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**Understanding Analytical Factors which Influence Trust and  
Satisfaction within Mobile Banking**

**AHMED GEEBREN**

**A thesis submitted to the University of Huddersfield in partial  
fulfilment of the requirements for the degree of Doctor of  
Philosophy**

**The University of Huddersfield**

**January 2022**

## **Abstract**

For the past decade, mobile banking research has received considerable attention across the world. However, scholars have focused mainly on studying adoption and behavioural intention at the expense of investigating the post-adoption consumer behaviour of mobile banking. In addition, the literature has focused mainly on the influence of initial trust in mobile banking. Although initial trust has been acknowledged as essential in mobile banking research, understanding the influence of the overall trust on the post-adoption behaviours remains limited.

Thus, this thesis provides a better understanding of the role of overall trust in enhancing user satisfaction in mobile banking by first, conceptualising trust in mobile banking based on the concept of trust in e-commerce. Second, developing a conceptual framework based on the information systems success model to identify the key factors influencing trust and satisfaction in mobile banking. Third, explaining the mediating role that trust plays in enhancing customer satisfaction with mobile banking.

An online survey was used to collect data from eighteen banking online communities on Facebook in Libya. Six hundred and fifty-nine useable responses were received. After the data preparation stage, the collected data was then analysed using the structural equation modelling with partial least square technique (PLS-SEM). The SmartPLS 3 software was employed to validate and test the hypothesised research model.

The research findings confirm that trust is a key predictor of customer satisfaction with mobile banking. Meanwhile, trust is influenced by information quality, system quality, service quality, structural assurance and task characteristics. Further, trust has a full mediation effect between service quality and structural assurance, and customer satisfaction. Finally, trust has a partial mediation effect between system quality, information quality and task characteristics, and customer satisfaction.

Overall, the research model proved a high in sample and out-of-sample predictive power. The study provides theoretical and practical implications that enhance the understanding of trust in mobile banking by developing a consistent conceptual framework of trust influence in mobile banking post-adoption behaviours, particularly customer satisfaction. Further, this research is the first that studied the mediating role of trust in enhancing customer satisfaction with mobile banking.

## **Publications and Conferences Presentations Associated with this Thesis**

### **Publications arising from this Thesis**

The following research papers were produced to publish some of the work undertaken by the researcher during the PhD journey.

Geebren, A., Jabbar, A., & Luo, M. (2021). Examining the role of consumer satisfaction within mobile eco-systems: Evidence from mobile banking services. *Computers in Human Behavior, 114*. doi:10.1016/j.chb.2020.106584

Geebren, A., & Jabbar, A. (2021). Factors That Influence Customer Trust and Satisfaction in Mobile Banking: A Problematization Approach. *International Journal of E-Business Research, 17*(3).

### **Conferences**

Geebren A, & Jabbar, A. Including trust in DeLone & McLane information systems success model to investigate customer satisfaction with mobile banking, Huddersfield Business School Research Conference, 15th Jan 2020.

Geebren A, & Jabbar, A. A conceptual framework of the factors influencing customer trust in and satisfaction with mobile banking: information system approach, Huddersfield Business School Research Conference, 09th Jan 2019.

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## List of abbreviations

MB	Mobile banking
IDT	Innovation Diffusion Theory
TRA	The Theory of Reasoned Action
TPB	Theory of Planned Behaviour
TAM	Technology Acceptance Model
UTAUT	The Unified Theory of Acceptance and Use of Technology
TTF	Task-Technology Fit Theory
MENA	The Middle East and North Africa region
CBL	The Central Bank of Libya
SEM	Structural equation modelling
PLS-SEM	Structural equation modelling with partial least squares
BOS	Bristol Online Survey
SYS	System quality
INF	Information quality
SEV	Service quality
TSK	Task characteristics
SA	Structural assurance
TRU	Trust
SAT	Customer satisfaction
CR	Composite reliability
AVE	Average variance extracted
HTMT	Heterotrait–monotrait ratio
R <sup>2</sup>	Coefficient of Determination
F <sup>2</sup>	Effect size
Q <sup>2</sup>	Predictive relevance
LM	Linear regression model



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## **Dedications**

To the soul of my beloved father

# **Chapter 1 Introduction to the Thesis**

## **1.1 Introduction**

The first section of this chapter aims to outline the background and motivation for conducting the current research and the problem that this research attempts to address. It then goes on to present and justify the research questions, aim and objectives of the research in the second section. The third section deals with introducing the research context, i.e., Libya. The fourth section concerns the methodology used for this study. Lastly, the overall structure of the thesis is summarised in the fifth section.

## **1.2 Research Background**

The evolution of the internet and the flexibility of smart devices have created the potential for new services and opportunities for managing money and have had a significant impact on the customer-bank relationship, resulting in the development of multiple electronic distribution channels such as online and mobile banking (MB) (Baptista & Oliveira, 2016; Malaquias & Hwang, 2016). The use of these e-banking channels enables customers to undertake banking transactions, such as managing and receiving online payments, checking account balance and transferring funds in a secure online environment (L. Yu, Balaji, & Khong, 2015). MB is defined as the system that enables users to access banking networks and conduct banking transactions using mobile devices (Tam & Oliveira, 2016b). MB promotes banks the required efficiency and effectiveness to ensure the quality of their services using mobile networks. In addition, it enables customers to optimize their time, obtain timely information and convenient services, and engage in a high degree of interactivity with their banks (Malaquias & Hwang, 2016). Therefore, for banks, moving into specific services like MB is a significant part of future growth strategies. The development of such strategies, however, entails considerable investment. According to some scholars (Abdullah M. Baabdullah, Alalwan, Rana, Kizgin, &

Patil, 2019), banks have invested \$115 billion in MB globally. MB enables customers to access account balances and do banking transactions such as bill payment and fund transfer conveniently at anytime and anywhere using cyber connections (Tam & Oliveira, 2017b). Additionally, as compared to other traditional banking networks, MB can minimise financial fees (Abdullah M. Baabdullah et al., 2019). These target benefits of MB are valuable only if customers trust MB services and are satisfied to continue using such services. Therefore, banks should convince customers to use MB services more frequently. Thus, the challenge of establishing trust within MB as a prerequisite to customer satisfaction is critical to a bank's long-term efficiency and strategy.

### **1.3 Gaps in the Existing MB Literature and Rational for the Research**

Based on the review of the existing literature, the current research gaps identified significant gaps, which can be classified into two categories: theoretical and methodological gaps.

#### **1.3.1 Theoretical Gaps**

##### ***Pre-adoption vs post-adoption behaviour***

First, over the last decade, MB has been investigated extensively in the last decade by both academics and practitioners, although from different perspectives. However, the majority of research has focused on identifying the factors that influence customer behavioural intention and adoption of MB (Gao & Waechter, 2017; Oliveira, Faria, Thomas, & Popovič, 2014; Singh & Srivastava, 2018), with only a few studies that have examined MB post-adoption behaviours (Tam & Oliveira, 2017a). Studying actual behaviours can provide practical implications for decision-makers in the banking sector, most importantly, an approach for identifying MB characteristics that banking executives can leverage on to enhance customer trust and satisfaction with MB (Albashrawi & Motiwalla, 2017; G. Kim, Shin, & Lee, 2009; Trabelsi-Zoghalmi, Berraies, & Ben Yahia, 2018). This creates potential gaps in the literature regarding

alternative models and additional constructs for understanding the factors influencing MB customer behaviour (Petter, DeLone, & McLean, 2013; Tam & Oliveira, 2017a).

