust we utilise system quality, information quality, services quality and task characteristics. Furthermore, we investigate institutional-based trust through the use of structural assurance. Secondly, eminent

researchers such as Petter et al. (2013) argues that there is a need to include other independent variables with the three quality factors in the (DeLone & McLean, 2003) model to enhance the understanding of information systems success. Hence, in response to this research we find it prudent to add task characteristics to primarily highlight the impact of information systems on user satisfaction in addition to the use and success of information systems. Besides, we added structural assurance to cover customers' concerns regarding security in MB.



**Fig. 2.** Proposed research model.

Furthermore, these five factors have been investigated by other scholars as having significant impacts on customer behaviour in the MB context. We highlight these scholars and the factors below in table 1:

**Table 1**  
Factors that influence customer behaviour in MB

Factors	Sources
System quality	(Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Choudrie et al., 2018; Lee & Chung, 2009; Motiwalla et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016a, 2016b, 2017; Zhou, 2011, 2012)
Information quality	(Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Lee & Chung, 2009; Motiwalla et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016b, 2017; Trabelsi-Zoghalmi, Berraies, & Ben Yahia, 2018; Zhou, 2011, 2012)
Service quality	(Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Choudrie et al., 2018; Sharma & Sharma, 2019; Tam & Oliveira, 2016b, 2017; Thakur, 2014; Zhou, 2012)

Task characteristics	(Baabdullah, Alalwan, Rana, Patil, & Dwivedi, 2019; Choudrie et al., 2018; Malaquias & Hwang, 2016; Oliveira et al., 2014; Tam & Oliveira, 2016b)
Structural assurance	(Baptista & Oliveira, 2016; Gu, Lee, & Suh, 2009; Kim G, Shin, & Lee, 2009; Oliveira et al., 2014; Priya, Gandhi, & Shaikh, 2018; Susanto, Chang, & Ha, 2016; Zhou, 2011, 2012)

## 4.2 Hypotheses

### 4.2.1 Trust and Customer Satisfaction

Trust has long been considered as a Catalyst in shaping satisfying business relationships in the online environment, in particular, the e-commerce contexts (Cao, Yu, Liu, Gong, & Adeel, 2018; Chen, Hsiao, & Hsieh, 2019). Trust is about the expectation of a party regarding specific actions of another party and the risk associated with these actions (McKnight & Chervany, 2001). Similarly, in the MB context, customers expect that the bank will provide them with convenient and proper services. Hence, if MB meets users' expectations, customers will tend to build their trust in the MB services (Malaquias & Hwang, 2016). Developing trust in MB should lead to achieving a high level of customer satisfaction which is required to guarantee the success of such services (Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Tam & Oliveira, 2016b). Hence, within an e-business setting, MB services can raise concerns of customers not only about the security issues associated with online transactions but also about the required ability, integrity and benevolence of such system. Thus, our paper considers all dimensions of overall trust that explain the mediating role of trust in shaping customer satisfaction. We argue that in the current MB literature, very few studies have investigated the impact of trust on customer satisfaction (Berraies, Ben Yahia, & Hannachi, 2017; Lee & Chung, 2009; Sharma & Sharma, 2019). In addition, these studies have not fully developed a comprehensive conceptualisation of trust in MB and failed to fully develop discussion around the mediating impact of trust on customer satisfaction. Thus, through this research and based on our comprehensive literature we formulate the following hypothesis:

**H1:** Trust has a positive impact on the level of customer satisfaction within MB.

### 4.2.2 System Quality

DeLone and McLean (1992) explain the notion of system quality as to how individuals perceive the quality of the overall performance of a specific system. System quality is most important in the e-commerce context due to the anonymity of services providers (Choudrie et

al., 2018). In this study and according to the discussion in section 3.1 regarding the conceptualisation of trust in the MB context, system quality measures the ability of MB. It is reasoning that, if customers perceive MB to be of high quality, for example, easy to use, easy to navigate and attractive, they will be likely to have high levels of trust in the bank's ability and will be willing to transact using such system (Choudrie et al., 2018). This view is supported by several prior studies who through their research argue that systems quality has a significant effect on customer satisfaction (Baabdullah, Alalwan, Rana, Kizgin, et al., 2019; Motiwalla et al., 2019; Tam & Oliveira, 2017). Sharma and Sharma (2019) however found no relationship between the two variables. We add to the previous literature by investigating the mediating role of trust in the relationship between system quality and customer satisfaction, which has not been considered in the MB research. Therefore, we attempt to examine the following hypothesis:

**H2:** Trust mediates the relationship between system quality and customer satisfaction within MB

#### **4.2.3 Information Quality**

Information quality has been confirmed as one of the main factors that influences trust, satisfaction and use in an information systems and e-business context (Motiwalla et al., 2019; Oliveira et al., 2017). Thus, in defining information quality, Ghasemaghaei and Hassanein (2016) argue that good quality information includes accuracy, relevance, timeliness, completeness, and accessibility.

Within a non-physical environment information quality plays an essential role in shaping the online experience of consumers, in many scenarios MB customers need to rely on their perceptions regarding the quality of the information generated from the MB system (Gao & Waechter, 2017). Poor quality information can cause significant issues from a consumer perspective, poor, out-of-date, inaccurate and irrelevant information can raise concerns about the ability and integrity of MB resulting in a low level of customer trust (Zhou, 2011). This can result in a low level of customer trust in MB services. By extension, the lack of trust can lead to the failure in achieving a high level of customer satisfaction (Lee & Chung, 2009; Sharma & Sharma, 2019). Therefore, we argue that information quality affects customer trust and satisfaction. In the MB research, information quality has been investigated as an independent variable that influences customer trust, satisfaction and use (Lee & Chung, 2009; Sharma & Sharma, 2019; Tam & Oliveira, 2017; Trabelsi-Zoghلامي et al., 2018; Zhou, 2011, 2012).

However, from our research we found no clear studies that have considered the influence of information quality on customer satisfaction indirectly through trust. Thus, the following hypothesis is formulated:

**H3.** Trust mediates the relationship between information quality of MB and customer satisfaction.

#### **4.2.4 Service Quality**

As discussed in section 3.2, service quality was integrated into the updated information system success model (DeLone & McLean, 2003) to measure the services provided by a specific system. Service quality evaluates the reliability, promptness, personalisation of the services, and whether the services are professional (Gefen, 2002). In the view of Choudrie et al. (2018), this component plays a significant role in customer quality within the context of MB. Thus, the development of service quality becomes a competitive driver in the investment of funds and strategies to enhance the quality of such services. Zhou (2013) argues that poor service quality through MB can cause poor customer trust and satisfaction. Research in the area has investigated the use of service quality as a measure of the overall quality of MB and its impact on initial trust and customer satisfaction (Gao & Waechter, 2017; Sharma & Sharma, 2019; Zhou, 2012). While this may be the case, we still argue that there is a gap in the MB research pertaining to the indirect effect of service quality on customer satisfaction through trust as a key predictor of satisfaction. Therefore, we formulate the following hypothesis:

**H4:** Trust mediates the relationship between service quality of MB and customer satisfaction.

#### **4.2.5 Task Characteristics**

Design, function and usability can impact customer usage habits, behaviour and perceptions of products, services and technology (Choudrie et al., 2018). Technological adoption has the potential for positive impact on user performance if it is perceived as a useful tool which can provide convenience and ease of use as part of daily life (Tam & Oliveira, 2019). Thus, new technology can lead to tasks being optimised in a manner which allows for efficiency, effectiveness and good user experience (Oliveira et al., 2014). According to Baabdullah, Alalwan, Rana, Kizgin, et al. (2019), task characteristics are the incentive that drives users to adopt a specific technological innovation. Hence, in the context of MB the potential for adoption in this area to drive innovation is huge, conducting normal everyday tasks such as money transfer, account inquires and account management are precursors for the build-up of trust (Malaquias & Hwang, 2016). Research in this area suggests that MB services are viewed

as “benevolent” activities which make the life of the consumer easier and more convenient (Baabdullah, Alalwan, Rana, Patil, et al., 2019; Tam & Oliveira, 2016b). Thus, in this paper we argue that the task characteristic variable can be used to measure the benevolence of MB in accordance to our framework. Recent research has utilised task characteristics as a mechanism to predict customer behaviour in MB (Baabdullah, Alalwan, Rana, Patil, et al., 2019; Malaquias & Hwang, 2016; Malaquias, Malaquias, & Hwang, 2018). Where we find a gap is the investigation of the direct and indirect relationships between task characteristics and customer satisfaction. In this paper, we expect that trust can play an important mediating role between task characteristics and customer satisfaction.

**H5:** Trust mediates the relationship between task characteristics of MB and customer satisfaction.

#### **4.2.6 Structural Assurance**

For H6 we investigate structural assurance, widely used in studies as the main dimension for institutional-based trust. Research by Baptista and Oliveira (2016) has outlined structural assurance as a critical contributor towards the building of trust within the MB setting. In this context structural assurance is defined as technological and legal structures which are essential to ensure security (McKnight et al., 2002). This is a critical component within MB, the infrastructure is built on wireless networks and cellular data points and in the past, these have had the perception that they are vulnerable to hacker attacks or information interception. Thus, strong structural assurances such as SSL certification and government regulations are essential in ensuring security, acting as the foundation on which customers can build their trust in MB (Oliveira et al., 2014). Strong trust in the infrastructure can result in achieving a high level of customer satisfaction. This view has been confirmed by prior research which discusses the importance of structural assurance on user trust in MB (Baptista & Oliveira, 2016; Oliveira et al., 2014; Zhou, 2012). Thus, in developing our study we argue that there have been very few studies which investigate the direct effect of structural assurance on customer satisfaction and indirect effect through the mediating impact of trust. Hence, this study argues that in the MB context structural assurance plays an integral role in enhancing customer satisfaction. Thus, we propose the following hypothesis:

**H6:** Trust mediates the relationship between structural assurance of MB and customer satisfaction.

## 5. Research Design

### 5.1 Research Instrument

This study applies the cross-sectional research design using a survey questionnaire to collect the data. The questions take the form of closed-ended questions using a seven-point Likert scale to be easy to administer and Analyse (Iacobucci & Churchill, 2010). Respondents choose from seven answers ranging from strongly disagree to strongly agree. The Bristol online survey (BOS) was employed as an appropriate method for gathering large-scale data from different Libyan regions and banks (Epstein, Klinkenberg, Wiley, & McKinley, 2001). As this study was carried out in Libya, the questionnaire was translated into the Arabic language using the back translation technique (Bulmer & Warwick, 1993).

### 5.2 Pilot Study

After the development of the questionnaire the research team conducted a pilot study to ensure there was no ambiguity in the questions, and to evaluate the time required for completion. The pilot study was also used as a mechanism to test the internal consistency of the research model using Cronbach alpha (Iacobucci & Churchill, 2010). The pilot study was conducted over a period of one week in September 2018 where paper-based hardcopy versions of the questionnaire were distributed to participants. The random sample for the pilot study consisted of Libyan students who were studying in the UK and have used MB in Libya. A total of 22 students agreed to participate in the pilot, which is an adequate number to conduct a valuable pilot study (Isaac, Michael, Educational, & Industrial Testing, 1995). 21 responses (15 male and 6 female) were returned. The IBM SPSS version 26 software was then used to assess the internal consistency of the measurement model using Cronbach's Alpha. As shown in table 2, all Cronbach's alpha values for all constructs are higher than 0.70. This means that all indicators are reliable to measure their constructs (Nunally & Bernstein, 1978).

**Table 2**  
Results of Cronbach's alpha of pilot study

Variables	Number of items	Cronbach's alpha values
System quality	4	0.77
Information quality	4	0.82
Services quality	4	0.88
Task characteristics	3	0.88
Structural assurance	3	0.72
Trust	5	0.90

Satisfaction	5	0.90
Total	28	

### 5.3 Measures

The variables in the study's conceptual model was operationalised using measures which are validated in prior MB literature and published in peer-reviewed journals. Table 3 depicts the measures of each variable in the questionnaire and the related literature.

### 5.4 Sample and Data Collection

This paper aims to investigate the mediating role of trust in enhancing customer satisfaction with MB in Libya. Therefore, the population of this study represents all Libyan MB users. Given the fact that it is not possible to obtain a complete list of MB customers in Libya, a non-probability convenience sampling technique was employed to draw the study sample. Using this technique can help in obtaining an adequate sample size (Dillon, Madden, & Firtle, 1993). We did consider other sampling approaches such as Judgment sampling which was inappropriate due to the authors specifying the sampling units in the target population (Deming, 1990) and snowball sampling was not used as the sample was large (Soloff, Lawrence, & Johnstone, 2005).

The online surveys can be distributed using several methods such as email, SMS and social media (SmartSurvey, 2016). However, sending an online survey by email or SMS requires a list of all the email addresses or mobile phone numbers of the potential respondents which are not possible to the nature of the study population and the data restriction by banks due to privacy and data protection laws. Therefore, social media platforms can be an appropriate channel to collect the data. Facebook is the most popular social media platform in Libya with 67.4% of the population having access to the platform (Statcounter, 2019). Thus, we decided to use this platform to distribute the survey. To facilitate this, we joined the 18 most popular banking communities to gain access to as many participants as possible, these communities were especially valuable as they included participants from all regions and banks. This innovative approach to questionnaire distribution created 4801 impressions on our survey page. From these 4801 impressions we obtained 683 responses from users who completed the whole survey. Thus, in order to identify the response rate, we calculated the total of all respondents who accessed the survey then divided by the number of respondents who finished and submitted the survey. So,  $683/4801*100= 14.22\%$ . This is an accepted response rate because

generally in online surveys the response is lower than in paper-based surveys (Nulty & education, 2008).

The responses were then coded into Statistical Package for the Social Sciences (SPSS) version 26.0 in order to perform the descriptive analysis on the demographic and practical characteristics of the study sample. Appendix A shows the descriptive characteristics of the study sample. It is important to clarify that due to the nature of the Libyan economy 77% of Libyan nationals work within the oil sector and thus are classified as government employees (The World Bank, 2016).

## **6. Data Analysis and Findings**

For the purpose of data analysis, this study uses the structural equation modelling (SEM) technique which is a multivariate statistical technique integrates the empirical data and the underlying model together to assess the direct and indirect relationships between constructs (Fornell & Bookstein, 1982; Gefen, Straub, & Boudreau, 2000). This study used SEM with partial least squares (PLS), which is more appropriate for the prediction and exploratory of the structural relationships (Hair, Hult, Ringle, & Sarstedt, 2017). PLS-SEM also provides a practical method to conduct mediation analysis and identify its level (full or partial mediation) (Sarstedt, Ringle, Smith, Reams, & Hair, 2014). We used The SmartPLS software 3 to perform a two-stage data analysis approach (Hair et al., 2017). First, the analysing of the measurement model to examine relationships between the latent variables and their measures to estimate the validity and reliability of the model. Second, the analysing of the structural model to test the relationships between the latent variables and the mediating effect of trust.

### **6.1 Assessment of the Reflective Measurement Model**

To validate the measurement model, we first examined the indicator (item) loadings to evaluate the indicator reliability. Second, the internal consistency reliability by testing the composite reliability (CR) and Cronbach's alpha. Third, assessing the convergent reliability of each construct to explain the variance of its items. The convergent validity was addressed using the average variance extracted (AVE) values for all indicators on each construct (Hair, Risher, Sarstedt, & Ringle, 2019).

As shown in table 3, the loadings of all items is above the acceptable level (0.70) (Sarstedt et al., 2014). This implies that the constructs explain more than 50 % of the indicators' variance (Hair et al., 2019). Also, all the composite reliability (CR) values are above 0.7, which is an indicator of adequate internal consistency reliability (Hair et al., 2017). The Cronbach's alpha

values of all constructs are ranged from 0.787 to 0.914 which are higher than the acceptable threshold of the test (Nunally & Bernstein, 1978). In addition, the AVE values ranged from 0.605 to 0.809, exceeding 0.5, which is the threshold recommended by (Fornell & Larcker, 1981). This means that each construct in the model interprets more than 50% of its items' variance (Hair et al., 2019).

**Table 3**

The measures of the questionnaire and the results of the measurement model.