### ***The Mediate Effect of Trust on MB Customer Behaviour***

It is obvious from the systematic literature review conducted in this study regarding trust research in MB that there is a lack of models that have comprehensively attempted to understand MB customer behaviour. In particular, there has been little or no study which has examined the mediating impact of trust on customer satisfaction in the MB context. Considering this influence can enable bankers in developing strategies that leverage online tools to enhance customer trust in online systems. Increased trust in systems, such as MB results in increased customer satisfaction, as it is a common predictor of the success and effectiveness of information system (DeLone & McLean, 2003). This research, therefore, reviews the existing information systems and MB literature and related theories in order to broaden the range of factors which may affect customer trust and satisfaction in MB.

### ***The Importance of Trust in MB Customer Behaviour***

The existing literature emphasises the critical role of trust in influencing behavioural intention and actual behaviour in the MB context (Abdullah M Baabdullah, Alalwan, Rana, Patil, & Dwivedi, 2019; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2016; Sharma & Sharma, 2019). However, it is worth noting that the majority of research on trust in MB has been on initial trust and its role in adoption and behavioural intention (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef, Baabdullah, Dutta, Kumar, & Dwivedi, 2018; Sharma, Govindaluri, Muharrami, & Tarhini, 2017; Zhou, 2011, 2012b). In addition, there is a lack of consensus among MB researchers regarding the concept, structure, and outcome of trust. This is because the majority of MB trust research is empirical, with narrowed conceptualisations of trust to fit their research types (Tam & Oliveira, 2017a).

To understand the factors that influence trust in MB and the role of trust in the post-adoption stage of MB, it is essential to analyse the definition and dimensions of trust and to define the conditions under which trust can exist. Eminent researchers, such as (McKnight & Chervany, 2001) highlight the need for a consistent conceptualisation for trust in e-commerce contexts such as MB. This enables researchers to communicate with practitioners effectively in order to provide them with practical solutions for trust concerns. Thus, in order to identify the factors influencing trust in MB, this study conceptualises trust from both the interpersonal and institutional perspectives.

### ***The Need for Other External Variables***

It is abundantly obvious from existing MB research that scholars have mainly relied on information technology adoption theories, such as the Technology Acceptance Model, to investigate MB (TAM) (Albashrawi & Motiwalla, 2017; Malaquias & Hwang, 2019), the Unified Theory of Acceptance and Use of Technology Model (UTAUT) (Alalwan, Dwivedi, & Rana, 2017; C.-S. Yu, 2012), the Theory of Reasoned Action (TRA) (Tran & Corner, 2016), and Innovation Diffusion Theory (IDT) (Lin, 2011). According to (Tam & Oliveira, 2017a), approximately 50% of the existing MB studies have adopted the TAM theory (Davis, 1989). The TAM examines the acceptance and adoption of new technologies and systems using two main independent variables, namely ease of use and usefulness. However, it has been argued that these variables are insufficient to explain consumer behaviour and that additional external variables are required (Zhang, Weng, & Zhu, 2018). This research relies on the information systems success model as it is the most significant contribution in evaluating consumer satisfaction in the e-commerce and information systems contexts (DeLone & McLean, 1992, 2003). The information system success model offers a comprehensive understanding of the key factors affecting use and satisfaction and thus, the effectiveness and success of information

systems. Hence, the current research expands the range of factors in the information system success model by including structural assurance and task characteristics.

### **1.3.2 Methodological Gaps**

Based on a comprehensive review of the existing MB literature, some methodological shortcomings were identified, which this research seeks to address.

Although some MB studies have proved that their research models have strong explanations and predictive powers, they have relied on basic in-sample techniques in their assessments. The most commonly used tests are the coefficient of determination ( $R^2$ ) and predictive relevance ( $Q^2$ ). These two tests are effective methods for determining the in-sample predictive power of models. However, it is critical to evaluate out-of-sample predictive power in order to simulate how the PLS model would be used to predict a new observation in the future (Shmueli et al., 2019). This can enable researchers to assess how models can be used in other contexts and cultural settings. The review of the current MB literature revealed a lack of research on out-of-sample predictive power. Thus, the current research has attempted to address this shortcoming by conducting a predictive power test using the PLS predict. (Shmueli, Ray, Estrada, & Chatla, 2016)

Another weakness is the use of inadequate sample sizes (Afshan & Sharif, 2016; Alalwan et al., 2017; Arcand, PromTep, Brun, & Rajaobelina, 2017; Berraies, Ben Yahia, & Hannachi, 2017; Sharma & Sharma, 2019). This can have an effect on the representativeness of the sample of the entire population. Having a large sample size enables researchers to conduct advanced data analysis such as structural equation modelling and to perform other approaches such as mediation effects and multi-group analysis (Iacobucci & Churchill, 2010). In addition, several researchers have indicated in the limitations of their findings that their studies lack representativeness as a result of the use of students as a representative sample of the entire

population (Afshan & Sharif, 2016; Ahmed, Kader, Md Harun Ur, & Nurunnabi, 2017; Chung & Kwon, 2009; Malaquias & Hwang, 2016, 2017; Priya, Gandhi, & Shaikh, 2018; Zhou, 2012b). In order to address these shortcomings and increase the generalisability of the findings, this research collects data from current 659 MB users.

#### **1.4 Research Problem**

The use of e-banking services is growing at the expense of conventional banking channels. Online and mobile banking together represent the primary banking channels (ABA Banking Journal, 2017). However, findings from a study conducted in seventeen countries by Deloitte found that online banking remains the preferred e-banking channel for users to interact with their banks in the near future, even for MB customers (Deloitte, 2019). According to the study, in comparison with only 59% of customers who use MB, nearly 73% of users utilise online banking every month (Deloitte, 2019). Also, although MB services are becoming more popular worldwide, online banking is the main e-banking channel when conducting more complicated transactions and activities (Juniper, 2017). Most users utilise MB to perform comparatively simple and quick banking transactions such as account balance inquiry. According to Applause (2017), roughly 44% of MB users utilised it in inquiring about account balance globally. However, only 29% of users made online payments using MB, and 22% used MB to send funds. Regarding transferring money internationally, only 24% of e-banking users transferred money using MB in 2019 compared to 53% who used online banking. Furthermore, online banking is preferred by e-banking users when updating account information with 47%, compared to only 26% of users who used MB to perform similar tasks (Deloitte, 2019).

These customer trends towards MB have been supported by other previous studies regarding the adoption and use of MB, such as a survey that was conducted by AudienceProject in Q2 2017 (eMarketer, 2017). This survey reveals that although about 80% of web users in the USA



downloaded MB apps, only 17% sent money to other people through MB. Additionally, only 40% of customers used their banking apps on a daily basis (eMarketer, 2017).