Constructs	Items	Measures	Sources	Loadings
System Quality CR= 0.859 Alpha= 0.787 AVE= 0.605	SYS1	Mobile banking provides convenient access.	(Lee & Chung, 2009); (Zhou, 2011)	0.703
	SYS2	Mobile banking is easy to use.		0.768
	SYS3	Mobile banking is easy to navigate.		0.819
	SYS4	Mobile banking is visually attractive.		0.815
Information quality CR= 0.900 Alpha= 0.852 AVE= 0.692	INF1	Mobile banking provides me with accurate information.	(Lee & Chung, 2009)and (Zhou, 2013)	0.827
	INF2	Mobile banking provides me with sufficient information.		0.834
	INF3	Mobile banking provides me with information relevant to my needs.		0.820
	INF4	Mobile banking provides me with up-to-date information.		0.848
Service Quality CR= 0.877 Alpha= 0.813 AVE= 0.641	SEV1	Mobile banking provides dependable services.	(Zhou, 2013)	0.792
	SEV2	Mobile banking provides prompt services.		0.821
	SEV3	Mobile banking provides professional services.		0.850
	SEV4	Mobile banking provides personalized services.		0.735
Task Characteristics CR= 0.884 Alpha= 0.802 AVE= 0.717	TSK1	I need to transfer money anytime anywhere.	(Malaquias & Hwang, 2016)	0.856
	TSK2	I need to manage my account anytime anywhere.		0.891
	TSK3	I need to acquire account information in real time.		0.790
Structural Assurance CR= 0.927 Alpha= 0.882 AVE= 0.809	SA1	I feel confident that encryption and other technological advances on the mobile Internet make it safe for me to use mobile banking.	(Zhou, 2012)	0.887
	SA2	I feel assured that legal and technological structures adequately protect me from payment problems on the mobile Internet.		0.905
	SA3	Mobile Internet is a robust and safe environment in which to use mobile banking.		0.906
Trust CR= 0.905 Alpha= 0.868 AVE= 0.656	TRU1	Mobile banking keeps its promises.	(Lee & Chung, 2009)	0.825
	TRU2	Mobile banking services meet my needs.		0.747
	TRU3	Mobile banking is trustworthy.		0.859
	TRU4	I think mobile banking is concerned with the present and future interests of users		0.768
	TRU5	Overall, I trust mobile banking.		0.845

Customer satisfaction CR= 0.936 Alpha= 0.914 AVE= 0.746	SAT1	I strongly recommend mobile banking to others.	(Lee & Chung, 2009)	0.811
	SAT2	I think that I made the correct decision to use mobile banking.		0.841
	SAT3	I am satisfied with the way that mobile banking has carried out transactions.		0.878
	SAT4	I am satisfied with the service I have received from mobile banking.		0.891
	SAT5	Overall, I was satisfied with mobile banking.		0.894

SYS system quality; INF information quality; SER service quality; TSK task characteristics; SA structural assurance; TRU trust; SAT customer satisfaction; CR composite reliability; AVE average variance extracted.

Regarding discriminant validity, two assessments are traditionally recommended for the purposes of estimation: while the Cross-loadings criterion deals with the indicator level, Fornell and Larcker criterion deals with the construct level (Hair et al., 2017). For the cross-loading criterion, table 4 depicts that the loadings of the measures on each assigned construct are higher than their loadings on all other constructs. This indicates that the items of a particular construct measure their construct, not other constructs (Chin, 1998). The second criterion is examining the Fornell and Larcker criterion. Table 5 exhibits that the square root of average variance extracted (AVE) of each construct have a greater value than the correlations with all the other constructs. This denotes that each construct explains better the variance of its own items than the variance of the other constructs (Hair, Sarstedt, Hopkins, & G. Kuppelwieser, 2014).

**Table 4**  
Results of the discriminant validity (Cross Loading criterion)

Items	Information Quality	Structural Assurance	Satisfaction	Services Quality	System Quality	Trust	Task Characteristics
INF1	<b>0.827</b>	0.333	0.507	0.524	0.416	0.503	0.257
INF2	<b>0.834</b>	0.414	0.493	0.572	0.459	0.481	0.266
INF3	<b>0.820</b>	0.359	0.534	0.579	0.479	0.513	0.252
INF4	<b>0.848</b>	0.406	0.525	0.651	0.529	0.548	0.322
SA1	0.389	<b>0.887</b>	0.491	0.510	0.385	0.611	0.364
SA2	0.447	<b>0.905</b>	0.538	0.545	0.415	0.649	0.358
SA3	0.388	<b>0.906</b>	0.503	0.514	0.380	0.639	0.375
SAT1	0.469	0.524	<b>0.811</b>	0.490	0.456	0.599	0.446
SAT2	0.500	0.485	<b>0.841</b>	0.460	0.507	0.614	0.477
SAT3	0.567	0.473	<b>0.878</b>	0.580	0.562	0.649	0.393
SAT4	0.564	0.461	<b>0.891</b>	0.550	0.546	0.667	0.402
SAT5	0.567	0.515	<b>0.894</b>	0.545	0.540	0.696	0.385
SEV1	0.636	0.445	0.500	<b>0.792</b>	0.444	0.555	0.256
SEV2	0.539	0.416	0.527	<b>0.821</b>	0.539	0.547	0.417
SEV3	0.587	0.565	0.501	<b>0.850</b>	0.450	0.596	0.273
SEV4	0.471	0.429	0.417	<b>0.735</b>	0.432	0.452	0.369
SYS1	0.368	0.193	0.388	0.359	<b>0.703</b>	0.294	0.213
SYS2	0.341	0.304	0.450	0.327	<b>0.768</b>	0.399	0.271
SYS3	0.480	0.385	0.520	0.508	<b>0.819</b>	0.473	0.365
SYS4	0.535	0.419	0.505	0.561	<b>0.815</b>	0.546	0.385
TRU1	0.550	0.555	0.588	0.589	0.452	<b>0.825</b>	0.371
TRU2	0.535	0.508	0.604	0.553	0.498	<b>0.747</b>	0.417
TRU3	0.501	0.654	0.595	0.564	0.409	<b>0.859</b>	0.350
TRU4	0.416	0.496	0.555	0.520	0.449	<b>0.768</b>	0.394
TRU5	0.487	0.626	0.679	0.510	0.497	<b>0.845</b>	0.451
TSK1	0.238	0.399	0.409	0.370	0.326	0.439	<b>0.856</b>
TSK2	0.309	0.357	0.445	0.371	0.400	0.439	<b>0.891</b>
TSK3	0.300	0.266	0.374	0.281	0.316	0.363	<b>0.790</b>

**Table 5**

Results of discriminant validity (Fornell and Larcker criterion)

Construct	Information Quality	Structural Assurance	Satisfaction	Service Quality	System Quality	Trust	Task Characteristics
Information Quality	<b>0.832</b>						
Structural Assurance	0.454	<b>0.899</b>					
Satisfaction	0.619	0.568	<b>0.864</b>				
Service Quality	0.701	0.582	0.609	<b>0.801</b>			
System Quality	0.567	0.437	0.606	0.582	<b>0.778</b>		
Trust	0.616	0.704	0.748	0.675	0.570	<b>0.810</b>	
Task Characteristics	0.331	0.407	0.485	0.405	0.412	0.491	<b>0.847</b>

Despite the dominant use of the cross-loadings and Fornell-Larcker criteria to estimate the discriminant validity, recent investigation has found that both criteria are not reliable detectors of discriminant validity issues (Henseler, Ringle, & Sarstedt, 2015). To deal with this insufficient detection of discriminant validity problems, Henseler et al. (2015) suggested a new approach for assessing discriminant validity namely heterotrait–monotrait ratio (HTMT) of the correlations. “(HTMT) is the mean of all correlations of indicators cross constructs measuring different constructs [.....] relative to the (geometric) mean of the average correlations of indicators measuring the same construct” (Hair et al., 2017, p. 218). The acceptable threshold of the HTMT test is controversial. However, in general, the correlation values close to one indicates a lack of discriminant validity. The present research adopts the threshold proposed by (Henseler et al., 2015), which is 0.90. Table 6 shows that the calculation of the HTMT ratio for each pair of constructs yielded values between 0.402 regarding (information quality, task characteristics) and 0.838 regarding (satisfaction, trust). Thus, all HTMT ratios are lower than 0.90 which signifies that there are no discriminant validity problems according to this criterion.

**Table 6**  
Results of discriminant validity (HTMT criterion).

Construct	Information Quality	Satisfaction	Service Quality	Structural Assurance	System Quality	Task Characteristics	Trust
Information Quality							
Satisfaction	0.670						
Service Quality	0.834	0.704					
Structural Assurance	0.523	0.634	0.684				
System Quality	0.672	0.702	0.704	0.500			
Task Characteristics	0.402	0.568	0.505	0.479	0.497		
Trust	0.714	0.838	0.801	0.803	0.662	0.585	

## 6.2 Assessment of the structural model

We assessed the structural model using the systematic approach suggested by Hair et al. (2017) which comprises collinearity issues test, path coefficient, effect size ( $F^2$ ), coefficient of determination ( $R^2$ ), Prediction relevance ( $Q^2$ ) and the model's out-of-sample predictive power by using the PLS predict procedure (Hair et al., 2019). The first step is to ensure that there are no significant levels of collinearity among the predictor constructs which can create redundant in the analysis (Hair et al., 2019). When conducting the PLS algorithm procedure in SmartPLS (table 7), all the VIF values are between 1 and 2.5431 and below the threshold of the collinearity test which is 5 (Hair et al., 2017). This demonstrates that there is no significant indication of multicollinearity issues and proved that the path coefficients are not biased.

Regarding the path coefficient, for the purpose of this paper, we examined the significance of the hypothesised relationship between trust and customer satisfaction using the Bootstrapping procedure in SmartPLS with 5000 subsamples (Hair et al., 2014). As depicted in table 10, H1 in the conceptual model is significantly supported. Also, table 7 shows the results of  $F^2$  and  $R^2$ . The last step in the assessment of the structural model is examining the predictive relevance of the structural model to measure the endogenous latent variables. We applied the blindfolding procedure in SmartPLS to calculate  $Q^2$  values. As shown in table 7,  $Q^2$  values are above zero, which implies that the structural model has a high predictive ability (Hair et al., 2019).

**Table 7**  
Results of structural model assessment.

Constructs	VIF	F <sup>2</sup>	R <sup>2</sup>	Q <sup>2</sup> = (1-SSE/SSO)
System Quality	1.736	0.026		
Information Quality	2.128	0.051		
Service Quality	2.543	0.037		
Task Characteristics	1.321	0.044		
Structural Assurance	1.615	0.296		
Trust	1.000	1.274	0.67	0.40
Satisfaction			0.64	0.44

Our model demonstrated a high explanatory power and predictive ability of the in-sample model. However, it is essential to assess the out of sample predictive power “to mimic how the PLS model will eventually be used to predict a new observation” (Shmueli et al., 2019, p. 2334). Shmueli, Ray, Estrada, and Chatla (2016) developed a new and straightforward approach to assess the out-of-sample predictive power, namely PLS predict. To employ this technique, we used the guideline recommended by (Hair et al., 2019; Shmueli et al., 2019). We use PLSpredict with 10 folds in SmartPLS to produce prediction statistics (RSME and MAE) for all indicators of the endogenous variables for both the PLS path model and the linear model (LM).

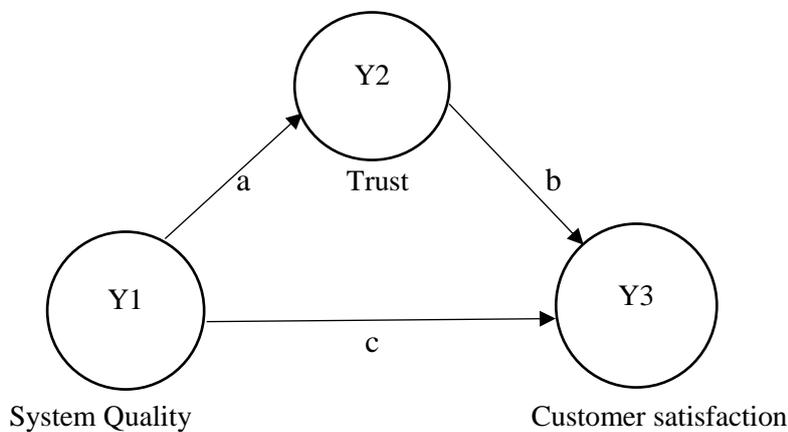
The first step to perform the PLS Predict technique is verifying if all predictions of the endogenous variables outperform indicator means of the training sample by testing the Q<sup>2</sup> predict statistic (Shmueli et al., 2019). Table 8 shows that all Q<sup>2</sup> predict are above zero, which indicate that all the indicators of endogenous constructs outperform the naïve benchmark. The second step is to analyse the prediction errors by comparing the prediction statistics values (RMSE and MAE) from the PLS path model with the linear regression model (LM). The rule of thumb is the predictive power of a model depends on the outcomes of comparison (Shmueli et al., 2019). PLS-SEM < LM for none of the indicators: lacks predictive power; PLS-SEM < LM for a minority of the indicators: low predictive power; PLS-SEM < LM for a majority of the indicators: medium predictive power; PLS-SEM < LM for all indicators: high predictive power. Table 8 shows that the majority of indicators in the PLS-SEM path model yielded lower prediction errors comparing to the naïve LM benchmark. However, Shmueli et al. (2019) state that the focus should be on the key endogenous construct of the model rather interpreting all indicators of the endogenous constructs. Thus, our model has a high predictive power.

**Table 8**  
Results of PLS Predict test

Item	PLS Predict			LM Predict		LM-PLS	
	RMSE	MAE	Q <sup>2</sup> Predict	RMSE	MAE	RMSE	MAE
SAT1	0.815	0.588	0.369	0.825	0.606	0.010	0.018
SAT2	0.823	0.579	0.368	0.845	0.602	0.022	0.023
SAT3	0.963	0.685	0.408	0.970	0.701	0.007	0.016
SAT4	0.938	0.682	0.391	0.958	0.702	0.020	0.020
SAT5	0.881	0.617	0.414	0.884	0.624	0.003	0.007
TRU1	0.985	0.730	0.434	0.987	0.734	0.002	0.004
TRU2	0.860	0.630	0.412	0.871	0.642	0.011	0.012
TRU3	0.866	0.649	0.462	0.882	0.648	0.016	-0.001
TRU4	0.962	0.690	0.347	0.961	0.706	-0.001	0.016
TRU5	0.865	0.619	0.467	0.862	0.616	-0.003	-0.003

### 6.3 Mediation Effects Analysis

The mediator variable refers to a third variable which explains the relationships between the independent and the dependent variables (Baron & Kenny, 1986). In this paper, for example, trust is conceptualised as a potential mediator of the effect of system quality on customer satisfaction (Fig. 3). It represents a proposed mechanism by which system quality influences trust, then trust causally influence customer satisfaction (Preacher & Hayes, 2008).

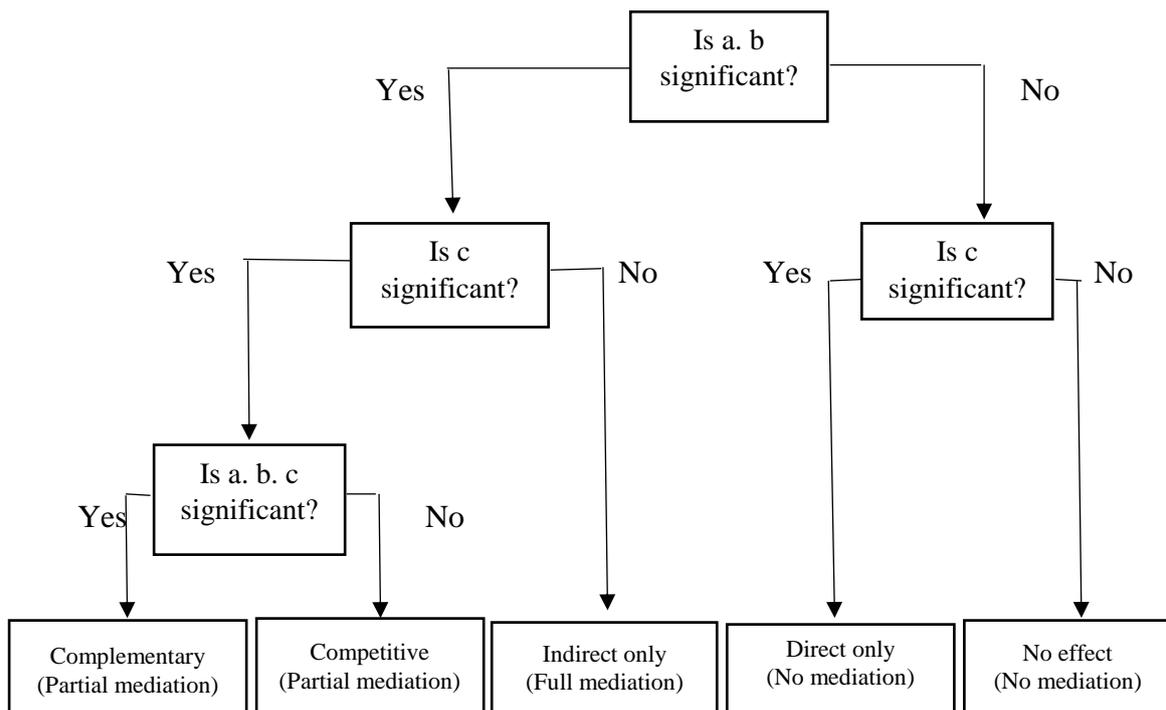


**Fig. 3.** Mediation effect model (Zhao, Lynch, & Chen, 2010).

Multiple methods have been proposed to analyse the mediation effect (Baron & Kenny, 1986; Preacher & Hayes, 2008; Sobel, 1982; Zhao et al., 2010). The most widely used technique to assess mediation is the causal steps approach proposed by Baron and Kenny (1986). However, it was criticised for its limitations. The most important criticism is that the significant direct relationship between the independent and dependent variables is unnecessary

to establish a mediation effect. The only requirement for mediation is that the indirect effect, which must be significant (Zhao et al., 2010).