The situation in developing countries is similar to their counterparts in developed countries. (Malaquias & Hwang, 2019). For example, despite the continuous efforts of the Omani Government to escalate and promote the implementation of MB among customers, the usage rate of MB is low (Sharma & Sharma, 2019). In addition, in Jordan, most banks have introduced MB services. However, customers have expressed less interest in the MB services, and the adoption and use rates of such services does not reach the expected level (Alalwan et al., 2017). Furthermore, the field of MB is relatively new in research in Libya. There are very few studies that have attempted to investigate the barriers that hinder the acceptance, adoption and use of MB. To the best of the researcher's knowledge, there are only two studies that investigated MB in the Libyan context. These two studies revealed some factors that might affect the adoption of MB, such as self-efficiency and ease of use (Bouthahab & Geador, 2014; A. Mostafa & Eneizan, 2018). However, both studies did not address customer behaviour in the post-adoption stage behaviours and the factors influencing customer behaviour to consciously use MB services.

Thus, these statistics and literature indicate that the use of MB may be considered as unsatisfactory. The reasons for this can be attributed to customer concerns about MB characteristics, most notably the quality aspects of the MB system such as ease of use, navigation capability, and the information that the customer expects to obtain from the bank via MB (Abdullah M. Baabdullah et al., 2019; Choudrie, Junior, McKenna, & Richter, 2018; Motiwalla, Albashrawi, & Kartal, 2019; Sharma & Sharma, 2019). In addition, customers' perceptions regarding the support they can gain from their banks using MB to optimize their tasks (Malaquias & Hwang, 2016; Tam & Oliveira, 2016b). Furthermore, customers may perceive MB as more vulnerable to information interception and hacker attack due to the

wireless internet environment (Sampaio, Ladeira, & Santini, 2017; Zhou, 2011). These concerns can increase customer resistance to using MB and influence customer satisfaction negatively with such services, especially for users who are more sensitive to the perceived risks in MB (Laukkanen, 2015; Zhang et al., 2018). This research presents this issue and comprehensively conceptualises trust in the MB context. Besides, it determines the factors influencing trust in MB and explains the indirect effect of trust in enhancing the level of user satisfaction within MB.

### **1.5 Research questions**

Several studies have investigated trust and satisfaction in the MB context. However, there is no comprehensive and integrated framework that investigates the factors that affect trust in MB based on the conceptualisation of trust in e-commerce. In addition, the mediating effect of trust in shaping user satisfaction within MB has not grabbed significant attention from scholars. The conceptual framework developed in the current research is drawn on the information system success model, which was developed by (DeLone & McLean, 2003). In order to deeply understand the mechanism of user satisfaction formation in MB, trust is integrated into the information system success model as a critical precursor of customer satisfaction. Furthermore, additional factors were added to provide an insight into trust formation in MB and its mediating role in enhancing customer satisfaction. Hence, the following are the questions which this research intends to answer:

RQ1. How can trust in MB be conceptualised based on the typology of trust in e-commerce?

RQ2. What is the relationship between trust and user satisfaction within MB?

RQ3. What are the key factors which affect customer trust in MB based on the conceptualisation of trust in e-commerce?

RQ4. What is the mediating role that trust plays in enhancing customer satisfaction within MB?

## 1.6 Research aim and objectives

This research mainly aims to expand the body of knowledge in the fields of information systems and MB by identifying the factors influencing trust and satisfaction of the current users of MB. In addition, based on the information system success model (DeLone & McLean, 2003), this research aims to investigate the mediating effect of trust in enhancing the level of MB user satisfaction. To fulfil this aim, these specific objectives are pursued:

- **Objective 1.** To extend the understanding of the trust concept in MB by systematically reviewing the literature that has investigated trust in the e-commerce context in order to conceptualise trust in the MB context (RQ1).
- **Objective 2.** To examine the influence of trust on customer satisfaction with MB (RQ2).
- **Objective 3.** To identify the factors which influence user trust in MB (RQ3).
- **Objective 4.** To explain the mediating effect of trust on customer satisfaction with MB (RQ4).
- **Objective 5.** To empirically validate the proposed model in an economically developing country, i.e., Libya.

## **1.7 Research Contributions**

This research embeds its contributions in the fields of MB and information systems through the investigation of factors that influence customer trust and satisfaction. Thus, this research puts forward a number of contributions (the contributions are discussed in depth in chapter 8, section 8.3.1 and section 8.3.2):

### **1.7.1 Contributions to theory**

**First**, this research defines trust in relation to MB based on the trust concept in e-commerce, specifically, interpersonal-based trust and institutional-based trust. In MB, trust is considered as a multidimensional construct comprised of four dimensions: ability, integrity, benevolence and structural assurance. This conceptualisation of trust enabled the identification of the factors affecting trust in MB. (Objective No. 1).

**Second**, this research used a systematic review approach to organise and incorporate previously published literature on trust in MB. This approach enabled the researcher to deduce relationships and contradictions in the literature and to identify gaps that needed to be filled (Objective No. 1).

**Third**, the primary theoretical contribution of this research to existing knowledge is the development of a consistent conceptual framework that improves understanding of trust influence in MB post-adoption behaviours, particularly customer satisfaction. This framework can be used to conduct further research on trust and satisfaction in other e-business contexts. It explains the relationship between trust and satisfaction. In addition, it determines the factors affecting trust in MB, i.e., system quality, information quality, service quality, task characteristics, and structural assurance. (Objectives No. 2 and 3).

**Fourth**, this research builds on and extends the information systems success model (DeLone & McLean, 2003) by integrating the trust construct as a mechanism to understand the mediating role of customer trust. It analyses the direct and indirect effects of the MB quality factors, task characteristics, and structural assurance on customer satisfaction via trust. This is the first study to explain the mediating effects of trust on customer satisfaction within MB. (Objective No. 4)

**Finally**, the majority of trust studies in MB have focused on initial trust formation (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef et al., 2018; Sharma et al., 2017; Zhou, 2011, 2012b). Focusing on initial trust is rational in the adoption stage and becomes less important in the post-adoption stage. This research shed light on the influence of the overall trust in the post-adoption stage of MB, which means that the respondents in the research are current users of MB. (Objective No. 2).

### **1.7.2 Contributions to Practice**

Regarding practical implications, this research provides a deeper understanding of trust and satisfaction in the online business environment in general, and particularly in the MB context. It explains how individuals perceive and evaluate MB services concerning trust and satisfaction. Hence, this research proposes a guideline for banks on how to enhance customer trust and satisfaction within MB.

**First**, this research suggests that building trust in MB will strongly and positively affect customer satisfaction. Hence, in order to achieve a high level of customer satisfaction, banks should pay attention to aspects of trust that need to be taken into consideration to enhance customer satisfaction within MB (Objective No. 2).

**Second**, this research suggests that trust in MB is significantly and positively determined by the quality factors of the MB system, task characteristics, and structural assurance. Thus,

policymakers in the banking sector need to incorporate these elements into their strategies and plans when developing MB and other mobile payment systems (Objective No. 3).