In this paper, we adopt the approach recently developed by (Zhao et al., 2010). Zhao et al. (2010) distinguish between three types of mediation and two non-mediation (see Fig. 4). The mediation effect cannot exist if there is no significant indirect effect between the independent variable and the dependent variable ( $a \cdot b$ ) or there is only a direct effect between them ( $c$ ). On the other hand, there are three types of mediation. The full mediation occurs when the independent variable significantly affect the dependent variable, but only indirectly through the mediator ( $a \cdot b$ ). In addition, if the indirect and direct effect ( $a \cdot b \cdot c$ ) are significant, the mediation effect can be partial complementary or partial competitive depending on the direction of the effect. The complementary mediation depicts that the direct and indirect effect point in the same direction (positive). In contrast, competitive mediation refers to opposite signs of the direct effect ( $c$ ) and one of the indirect effects ( $a$  or  $b$ ) (negative).



**Fig. 4.** Mediation analysis approach derived from (Zhao et al., 2010) & (Hair et al., 2017).

### The Results of the Mediation Analysis

To test the mediating effect using the PLS-SEM, scholars have relied on the bootstrapping procedure, which is a resampling technique using to draw a large number of samples from the original sample. It adopts a free assumption regarding sampling distribution (Hair et al., 2017).

As mention, the first step in the mediation analysis is to test the indirect effects of the independent variables on customer satisfaction through trust. Table 9 illustrates that all the indirect effects in the conceptual model are significant, which indicates that trust acts as a mediator. (System quality  $t=2.254$ ,  $p<0.05$ ), (information quality  $t= 3.384$ ,  $p<0.01$ ), (services quality  $t=2.880$ ,  $p<0.01$ ), (task characteristics  $t=3.905$ ,  $p<0.001$ ) and (structural assurance  $t=5.790$ ,  $p<0.001$ ).

**Table 9**  
Results of the indirect effects (mediation analysis).

Relationships	Std.Error	T-Value	P-value
System Quality $\longrightarrow$ trust $\longrightarrow$ satisfaction	0.023	2.254	0.025
Information Quality $\longrightarrow$ trust $\longrightarrow$ satisfaction	0.025	3.384	0.001
Service Quality $\longrightarrow$ trust $\longrightarrow$ satisfaction	0.027	2.880	0.004
Task Characteristics $\longrightarrow$ trust $\longrightarrow$ satisfaction	0.016	3.905	0.000
Structural Assurance $\longrightarrow$ trust $\longrightarrow$ satisfaction	0.031	5.790	0.000

\*Significant at 0.05 level, \*\* Significant at 0.01 level, \*\*\* Significant at 0.001 level

The second step is to test the direct effects between the independent variables and customer satisfaction to specify the mediation types. Table 10 revealed significant direct effects between three exogenous variables and customer satisfaction. (System quality  $t=3.539$ ,  $p<0.01$ ), (information quality  $t=3.967$ ,  $p<0.001$ ) and (task characteristics  $t=3.078$ ,  $p<0.01$ ). On the other hand, the direct effect is insignificant between the other two variables and customer satisfaction. (Services quality  $t= 0.085$ ,  $p>0.05$ ) and (structural assurance  $t=1.057$ ,  $p>0.05$ ) Thus, based on the criteria of Zhao et al. (2010), trust is fully mediating the relationships between (services quality, structural assurance) and customer satisfaction. In addition, trust is partially mediating the relationships between (System Quality, Information Quality and task characteristics), and customer satisfaction.

**Table 10**  
Hypotheses testing results.

Hypothesis	T-values	P-values	Decision
Direct effects			
H1: Trust has a positive impact on the level of customer satisfaction within MB. Trust $\longrightarrow$ Customer Satisfaction	5.743	0.0000	Accepted***
H2: Trust mediates the relationship between system quality and customer satisfaction within MB. System Quality $\longrightarrow$ Customer Satisfaction	3.539	0.0004	Partial Mediation** (Complementary)
H3. Trust mediates the relationship between information quality of MB and customer satisfaction. Information Quality $\longrightarrow$ Customer Satisfaction	3.967	0.0001	Partial Mediation** (Complementary)

H4: Trust mediates the relationship between service quality of MB and customer satisfaction. Service Quality —————▶ Customer Satisfaction	0.085	0.9321	Full Mediation***
H5: Trust mediates the relationship between task characteristics of MB and customer satisfaction. Task Characteristics —————▶ Customer Satisfaction	3.078	0.0022	Partial Mediation** (Complementary)
H6: Trust mediates the relationship between structural Assurance of MB and customer satisfaction. Structural Assurance —▶ Customer Satisfaction	1.057	0.2910	Full Mediation***
*Significant at 0.05 level, ** Significant at 0.01 level, *** Significant at 0.001 level			

## 7. Discussion

In this paper we aim to investigate the centrality of trust as a mediator between our identified five factors (system quality, information quality, service quality, structural assurance and task characteristics) and customer satisfaction. Our model explains a 67% of variation in trust and 64% of variation in customer satisfaction. In the view of Chin (1998) suggests that  $R^2$  values of 0.67, 0.33, and 0.19 are considered as substantial, moderate, and weak respectively Our model obtained a strong explanatory power compared to other existing models that have investigated trust or satisfaction in MB. Previous studies such as Baabdullah, Alalwan, Rana, Kizgin, et al. (2019) in thier model explain 29% of variation in customer satisfaction within MB, while Malaquias and Hwang (2016) explains 38% of variation in trust and Thakur (2014) explains 55% of variance for customer satisfaction towards MB. Through our research we have both conceptually and empirically proved that trust is a direct antecedent of customer satisfaction.

Through this paper we have identified two clear contributions to knowledge, in the first contribution we outline the role of trust and its impact on MB post-adoption customer behaviour. In our results we found that trust acts as a strong determinant of customer satisfaction and our findings add value to the area of literature where researchers seek to conceptualise and investigate the role of trust and satisfaction in MB services. From our exhaustive literature review we find that there are no studies that consider the mediating impact of trust on customer satisfaction (Lee & Chung, 2009; Sharma & Sharma, 2019; Susanto et al., 2016; Trabelsi-Zoghلامي et al., 2018). Thakur (2014) did combine within these two factors but did no investigate the relationship between trust and satisfaction.

For our second contribution we investigate the indirect effects of MB quality factors, task characteristics and structural assurance on customer satisfaction through trust. In our research within H1, H2 and H3 it quickly became apparent that all the quality dimensions of MB have indirect effects on customer satisfaction through trust. These results consistent with the work of other researchers in this area who link system quality, information quality and services quality to trust (Gao & Waechter, 2017; Lee & Chung, 2009; Zhou, 2011, 2012). In addition to this Motiwalla et al. (2019) found that the three quality factors of MB have significant impacts on customer satisfaction while Sharma and Sharma (2019) confirmed the effects of information quality and service quality on MB customer satisfaction. Our work has built on this research and in developing the second contribution we considered the impact of the quality factors on customer satisfaction through the mediating impact of trust. When considering the mediating effect of trust, it is noteworthy that the strongest mediating impact of trust is associated with services quality. Trust has a full mediating impact on the relationship between services quality and customer satisfaction. The mediating effects of trust on the two other quality factors are partial (Complementary). These findings are inconsistent with the study of (Sharma & Sharma, 2019), who found that information quality and service quality have direct impacts on satisfaction and system quality does not affect satisfaction.