**Third**, this research determines the degree to which trust mediates the relationship between the quality factors of MB, task characteristics, and structural assurance), and customer satisfaction. This mechanism provides a practical framework for enhancing customer satisfaction through trust in MB (Objective No. 4).

**Finally**, this study is one of the few that investigates trust in the MB context in Libya, and in particular, it is the first that considers the relationship between trust and customer satisfaction in this context (Objective No. 5).

### **1.7.3 Contributions to Methodology**

This research provides several methodological contributions. The most significant contribution is that this research assesses 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). Although the structural model of this research demonstrated a high level of explanatory power and predictive ability of the in-sample model, it is essential to assess the out-of-sample predictive power. As mentioned, this research is limited to MB users in Libya, and cultural differences in other countries and societies may limit the generalisability of the findings. However, since the research model has high in-sample and out-of-sample predictive power, it can be applied in other countries and contexts. This research uses the technique developed by Shmueli et al. (2016) to assess the out-of-sample predictive power, namely the PLS predict. The details of this technique are discussed in detail in the chapter (5) section, (5.5.4.5.2.6), and the results of the out-of-sample test are reported in chapter (6), section (6.5.6).

In addition, on review of the MB's existing literature, some methodological shortcomings have been revealed, which this study seeks to address. One shortcoming is the use of an inadequate

sample size (Afshan & Sharif, 2016; Alalwan et al., 2017; Arcand et al., 2017; Berraies et al., 2017; Sharma & Sharma, 2019). This can affect the representativeness of the sample to the entire population. This research uses a relatively large sample size i.e. 659 responses. Besides, several researchers have indicated in their studies' limitations that their studies lack representativeness due to their use of students as a representative sample of the entire population (Afshan & Sharif, 2016; Ahmed et al., 2017; Chung & Kwon, 2009; Malaquias & Hwang, 2016, 2017; Priya et al., 2018; Zhou, 2012b). In order to overcome this shortcoming and increase the generalisability of the findings to the population, this research collects data from current MB users in Libya.

## **1.8 Overview of the Study Context**

The context of this research is MB in Libya. Hence, it is important to present some key information about the research context, including geographical information, population, demographic information and its economy. In addition, this section provides justifications for selecting Libya as a context for this research. Furthermore, it presents a brief outline of the Libyan banking system and the electronic banking practices in Libya.

### **1.8.1 Geography and Population of Libya**

Libya is a Middle Eastern country situated in North Africa overlooking the Mediterranean Sea. As exhibited in the map in (figure 1.1), Libya is bordered by six African countries: Egypt, Sudan, Tunisia, Algeria, Chad and Niger. Among these countries, Libya has the smallest population. The Libyan population is 6,886,481 in 2020, compared to 102,334,404 in Egypt, 43,849,260 in Sudan, 11,818,619 in Tunisia, 43,851,044 in Algeria, 16,425,864 in Chad and 24,206,644 in Niger (worldometer, 2020). However, Libya is a large country in terms of landmass; it is the 17th largest country in the world and the fourth largest in Africa, with a population density of 4 people per square kilometre. It is the smallest density among its

neighbours, 103 per Km<sup>2</sup> in Egypt, 25 per Km<sup>2</sup> in Sudan, 76 per Km<sup>2</sup> in Tunisia, 18 per Km<sup>2</sup> in Algeria, 13 per Km<sup>2</sup> in Chad and 19 per Km<sup>2</sup> in Niger (worldometer, 2020).

Tripoli is the country's capital and the most populous city, followed by the city of Benghazi. The climate is Mediterranean along the Libyan coast. At the same time, the Sahara Desert shapes approximately 90% of the land with hot and dry weather. For this reason, most of Libya's people live in the coastal area (Commisceo Global, 2020). In cultural terms, Libya belongs to the Arab Maghreb countries (North Africa countries). These countries share a similar religion, culture and history. The most prevalent religion in Libya is Islam and the country's official language is Arabic. (Commisceo Global, 2020).



**Figure 1. 1 Map of Libya**

source: (britannica, 2021)



### **1.8.2 Overview of the Libyan Economy**

Since Libya's independence on 24 December 1951 and before the beginning of oil discovery and export in 1961, with a per capita annual income of USD 35, Libya was considered one of the poorest independent countries in the world (St John, 2008). Libya's economy depended on agricultural and animal products and some handicrafts (Otman & Karlberg, 2007). After the production of crude oil and gas, the Libyan economy has experienced strong economic growth (Allan, McLachlan, & Penrose, 2015). The revenues generated from petroleum products exports increased rapidly from only \$40 million in 1962 to reaching \$625 million in 1967 (St John, 2008). These revenues have supported the Libyan successive governments in developing infrastructure and the civil services of the country (Allan et al., 2015).

The Libyan economy is highly dependent on the oil sector. It represents over 95% of export earnings and 65% of GDP (Islamic Development Bank, 2018). These oil revenues and low population densities have supported Libya to be one of the highest nominal per capita GDP in the region of the Middle East and North Africa (MENA) (OECD/The European Commission/European Training Foundation, 2014). This economic growth was interrupted by the Libyan Civil War in 2011, which resulted in the contraction of the economy by 62.1%. After the war, the economy rebounded by 104.5% in 2012 (GlobalTenders.com, 2020).

### **1.8.3 Justifications for Selecting Libya as a Context of this Research**

The current research focuses on the population of MB users in Libya in order to investigate the factors that influence trust and satisfaction in MB, and the role of trust as a moderator in improving customer satisfaction in MB. Libya is a suitable context for conducting this research due to a variety of factors:

**First**, in Libya, there is a convincing need to embed MB because of its vast size and geography. This has compelled banks to establish branches in all regions, cities, and remote villages, a

costly and time-consuming endeavour, with many branches are not economically feasible Lin, Hu, and Sung (2005) state that the more branches a bank has, the more inefficient it becomes. Libya has the sixth largest number of commercial bank branches per 100,000 adults in Africa with 11.4 per 100000 adults (THE WORLD BANK, 2018b). In addition, Libya is the fifth largest country in Africa, according to the World Bank, in terms of account ownership at a financial institution by population over the age of 15, with 65.7 percent. Compared to other MENA countries (see table 1.1), it is 32.8% in Egypt, 36.9% in Tunisia, 28.6% in Morocco and 71.7% in Saudi Arabia (THE WORLD BANK, 2018a). As a result of these factors, the development of MB services has accelerated, with a private bank, the Bank of Commerce and Development, spearheading the marketing drive to introduce e-banking services in 2006 (CBL, 2019).

**Second,** Internet penetration has increased significantly in Libya Over the past five years, internet users have risen from 21.1 percent in 2016 (internet live stats, 2016) to 74.2 percent in 2020 (Internet World Stats, 2020). In comparison to other MENA nations, Egypt has a 48.1 percent adoption rate, Morocco has a 64.3 percent adoption rate, Tunisia has a 66.8 percent adoption rate, and Saudi Arabia has a 91.5 percent adoption rate (Internet World Stats, 2020). It is worth recalling that mobile phone usage has risen similarly from one percent in 2012 (Jones, Kennedy, Kerr, Mitchell, & Safayeni, 2012) to 172 percent in 2019 (Freedom House, 2019), representing substantial increases over Egypt's 95%, Morocco's 124%, Tunisia's 128%, and Saudi Arabia's 122.6 percent (index mundi, 2019). Therefore, many banks incorporate MB services as a core part of their organisational development plans, in order to stay competitive and improve performance (CBL, 2019). To this end, the Libyan government and central bank have invested substantial amounts in IT networks and payment systems that depend on mobile devices in order to increase adoption in this sector (CBL, 2019). Thus, this is the first study of

its type to examine the use of MB devices in a Libyan background and the factors that affect their use.

**Third**, when reviewing the existing e-banking literature in general and in particular the MB research in Libya, it is obvious that the majority of the e-banking studies have centred on the acceptance and adoption of e-banking services (Abukhzam & Lee, 2010; Bouthahab & Geador, 2014; A. Mostafa & Eneizan, 2018). To the best of the researcher's knowledge, no study has been conducted on customer behaviour at the post-adoption stage in MB. Hence, questions remain about the factors influencing MB customer behaviour in the post-adoption stage in Libya, in particular, the factors affecting trust and satisfaction.

**Fourth**, the volatile political situation in Libya has affected the banking sector in many ways. The most significant impact of political instability on Libya's banking sector is the current cash liquidity crisis. Therefore, banks in Libya have attempted to invest in developing several payment systems that rely on mobile devices. Hence, investigating customer trust and satisfaction in these systems is needed to evaluate the effectiveness and success of such services.

**Finally**, as the researcher is a Libyan citizen, and has experience in the Libyan banking industry, the accessibility of the data is more straightforward.

**Table 1.1 Statistics of Libya and other MENA countries.**

Statistics	Libya	Egypt	Tunisia	Morocco	Saudi Arabia
Population density (worldometer, 2020)	4 per Km2	103 per Km2	76 per Km2	83 per Km2	16 per Km2
Internet adoption (Internet World Stats, 2020)	74.2%	48.1%	66.8%	64.3%	91.5 %
Mobile phone penetration (Freedom House, 2019; index mundi, 2019).	172%	95%	128%	124%	122.6%
number of commercial bank branches (per 100,000 adults) (THE WORLD BANK, 2018a)	11.4	5	22.1	24.9	8.3
Account ownership at a financial institution (THE WORLD BANK, 2018a)	65.7%	32.8%	36.9%	28.6%	71.7%

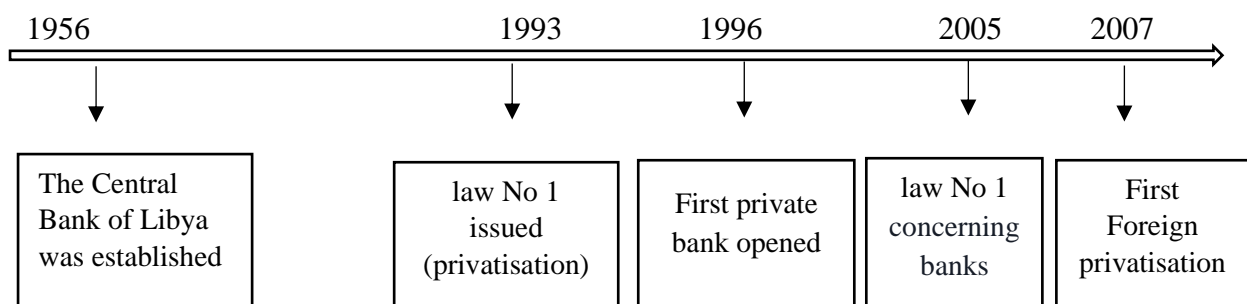
#### **1.8.4 Libyan Banks**

Having discussed and justified the selection of Libya as a context of this research. It is important to shed light on the Libyan banking system and the electronic banking services which are provided by Libyan banks. The Libyan banking system is formed mainly of the Central Bank of Libya (CBL), commercial banks and specialised banks. The Central Bank of Libya (CBL) was founded on April 1, 1956, to replace the previously established Libyan Currency Committee, which was restricted to backing the issued local currency with Sterling assets (CBL, 2019). The CBL regulates and supervises the Libyan commercial banks according to Law No. 1 of 2005. Its responsibilities in addition to supervising the banks' operations involve issuing the Libyan currency, ensuring financial stability, governing the monetary policies, managing banking reserves and controlling the foreign exchange market (CBL, 2019).

Concerning specialised banks in Libya, there are three specialised banks, namely the Development Bank, Real Estate Investment Bank and the Agricultural Bank. These three specialised banks are governed by special legislation and are operated by the Libyan

government. The main aim of establishing these banks is to provide special loans and advisory for individuals, investors and cooperatives.

Regarding the commercial banks operating in Libya, there are five public banks with more than 500 branches across all Libyan regions and 10 private banks. The Libyan commercial banks were mainly owned by the public sector until 1993 when the central bank of Libya issued the law No 1 allowing to open private banks in the country (CBL, 2019). After that, there have been many attempts by local and foreign investors to access the Libyan banking sector. The Bank of Commerce and Development was founded in 1996 as Libya's first private bank. Jumhouria Bank, National Commercial Bank, Wahda Bank, Sahara Bank, and North Africa Bank are the public banks in Libya. As a result of the privatisation legislation of public commercial banks in Libya in 2007, two of these banks were privatised. In September 2007, France's BNP Paribas acquired a 19% stake in Sahara Bank (BNP Paribas, 2007), and the Jordan-based Arab Bank secured a tendering process to buy a 19% stake in Wahda Bank with management control in 2008 (CBL, 2019). The Libyan private banks are Aman Bank for Commerce and Investment, Bank of Commerce and Development, Wafa Bank, First Gulf Libyan Bank, Assaray Trade & Investment Bank, Mediterranean Bank, Alejma'a Alarabi Bank, United Bank for Commerce & Investment, Arab Commercial Bank, Nuran Bank and Al Waha Bank (CBL, 2019). Figure 1.2 presents a timeline for important banking events in Libya.



**Figure 1. 2 A timeline for important banking events in Libya**

### **1.8.5 Electronic banking Services in Libya**

The advent of the internet and the development of the communication sector in Libya have played essential roles in developing electronic banking channels, which have enhanced the quality of the banking services, especially the accuracy and speed of banking transactions. In 2005, the Central Bank of Libya played a key role in reorganising the Libyan commercial banks, inducing banks to look for investment opportunities (Abukhzam & Lee, 2010). Most importantly, the efforts to embrace electronic banking. The Bank of Commerce and Development, a private bank, was scheduled to become the leading bank to initiate internet banking in 2005. Since then, all the Libyan commercial banks have begun to adopt e-banking services but with very limited usage.

In 2009, the Central Bank of Libya selected the Flex Cube Banking system as an integrated banking system to deploy a centralised environment for information technology (CBL, 2019). The most important features of this system are the possibility of carrying out banking transactions through any branch, supporting open accounts in different currencies, supporting multiple means of communication, supporting multi-channel payment, implementing automatic financial transfers between accounts, enabling bill payment electronically, supporting the use of MB and supporting the communication with the national payment system components such as electronic clearing system and the point of sale POS.