To the best of our knowledge, our study is the first that investigates the impact of task characteristics on customer satisfaction. The test of H4 revealed that task characteristics have a significant direct effect on customer satisfaction and also a significant indirect effect through trust. This result is in accordance with the study of (Malaquias & Hwang, 2016) in supporting the positive relationship between task characteristics and trust. In addition, it emphasises the importance of MB for customers to perform their activities and also consistent with other studies regarding the influence of task characteristics in the adoption and usage of MB (Tam & Oliveira, 2016b; Zhou, Lu, & Wang, 2010). Finally, for the H5, the current study confirms that structural assurance is the most influential factor of trust. Earlier work has emphasised the importance of structural assurance in building trust in MB (Baptista & Oliveira, 2016; Gu et al., 2009; Oliveira et al., 2014; Zhou, 2011, 2012). However, all these studies considered the role of structural assurance in developing initial trust in the pre-adoption stage. Our study considers the role of structural assurance in MB trust in the post-adoption stage, and in turn customer satisfaction. Our findings revealed that structural assurance has only an indirect impact on customer satisfaction via trust, demonstrating that structural assurance can also have a key influence on customer behaviour in the post-adoption stage.

Our study was limited to MB users in Libya, and cultural differences in other countries and societies may limit the study's generalisability. However, as discussed in (section 6.2), our research model has a high in-sample and out of sample predictive power. Therefore, it can be applied in other contexts as we highlighted in future research (section 9).

## **8. Managerial Implications**

The conceptual framework of this paper comprises the three MB quality dimensions, task characteristics and structural assurance and their influence on customer satisfaction. It offers a valuable checklist of the key characteristics for bankers in assessing their MB services. We suggest policymakers in banks systematically evaluate customer satisfaction as an indicator of MB success through the three MB quality dimensions, task characteristics and structural assurance. The measures used in this study can be also applied to survey MB customers discovering potential weaknesses and/or strengths in these factors. Dealing with this, can create competitive advantages for banks.

Due to MB features comparing to online banking, for example, small screen and keypads, MB quality characteristics represent controllable aspects that affect MB customer behaviour. Therefore, banks should continuously monitor and improve their MB quality to efficiently meet the expectations of MB current and potential customers.

This paper proved that trust mediates the relationship between system quality, information quality and services quality, and customer satisfaction. These results will provide high values to banks in making their MB system increasingly trusty and in turn, satisfactory. As trust is fundamental in e-finance in achieving customer satisfaction, MB should encourage customers to use such services continuously. We offer a guideline to enhance trust in MB. Our findings reveal that MB quality dimensions have substantial effects on trust. Thus, these dimensions should be considered in designing MB apps and their related services. This is important as high trust level will be translated to a high level of customer satisfaction influencing the success of MB. The improvement of MB system quality through ensuring convenient accessibility, improving ease of use and navigation and enhancing visual attractiveness, is expected to lead to higher user satisfaction directly and indirectly via trust. Information quality can be improved by paying attention to accuracy, completeness, relevance and timeliness of the information customer obtain from MB. Our findings reveal that high-quality information directly and indirectly via trust has a positive impact on customer satisfaction. In terms of overall quality of MB services, our findings show that service has a significant effect on customer satisfaction

but only through trust. Hence, in order to reinforce customers' perception regarding the ability and integrity of their banks to offer quality MB services, banks must continuously assess service quality. This can be achieved by ensuring reliability, promptness, professionalism and personalization of their MB services. Enhancing services quality leads to trust and in turn customer satisfaction.

As mentioned, task characteristics has a significant direct and indirect effect on customer satisfaction. This proved the fact that customers need to feel that their banks behave in the interest of them by providing them with the required support to do their banking transactions through MB which can support them in performing their activities. Therefore, banks must ensure that customers can do banking convivially and properly. Finally, in addition to the important attention that should be paid to the characteristics of MB and supporting customers' activities, banks should reinforce feelings of security of their customers. This can be achieved by guaranteeing information protection and transactional confidentiality (Zhou, 2012). This is most important due to that MB is operated using wireless networks which can be perceived by customers as vulnerable to hacker attacks and information interception. Accomplishing this will enhance trust in MB, resulting in achieving high levels of customer satisfaction.

### **9- Limitation and Future Research**

This study is subject to three limitations. First, as the data of this study were collected using a cross-sectional research design, further longitudinal research is needed to examine our model to improve the generalizability of the findings. Second, future research is required to generalize our findings to other countries, particularly in a developed country as the study was conducted in a developing country. Applying the model in two developed and developing countries and comparing the results can also be a useful approach. Third, this paper did not consider potential impacts of unobserved and observed heterogeneity of the study population such as gender, age and experience. Future research can study the moderator effects of one or more of these variables on our model.

### **References**

- Al-Otaibi, S., Aljohani, N. R., Hoque, M. R., & Alotaibi, F. S. J. J. o. G. I. M. (2018). The satisfaction of Saudi customers toward mobile banking in Saudi Arabia and the United Kingdom. *26*(1), 85-103.
- Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. (2017). Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management*, *37*(3), 99-110. doi:10.1016/j.ijinfomgt.2017.01.002

- Albashrawi, M., Kartal, H., Oztekin, A., & Motiwalla, L. (2019). Self-Reported and Computer-Recorded Experience in Mobile Banking: a Multi-Phase Path Analytic Approach. *Information Systems Frontiers*, 1. doi:10.1007/s10796-018-9892-1
- Applause. (2017). 61% OF PEOPLE ACCESS MOBILE BANKING ON A REGULAR BASIS. Retrieved from <https://www.applause.com/blog/mobile-banking-adoption-rates/>
- Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Kizgin, H., & Patil, P. (2019). Consumer use of mobile banking (M-Banking) in Saudi Arabia: Towards an integrated model. *International Journal of Information Management*, 44, 38-52.
- Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Patil, P., & Dwivedi, Y. K. (2019). An integrated model for m-banking adoption in Saudi Arabia. *International Journal of Bank Marketing*, 37(2), 452-478. doi:10.1108/IJBM-07-2018-0183
- Baptista, G., & Oliveira, T. (2016). A weight and a meta-analysis on mobile banking acceptance research. *Computers in Human Behavior*, 63, 480-489. doi:10.1016/j.chb.2016.05.074
- Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi:10.1037/0022-3514.51.6.1173
- Berraies, S., Ben Yahia, K., & Hannachi, M. (2017). Identifying the effects of perceived values of mobile banking applications on customers: Comparative study between baby boomers, generation X and generation Y. *International Journal of Bank Marketing*, 35(6), 1018-1038. doi:10.1108/IJBM-09-2016-0137
- Bulmer, M., & Warwick, D. P. (1993). *Social research in developing countries: Surveys and censuses in the Third World*: Psychology Press.
- Cao, X., Yu, L., Liu, Z., Gong, M., & Adeel, L. (2018). Understanding mobile payment users' continuance intention: a trust transfer perspective. *Internet Research*, 28(2), 456-476. doi:10.1108/IntR-11-2016-0359
- CBL. (2019). Strategic Plan. Retrieved from <https://cbl.gov.ly/en/strategic-plan/>
- Chari, S., Christodoulides, G., Presi, C., Wenholt, J., & Casaletto, J. P. (2016). Consumer Trust in User-Generated Brand Recommendations on Facebook. *Psychology & Marketing*, 33(12), 1071-1081. doi:10.1002/mar.20941
- Chen, C.-C., Hsiao, K.-L., & Hsieh, C.-H. (2019). Understanding usage transfer behavior of two way O2O services. *Computers in Human Behavior*, 100, 184-191.
- Chin. (1998). The partial least squares approach to structural equation modeling. 295(2), 295-336.
- Choi, O.-K., & Cho, E. (2019). The mechanism of trust affecting collaboration in virtual teams and the moderating roles of the culture of autonomy and task complexity. *Computers in Human Behavior*, 91, 305-315. doi:10.1016/j.chb.2018.09.032
- Choudrie, J., Junior, C.-O., McKenna, B., & Richter, S. (2018). Understanding and conceptualising the adoption, use and diffusion of mobile banking in older adults: A research agenda and conceptual framework. *Journal of Business Research*, 88, 449-465. doi:10.1016/j.jbusres.2017.11.029
- Dang, V. T., Nguyen, N., & Pervan, S. (2020). Retailer corporate social responsibility and consumer citizenship behavior: The mediating roles of perceived consumer effectiveness and consumer trust. *Journal of retailing and consumer services*, 55, 102082. doi:10.1016/j.jretconser.2020.102082
- Deloitte. (2019). The value of online banking channels in a mobile-centric world. Retrieved from <https://www2.deloitte.com/us/en/insights/industry/financial-services/online-banking-usage-in-mobile-centric-world.html>

- DeLone, W. H., & McLean, E. R. (1992). Information Systems Success: The Quest for the Dependent Variable. *Information Systems Research*, 3(1), 60-95. doi:10.1287/isre.3.1.60
- DeLone, W. H., & McLean, E. R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, 19(4), 9-30.
- Deming, W. E. (1990). *Sample design in business research* (Vol. 23): John Wiley & Sons.
- Dillon, W. R., Madden, T. J., & Firtle, N. H. (1993). *Essentials of marketing research*: Irwin.
- Epstein, J., Klinkenberg, W. D., Wiley, D., & McKinley, L. (2001). Insuring sample equivalence across Internet and paper-and-pencil assessments. *Computers in Human Behavior*, 17(3), 339-346.
- Fornell, C., & Bookstein, F. L. (1982). Two Structural Equation Models: LISREL and PLS Applied to Consumer Exit-Voice Theory. *Journal of Marketing Research*, 19(4), 440-452. doi:10.2307/3151718
- Fornell, C., & Larcker, D. F. J. J. o. m. r. (1981). Evaluating structural equation models with unobservable variables and measurement error. *18*(1), 39-50.
- Freedom House. (2019). Freedom on the net 2019 Libya Retrieved from <https://freedomhouse.org/country/libya/freedom-net/2019>
- Gao, L., & Waechter, K. A. (2017). Examining the role of initial trust in user adoption of mobile payment services: an empirical investigation. *Information Systems Frontiers*, 19(3), 525-548. doi:10.1007/s10796-015-9611-0
- Gefen, D. (2002). Nurturing clients' trust to encourage engagement success during the customization of ERP systems. *Omega*, 30(4), 287-299.
- Gefen, D., Straub, D., & Boudreau, M.-C. (2000). Structural Equation Modeling and Regression: Guidelines for Research Practice. *Communications of the Association for Information Systems*, 4. doi:10.17705/1CAIS.00407
- Ghasemaghaei, M., & Hassanein, K. (2016). A macro model of online information quality perceptions: A review and synthesis of the literature. *Computers in Human Behavior*, 55, 972-991.
- Gu, J.-C., Lee, S.-C., & Suh, Y.-H. (2009). Determinants of behavioral intention to mobile banking. *Expert Systems With Applications*, 36(9), 11605-11616. doi:10.1016/j.eswa.2009.03.024
- Guo, Y., Bao, Y., Stuart, B. J., & Le-Nguyen, K. (2018). To sell or not to sell: Exploring sellers' trust and risk of chargeback fraud in cross-border electronic commerce. *Information Systems Journal*, 28(2), 359-383. doi:10.1111/isj.12144
- Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)*. Los Angeles: Sage publications.
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2-24. doi:10.1108/EBR-11-2018-0203
- Hair, J. F., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. *European Business Review*, 26(2), 106-121. doi:10.1108/EBR-10-2013-0128
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115-135. doi:10.1007/s11747-014-0403-8
- Iacobucci, D., & Churchill, G. A. (2010). *Marketing research: methodological foundations* (10th, International ed.). Mason, Ohio?: South-Western Cengage Learning.
- index mundi. (2019a). Libya - Land area (sq. km). Retrieved from <https://www.indexmundi.com/facts/libya/indicator/AG.LND.TOTL.K2>

- index mundi. (2019b). Mobile cellular subscriptions (per 100 people). Retrieved from <https://www.indexmundi.com/facts/indicators/IT.CEL.SETS.P2>
- internet live stats. (2016). Libya Internet Users. Retrieved from <https://www.internetlivestats.com/internet-users/libya/>
- Internet World Stats. (2020). Internet World Stat Usage and Population Statistics Retrieved from <https://www.internetworldstats.com/africa.htm>
- Isaac, S., Michael, W. B., Educational, & Industrial Testing, S. (1995). *Handbook in research and evaluation: a collection of principles, methods, and strategies useful in the planning, design, and evaluation of studies in education and the behavioral sciences* (3rd ed.). San Diego, Calif: Educational and Industrial Testing Services.
- Jones, C., Kennedy, S., Kerr, S., Mitchell, J., & Safayeni, D. (2012). *Furthering democracy in Libya with information technology: Opportunities for the international donor community*. Retrieved from [https://www.cigionline.org/sites/default/files/no4\\_0.pdf](https://www.cigionline.org/sites/default/files/no4_0.pdf)
- Juniper. (2017). MOBILE BANKING USERS TO REACH 2 BILLION BY 2020. Retrieved from <https://www.juniperresearch.com/press/press-releases/mobile-banking-users-to-reach-2-billion-by-2020>
- Kim G, Shin, B., & Lee, H. G. (2009). Understanding dynamics between initial trust and usage intentions of mobile banking. *Information Systems Journal*, 19(3), 283-311. doi:10.1111/j.1365-2575.2007.00269.x
- Lee, K. C., & Chung, N. (2009). Understanding factors affecting trust in and satisfaction with mobile banking in Korea: A modified DeLone and McLean's model perspective. *Interacting with Computers*, 21(5-6), 385-392. doi:10.1016/j.intcom.2009.06.004
- Lin, X., Wang, X., & Hajli, N. (2019). Building E-Commerce Satisfaction and Boosting Sales: The Role of Social Commerce Trust and Its Antecedents. *International Journal of Electronic Commerce*, 23(3), 328-363. doi:10.1080/10864415.2019.1619907
- Liu, B., Zhou, Q., Ding, R.-X., Palomares, I., & Herrera, F. (2019). Large-scale group decision making model based on social network analysis: Trust relationship-based conflict detection and elimination. *European Journal of Operational Research*, 275(2), 737-754. doi:10.1016/j.ejor.2018.11.075
- Malaquias, R. F., & Hwang, Y. (2016). An empirical study on trust in mobile banking: A developing country perspective. *Computers in Human Behavior*, 54, 453-461. doi:10.1016/j.chb.2015.08.039
- Malaquias, R. F., Malaquias, R., & Hwang, Y. (2018). Understanding the determinants of mobile banking adoption: A longitudinal study in Brazil. *Electronic Commerce Research and Applications*, 30, 1-7. doi:10.1016/j.elerap.2018.05.002
- Mason, R. O. (1978). Measuring information output: A communication systems approach. *Information & Management*, 1(4), 219-234. doi:10.1016/0378-7206(78)90028-9
- Mayer, R. C., & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of applied psychology*, 84(1), 123.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An Integrative Model of Organizational Trust. *The Academy of Management Review*, 20(3), 709-734. doi:10.5465/AMR.1995.9508080335
- McKnight, D. H., & Chervany, N. L. (2001). *Conceptualizing trust: A typology and e-commerce customer relationships model*. Paper presented at the System Sciences, 2001. Proceedings of the 34th Annual Hawaii International Conference on.
- McKnight, D. H., Choudhury, V., & Kacmar, C. (2002). Developing and Validating Trust Measures for e-Commerce: An Integrative Typology. *Information Systems Research*, 13(3), 334-359. doi:10.1287/isre.13.3.334.81
- Moorman, C., Deshpandé, R., & Zaltman, G. (1993). Factors Affecting Trust in Market Research Relationships. *Journal of Marketing*, 57(1), 81-101.