This development in information technology has provided banks with means to facilitate electronic services such as online and MB. Since then, all Libyan banks have invested in offering online banking. However, the adoption rate of these services has been considered low (Abukhzam & Lee, 2010). Thus, the need for increasing the adoption of electronic banking services is growing as a strategy for the CBL and the Libyan Government to counter the increasing pressure of the cash liquidity crisis which is afflicting Libyan banks currently.

Hence, the CBL and commercial banks have been prompted to take steps towards these challenges.

Given the fact that Libya has a high rate of mobile phone penetration with 172% in 2019 (Freedom House, 2019) and the internet adoption is 74.2% of the population in 2020 (Internet World Stats, 2020), Libyan banks have begun to seize these opportunities. They have invested in developing MB and other e-payment systems that rely on mobile devices to provide individuals and businesses with e-banking services. An example of these services is Pay me, which was established in 2016 by Bank for Commerce & Development BCD (BCD, 2020). This service is based on a contract under which the bank deducts the amount of purchase of goods and services from the customer's account in favour of the retailer. The customer has to be subscribed in MB and has the app on his/her mobile device; simply, the customer provides his/her mobile phone number to the retailer to be put with the amount of the purchase in the seller's application. The purchaser then receives an SMS from the bank asking them to approve the payment. The other Libyan commercial banks have initiated many other mobile payment innovations, such as Mobi cash in Wahda Bank and Masterpass QR in Aman Bank.

### **1.9 Research hypotheses**

As mentioned, the current research aims to investigate the factors affecting trust and customer satisfaction in MB. In addition, this study aims to explain the mediating effect of trust on consumer satisfaction with MB. Based on the research aim and objectives, there are 11 hypotheses which shape the basis of this research to be tested in the empirical analysis. These hypotheses are formulated as follows:

***H1: Trust positively influences customer satisfaction within MB.***

This hypothesis aims to understand to what extent trust affects customer satisfaction within the MB context. Supporting this hypothesis will provide evidence of the relationship between trust

and user satisfaction and, as a consequence, present valuable information for bankers to implement strategies to address issues related to trust and satisfaction.

In addition to H1, there are 10 hypotheses. 5 hypotheses deal with the factors that affect trust in MB, while the other 5 hypotheses examine the indirect effects of the independent variables in the conceptual model on user satisfaction via the mediating effect of trust.

***H2a:** System quality has a positive influence on trust within MB.*

***H2b:** Trust acts as a mediator between system quality and customer satisfaction within MB.*

***H3a:** Information quality has a positive influence on trust within MB.*

***H3b:** Trust acts as a mediator between information quality and customer satisfaction within MB.*

***H4a:** Service quality has a positive influence on trust within MB.*

***H4b:** Trust acts as a mediator between service quality and customer satisfaction within MB.*

***H5a:** Task characteristics has a positive influence on trust within MB.*

***H5b:** Trust acts as a mediator between task characteristics and customer satisfaction within MB.*

***H6a:** Structural assurance has a positive influence on trust within MB.*

***H6b:** Trust acts as a mediator between structural assurance and customer satisfaction within MB.*

The hypotheses H2a, H3a, H4a, H5a and H6a aim to identify the factors that affect trust in MB based on the conceptualisation of trust in e-commerce. Supporting these hypotheses provides constructive information for banks to understand the factors that need to be taken into account when addressing customer trust issues.



On the other hand, the hypotheses H2b, H3b, H4b, H5b and H6b aim to investigate the indirect effects of the five independent variables in the research model on user satisfaction through trust as mediator. Supporting these hypotheses enables researchers and practitioners to understand how trust can play an important role as mediator to enhance customer satisfaction within MB. In addition, the degree of mediation, i.e., full mediation or partial mediation.

### **1.10 Preface to Research Methodology**

The primary goal of this study is to identify the factors that influence customer trust and satisfaction with MB, and to investigate the role of trust as a mediator in improving customer satisfaction within MB. Therefore, the target entire population is the current MB customers in Libya. The data were collected using a cross-sectional questionnaire which was collected through the BOS online survey. Following the development of the study questionnaire, a pilot study was carried out to ensure that there were no ambiguities in the questionnaire items and to assess the time required to answer the question. It also aimed to use Cronbach alpha to test the internal consistency of the research model. The online survey method was employed as the most appropriate approach to gathering an adequate sample size from various regions and banks in Libya (Iacobucci & Churchill, 2010). In order to obtain access from as many participants as possible, the data were gathered from the most prominent banking communities in Libya and were particularly important as participants were from all the regions and banks.

After three invitations in three months, 683 responses were collected using the convenience nonprobability sampling technique. 26 of the responses were excluded in the data screening stage, resulting in 659 valid responses for further data analysis. These responses were then entered into the Statistical Package for the Social Sciences (SPSS) version 26.0 for descriptive analysis of the respondents' demographic and experience characteristics. The conceptual model of this research was examined using structural equation modelling with partial least squares PLS-SEM.

This study employed a two-stage data analysis approach, using SmartPLS 3 software. Firstly, the measurement model is analysed to evaluate the relationships between latent variables and their indicators in order to determine the research model's validity and reliability. Secondly, the structural model is analysed to assess the relationships between the latent variables contained within the structural model. The structural model was analysed using these procedures: collinearity level, path coefficients, Coefficient of Determination  $R^2$ , Effect size  $F^2$ , Predictive relevance  $Q^2$ . Also, it examined the PLS predict criterion to test the out-of-sample predictive power (Hair, Risher, Sarstedt, & Ringle, 2019). Further, after testing the measurement and structural models, the mediation effect analysis was used to assess the mediating impact of trust using the technique recommended by (Zhao, Lynch, & Chen, 2010). The methodology of this research is discussed in detail in chapter 5.

### **1.11 Organisation of the study**

This section outlines the organisation of this thesis, which is structured into eight chapters as follows:

**Chapter one** introduces the background and the rationale of the research, the research problem, the research questions, aim and objectives, and the research context, i.e., Libya, followed by a brief of the methodology used in the research.

**Chapter 2** discusses the issues related to trust and satisfaction in MB. It also summaries the systematic literature review conducted to review trust research in MB in order to identify the literature gaps that the current research aims to bridge. In addition, it analyses trust concepts in e-commerce to conceptualise trust in MB, and discusses the relationship between trust and satisfaction within the MB context.

**Chapter 3** reviews the literature relevant to customer behaviour in information systems and e-commerce fields and the theories that have been used in to investigate customer behaviour in

these research areas. Further, it presents the information system success model (DeLone & McLean, 2003) and discusses the rationale for adopting this model as the theoretical underpinning of this research.

**Chapter 4** produces the conceptual model of trust and satisfaction in MB, and discussed the 11 hypotheses formulated from the paths between the seven variables in the research conceptual framework.

**Chapter 5** discusses the methodology used in this research to empirically examine the measurement and structural models, and the mediation analysis approach employed to evaluate the mediating impact of trust. It discusses the philosophical paradigm of the research, research strategy, approach and design. It also presents the data collection procedure, justification of the online survey adoption, development of the questionnaire and operationalisation of the variable in the research model. Furthermore, it discusses the sampling procedure to collect representative data from the research population. and justification for the sampling strategy used in the research. Finally, it discusses and justifies the utilise of the PLS-SEM technique and the procedures used to analyse the data collected.

**In Chapter 6**, the data analysis and the research findings are presented. It begins with discussion of the data procreation and screening procedures, including editing and coding the data, testing missing data, suspicious response patterns, outliers, normality and common method bias. The chapter continues with reporting the descriptive statistics analysis, which includes analysis of demographic variables and descriptive analysis of latent variables. The chapter then presents the results of the measurement model assessment, including the results of reliability and validity of the constructs in the model, and assessment of the structural model, including the hypotheses test and the model evaluation. The last section in chapter 6 reports the results of the mediation effect analysis of trust.

**Chapter 7** discusses the research findings, presenting the importance of the research results and comparing them with findings of the existing MB literature. Finally, **chapter 8** provides a summary of the theoretical and managerial implications of the research, research limitations, directions for future work.

## **Chapter 2 Literature Review: The Role of Trust within the MB Context**

### **2.1 Introduction**

Trust is widely regarded as the most important predictor of consumer behaviour in the e-business setting, especially in e-commerce (Hallikainen & Laukkanen, 2020; McKnight, Choudhury, & Kacmar, 2002a). The goal of this chapter is to conduct a systematic review of trust literature in MB to identify gaps that need to be filled regarding the effect of trust on consumer behaviour in the post-adoption stage of MB, specifically user satisfaction. This systematic review of trust in MB will lead to a review of the trust concept in e-commerce in order to conceptualise trust in the MB context.

### **2.2 Introduction on Trust in MB**

Trust has long been regarded as a critical component of resolving risk and ambiguity in the majority of business and social relationships. It is also the most critical factor influencing consumer behaviour in online environments due to the risk and uncertainty situations associated with such environments (Pavlou, 2003). Previous research has proved that the lack of trust has a negative effect on relationships established on the internet in various contexts such as e-commerce (Gefen, Karahanna, & Straub, 2003; Hallikainen & Laukkanen, 2018; McKnight, Choudhury, & Kacmar, 2002b; Shareef et al., 2018).

In the MB context, trust has been widely investigated, and researchers have confirmed the vital role of initial trust in the acceptance, adoption and use of MB services (Alalwan et al., 2017; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2016; Sun, Sun, Liu, & Gui, 2017; Susanto, Chang, & Ha, 2016; Zhou, 2014). For example, Baptista and Oliveira (2016) conducted a meta-analysis study to understand the key factors that influence MB user acceptance. The authors found that trust is one of the most important predictors of intention to use MB. In addition, Zhou (2011) developed a framework to investigate the impact of initial trust on MB user

adoption. The findings of the study revealed that initial trust has a significant influence on the usage intention of MB. Oliveira et al. (2014) investigated the adoption of MB by combining three information systems theories which are the unified theory of acceptance and usage of technology (UTAUT), the task technology fit (TTF) and the initial trust model (ITM). These three theories were used to propose a framework to explain the relationship between customer perception of MB, initial trust and task technology fit. The study found that initial trust has the most significant impact on behavioural intention towards the adoption of MB.

### **2.3 Importance of Trust in MB**

Due to the risk and uncertainty inherent in online environments, trust has long been regarded as a critical factor influencing consumer behaviour (Fang et al., 2014a; McCole et al., 2019b). As mentioned, trust has been extensively studied in the context of MB, with studies confirming the critical role of initial trust in the acceptance, adoption, and utilisation of MB services (Alalwan et al., 2017; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2016; Sun et al., 2017; Susanto et al., 2016; Zhou, 2014). MB enable users to conveniently access account balances and conduct banking transactions such as bill payment and fund transfers through cyber connections at any time and from any location (Tam & Oliveira, 2017b). In addition, MB can reduce financial fees in comparison to other traditional banking networks (Abdullah M. Baabdullah et al., 2019). These target benefits of MB are valuable only if users trust MB services and are satisfied with it. As a result, banks must persuade clients to utilise MB services more regularly. Thus, establishing trust within MB as a precondition for user satisfaction is crucial for a bank's long-term strategies. This means that banks will struggle to shape customer satisfaction in the absence of trust. As a result, banks must develop marketing strategies that highlight the characteristics of MB in order to improve MB users' perceptions of MB services, thereby increasing their trust in such services.

## **2.4 Trust Research in the MB Literature**

Over the last ten years, trust in MB has frequently grabbed attention from scholars in MB research. As a result, there are different points of view regarding trust types, dimensions, antecedents and outcomes. A review of the literature can lead to the identification of limitations, contradictions, and gaps in the literature that need to be bridged. Table 2.1 summaries selected MB studies, which focus on trust in MB or integrating trust as a construct in conceptual frameworks to study its impact on other investigations related to MB.

**Table 2.1 Selected empirical trust literature in MB**

Author	Knowledge Gap/Contribution	Trust type	Trust position	Trust Antecedents	Trust Outcomes	Theoretical limitations
Lee & Chung, 2009)	To determine how MB-related quality factors influence satisfaction and trust.	Interpersonal-based trust	Dependent	System quality Information quality	customer satisfaction	Familiarity with MB can be used as a moderator variable. The variables used in the study do not represent the inherent characteristics of the mobile context. Other variables may have an effect on user satisfaction within MB.
(G. Kim et al., 2009)	To understand the impact of relative benefits, personal propensity to trust, structural assurances and firm reputation on the formation of initial trust in MB.	Institutional-based trust. Personality-based trust.	Mediator	Relative benefits propensity to trust structural assurances	intention to use MB	Many other factors (e.g., system quality) can have influences on initial trust. Future work is needed to investigate actual behaviour, not only intention to use.
(Gu, Lee, & Suh, 2009)	To identify the determinants of users' intention to MB.	Institutional-based trust.	Independent	Structural assurance Calculative-based trust	Behavioural intention towards MB.	The model needs to be extended by integrated more antecedents and diverse theoretical models.
(Zhou, 2011)	To examine the effect of initial trust on the adoption of MB.	Institutional-based trust. Interpersonal-based trust.	Dependent	Structural assurance. Information quality.	Usage intention	The influences of bank reputation and perceived cost on initial trust need to be investigated.
(Lin, 2011)	To investigate the impact of innovation attributes on the attitude toward and behavioural	Institutional-based trust.	Independent	N/A	Attitude towards the adoption and use of MB.	Other factors influencing customer attitude and use of MB such as risk. Alternate theories can be used to understand



	intention to adopt and continuous use of MB.					customer attitudes and use of MB.
(Thakur, 2014)	To measure the role of customer satisfaction and trust in developing customer loyalty in MB.	Interpersonal-based trust.	Independent	N/A	Loyalty	Other factors that may have effects on customers' perception of trust in MB need to be further explored.
(Oliveira et al., 2014)	To understand the relationships between customer's perceptions of MB, initial trust in MB, and task-technology fit.	Institutional-based trust.	Independent	Structural assurance	Behavioural intention towards MB.	The post-adoption trust structure differs from the initial trust structure in the adoption stage. As a result, it is necessary to investigate trust antecedents in the post-adoption stage.
(Malaquias & Hwang, 2016)	To identify the determinants of trust in MB.	Institutional-based trust Interpersonal-based trust.	Dependent	Age, gender, risk, social influence, task characteristics and personal innovativeness.	N/A	N/A
(Baptista & Oliveira, 2016)	To understand the key factors affecting MB customer acceptance.	Institutional-based trust	Independent	Structural assurance	Intention to use MB.	N/A
(Susanto et al., 2016)	To investigate the determinants of continuance intention to use MB.	Institutional-based trust	Independent	Perceived usefulness, security and privacy confirmation	User satisfaction	N/A
(Afshan & Sharif, 2016)	to analyse the behavioural, environmental and technological dimensions of MB acceptance.	Institutional-based trust	Independent	Familiarity, structural assurance, performance expectancy effort expectancy	Behavioural intention toward adoption of MB	The impact of propensity-based trust on initial trust should be investigated.