- Motiwalla, L. F., Albashrawi, M., & Kartal, H. B. (2019). Uncovering unobserved heterogeneity bias: Measuring mobile banking system success. *International Journal of Information Management*, 49, 439-451. doi:10.1016/j.ijinfomgt.2019.07.005
- Nulty, D. D. J. A., & education, e. i. h. (2008). The adequacy of response rates to online and paper surveys: what can be done? , 33(3), 301-314.
- Nunally, J., & Bernstein, I. J. N. Y. (1978). *Psychometric theory*. 1978.
- Oliveira, T., Alinho, M., Rita, P., & Dhillon, G. (2017). Modelling and testing consumer trust dimensions in e-commerce. *Computers in Human Behavior*, 71, 153-164.
- Oliveira, T., Faria, M., Thomas, M. A., & Popovič, A. (2014). Extending the understanding of mobile banking adoption: When UTAUT meets TTF and ITM. *International Journal of Information Management*, 34(5), 689-703. doi:10.1016/j.ijinfomgt.2014.06.004
- Petter, S., DeLone, W., & McLean, E. R. (2013). Information systems success: The quest for the independent variables. *Journal of Management Information Systems*, 29(4), 7-62.
- Pitt, L. F., Watson, R. T., & Kavan, C. B. J. M. q. (1995). Service quality: a measure of information systems effectiveness. 173-187.
- Preacher, K. J., & Hayes, A. F. J. B. r. m. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. 40(3), 879-891.
- Priya, R., Gandhi, A. V., & Shaikh, A. (2018). Mobile banking adoption in an emerging economy: An empirical analysis of young Indian consumers. *Benchmarking: An International Journal*, 25(2), 743-762. doi:10.1108/BIJ-01-2016-0009
- Rotter, J. B., & Rotter, J. B. (1967). A new scale for the measurement of interpersonal trust. *Journal of Personality*, 35(4), 651-665. doi:10.1111/j.1467-6494.1967.tb01454.x
- Sampaio, C. H., Ladeira, W. J., & Santini, F. D. O. (2017). Apps for mobile banking and customer satisfaction: a cross-cultural study. *International Journal of Bank Marketing*, 35(7), 1133-1153. doi:10.1108/IJBM-09-2015-0146
- Santa, R., MacDonald, J. B., & Ferrer, M. (2019). The role of trust in e-Government effectiveness, operational effectiveness and user satisfaction: Lessons from Saudi Arabia in e-G2B. *Government Information Quarterly*, 36(1), 39-50. doi:10.1016/j.giq.2018.10.007
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of Family Business Strategy*, 5(1), 105-115. doi:10.1016/j.jfbs.2014.01.002
- Seddon, P. B. (1997). A Respecification and Extension of the DeLone and McLean Model of IS Success. *Information Systems Research*, 8(3), 240-253. doi:10.1287/isre.8.3.240
- Shannon, C. E., & Weaver, W. (1949). *The mathematical theory of communication*. Urbana [Ill.];London;: University of Illinois Press.
- Sharma, S. K., & Sharma, M. (2019). Examining the role of trust and quality dimensions in the actual usage of mobile banking services: An empirical investigation. *International Journal of Information Management*, 44, 65-75. doi:10.1016/j.ijinfomgt.2018.09.013
- Shmueli, G., Ray, S., Estrada, J. M. V., & Chatla, S. B. (2016). The elephant in the room: Predictive performance of PLS models. *Journal of Business Research*, 69(10), 4552-4564.
- Shmueli, G., Sarstedt, M., Hair, J. F., Cheah, J.-H., Ting, H., Vaithilingam, S., & Ringle, C. M. (2019). Predictive model assessment in PLS-SEM: guidelines for using PLSpredict. *European Journal of Marketing*, 53(11), 2322-2347. doi:10.1108/ejm-02-2019-0189
- SmartSurvey. (2016). Survey Distribution – The Best Methods. Retrieved from <https://blog.smartsurvey.co.uk/survey-distribution>
- Sobel, M. E. (1982). Asymptotic Confidence Intervals for Indirect Effects in Structural Equation Models. *Sociological Methodology*, 13, 290-312. doi:10.2307/270723

- Soloff, C., Lawrence, D., & Johnstone, R. (2005). *Sample design*: Australian Institute of Family Studies Melbourne.
- Statcounter. (2019). Social Media Stats Libya. Retrieved from <http://gs.statcounter.com/social-media-stats/all/libya>
- Stouthuysen, K. (2020). A 2020 perspective on “The building of online trust in e-business relationships”. *Electronic Commerce Research and Applications*, 40, 100929. doi:10.1016/j.elerap.2020.100929
- Susanto, A., Chang, Y., & Ha, Y. (2016). Determinants of continuance intention to use the smartphone banking services: An extension to the expectation-confirmation model. *Industrial Management and Data Systems*, 116(3), 508-525. doi:10.1108/IMDS-05-2015-0195
- Tam, C., & Oliveira, T. (2016a). Performance impact of mobile banking: using the task-technology fit (TTF) approach. *International Journal of Bank Marketing*, 34(4), 434-457. doi:10.1108/IJBM-11-2014-0169
- Tam, C., & Oliveira, T. (2016b). Understanding the impact of m-banking on individual performance: DeLone & McLean and TTF perspective. *Computers in Human Behavior*, 61, 233-244. doi:10.1016/j.chb.2016.03.016
- Tam, C., & Oliveira, T. (2017). Understanding mobile banking individual performance: The DeLone & McLean model and the moderating effects of individual culture. *Internet Research*, 27(3), 538-562. doi:10.1108/IntR-05-2016-0117
- Tam, C., & Oliveira, T. (2019). Does culture influence m-banking use and individual performance? *Information & Management*, 56(3), 356-363. doi:10.1016/j.im.2018.07.009
- Thakur, R. (2014). What keeps Mobile Banking Customers Loyal? *International Journal of Bank Marketing*, 32(7), 628-646. doi:10.1108/IJBM-07-2013-0062
- The World Bank. (2016). Public-Private Partnerships for Jobs in Libya Are Key for Youth and Women, Now More Than Ever. Retrieved from <https://www.worldbank.org/en/news/feature/2016/05/03/public-private-partnerships-for-jobs-in-libya-are-key-for-youth-and-women>
- Trabelsi-Zoghalmi, A., Berraies, S., & Ben Yahia, K. (2018). Service quality in a mobile-banking-applications context: do users' age and gender matter? *Total Quality Management and Business Excellence*, 1-30. doi:10.1080/14783363.2018.1492874
- Wang, Z., Guan, Z., Hou, F., Li, B., & Zhou, W. (2019). What determines customers' continuance intention of FinTech? Evidence from YuEbao. *Industrial Management & Data Systems*, 119(8), 1625-1637. doi:10.1108/IMDS-01-2019-0011
- Wingreen, S. C., Mazey, N. C., Baglione, S. L., & Storholm, G. R. J. E. C. R. (2019). Transfer of electronic commerce trust between physical and virtual environments: experimental effects of structural assurance and situational normality. *19(2)*, 339-371.
- worldometers. (2019). Libya Population. Retrieved from <https://www.worldometers.info/world-population/libya-population/>
- Yousafzai, S., Pallister, J., & Foxall, G. (2009). Multi-dimensional role of trust in Internet banking adoption. *The Service Industries Journal*, 29(5), 591-605. doi:10.1080/02642060902719958
- Yu, Y., Li, M., Li, X., Zhao, J. L., & Zhao, D. (2018). Effects of entrepreneurship and IT fashion on SMEs' transformation toward cloud service through mediation of trust. *Information and Management*, 55(2), 245-257.
- Zhao, X., Lynch, John G., & Chen, Q. (2010). Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis. *Journal of Consumer Research*, 37(2), 197-206. doi:10.1086/651257

- Zhou, T. (2011). An empirical examination of initial trust in mobile banking. *Internet Research*, 21(5), 527-540.
- Zhou, T. (2012). Understanding users' initial trust in mobile banking: An elaboration likelihood perspective. *Computers in Human Behavior*, 28(4), 1518-1525. doi:10.1016/j.chb.2012.03.021
- Zhou, T. (2013). An empirical examination of continuance intention of mobile payment services. *Decision Support Systems*, 54(2), 1085-1091. doi:10.1016/j.dss.2012.10.034
- Zhou, T., Lu, Y., & Wang, B. (2010). Integrating TTF and UTAUT to explain mobile banking user adoption. *Computers in Human Behavior*, 26(4), 760-767. doi:10.1016/j.chb.2010.01.013

**Appendix A the Descriptive Characteristics of the Sample**

Descriptive variable	Frequency	Percentage %	Descriptive variable	Frequency	Percentage %
<b>Experience:</b>			<b>Gender:</b>		
Less than one year	94	14.3%	Male	395	59.9%
1-2 years	162	24.6%	Female	264	40.1%
More than 2 years	403	61.2%			
<b>Frequency:</b>			<b>Education:</b>		
Every day	120	18.2%	Less than high school	5	0.8%
Several time a week	292	44.3%	High school	49	7.4%
Once a week	54	8.2%	Diploma	160	24.3%
Several time a month	151	22.9%	Undergraduate degree	286	43.4%
Once a month	42	6.4%	Post-graduate or above	159	24.1%
<b>Products:</b>			<b>Occupation:</b>		
Basic account information	364	55.2%	Unemployed	24	3.6%
Making online payments	398	60.4%	Student	62	9.4%
Checking account balance	589	89.4%	Private sector	141	21.4%
Bank transfer	214	32.5%	Government employee	335	50.8%
Other	135	20.5%	Retired	27	4.1%
			Other	70	10.6%
<b>Age:</b>					
Less than 18 Years	1	0.1%			
18-24Years	71	10.8%			
25-34 Years	284	43.1%			
35- 50	234	35.5%			
Above 50 Years	69	10.5%			
<b>Total</b>	<b>659</b>	<b>100.0</b>		<b>659</b>	<b>100.0</b>