(Berraies et al., 2017)	To investigate the moderating role of age in the relationship between perceived MB values and trust, as well as the impact of perceived MB values on trust, satisfaction, and loyalty in MB.	Interpersonal-based trust	Independent	Quality value Monetary value Emotional value	Satisfaction Loyalty	Other variables such as quality factors related to MB should be considered. Future research can examine the mediating effect of trust and satisfaction.
(Alalwan et al., 2017)	To explore the factors influencing MB behavioural intention and adoption of MB.	Institutional-based trust.	Independent	N/A	Behavioural intention towards MB.	Factors related to culture need to be investigated. Actual use also should be given attention in future research.
(Sharma, 2017)	To identify the key antecedents of MB acceptance.	Institutional-based trust.	Independent	N/A	Behavioural intention to use MB.	There is a need to study the moderating effects of demographic variables for better understanding of MB behavioural intention.
(Shareef et al., 2018)	To investigate customers' behavioural intention to adopt MB at static, interaction, and transaction service stages.	Institutional-based trust.	Independent	Perceived uncertainty  Perceived security	MB adoption	The moderating influences of the cultural issues and demographic variables can be investigated to provide deeper understanding of MB adoption.
(Trabelsi-Zoghalmi et al., 2018)	To understand the evaluation of mobile service quality by customers in the MB context.	Institutional-based trust. Interpersonal-based trust.	Independent	Security Reliability Ease of use	Satisfaction and loyalty of MB.	Other variables should be considered such as e-reputation of the bank, customers' experiences and the demographic variables.
(Sharma & Sharma, 2019)	To understand actual usage of MB.	Institutional-based trust.	Independent	N/A	Intention to Use Satisfaction	the moderating effect of demographic variables can be investigated.
(Poromatikul, De Maeyer, Leelapanyale	To examine the drivers of continuance intention to MB apps.	Institutional-based trust.	Independent	N/A	Continuance intention Satisfaction	N/A

rt, & Zaby, 2019)					Perceived value	
(Shankar et al., 2020)	To investigate the role of positive e-WOM in enhancing MB adoption.	Interpersonal-based trust.	Mediator	Argument Quality, Valence, Consistency, Volume	MB adoption attention	Different mediating and moderating variables can be investigated to explore MB adoption intention.
(Thusi & Maduku, 2020)	To determine the factors that influence the acceptance and use of the MB app among a sample of millennial banking customers.	Institutional-based trust.	Independent	Structural assurance  Situational normality	Perceived risk  Behavioural intention to use MB.	N/A
(R. B. Mostafa, 2020)	To determine the effect of MB quality dimensions on customers' intention to cocreate value.	Interpersonal-based trust.	Independent and moderator	N/A	Customer value co-creation intention	Other moderating variables such as gender and social presence can be investigated

The existing literature of trust in MB (table 2.1) demonstrates the critical role of trust as a key factor in both the pre-adoption and post-adoption stages in the MB context. However, it can be observed from the trust literature in MB that there is no consensus regarding trust's concept, antecedents and outcomes. The reason behind this disagreement can be related to the nature and focus of research. According to McKnight and Chervany (2001), most MB trust research is empirical, with conceptualizations of trust narrowed to fit their research types.

When reviewing how the trust concept has been explained in the MB context, it is obvious that scholars have relied on different perspectives to develop the concept of trust. For instance, the majority of research focuses on institutional-based trust and neglects other perspectives that can provide a profound interpretation of trust such as trusting beliefs (Afshan & Sharif, 2016; Baptista & Oliveira, 2016; Chung & Kwon, 2009; Hanafizadeh, Behboudi, Abedini Koshksaray, & Jalilvand Shirkhani Tabar, 2014; Shareef et al., 2018; Sharma & Sharma, 2019; Thusi & Maduku, 2020; Zhou, 2014). In addition, other researchers have adopted only the interpersonal-based trust perspective (Berraies et al., 2017; K. C. Lee & Chung, 2009; Shankar et al., 2020; Thakur, 2014). Few researchers have considered two or more types of trust (G. Kim et al., 2009; Susanto et al., 2016; Trabelsi-Zoghalmi et al., 2018).

Concerning the antecedents that have been used to investigate trust in MB, some researchers have only focused on limited aspects of the MB system. For example, Malaquias and Hwang (2016) considered a set of factors such as Task Characteristics, Social Influence and Risk, with less emphasis on other aspects of MB such as factors that are associated with the quality aspects of the MB system, which are proved by many scholars to have substantial impact on trust in the e-commerce contexts. Similarly, G. Kim et al. (2009) used only factors related to benefits of MB and its reputation to investigate initial trust in MB, and neglected other factors linked to the characteristics of the MB system such as information quality and system quality. Thusi and Maduku (2020) investigated trust in MB only from the perspective of security to identify the

determinants of MB acceptance. Shankar et al. (2020) investigated the role of positive e-WOM in enhancing trust in MB, and in turn, MB adoption.

Many researchers, on the other hand, have confused trust with its antecedents. Sharma and Sharma (2019), for example, investigated trust as an independent variable that affects the use and satisfaction of MB. In their model, the authors placed trust with other independent variables such as information quality and system quality, which are considered as predecessors of trust in other MB and e-commerce studies (K. C. Lee & Chung, 2009; Zhou, 2012b). The effect of trust in the MB literature has also been confused. Chung and Kwon (2009) for example, trust was seen as a moderator of the relationship between MB quality factors and user satisfaction. Other researchers saw trust as a mediator variable (G. Kim et al., 2009). On the other hand, trust has been considered as an independent variable by other researchers (Malaquias & Hwang, 2019; Sharma & Sharma, 2019).

Regarding the outcomes of trust, the majority of trust research in MB has investigated trust as a determinant of users' behavioural intention toward accepting, adopting or using MB (Afshan & Sharif, 2016; Baptista & Oliveira, 2016; Hanafizadeh et al., 2014; Luo, Li, Zhang, & Shim, 2010; Zhou, 2011). By comparison, very few studies have examined the influence of trust on post-adoption user behaviour in MB (K. C. Lee & Chung, 2009; Tam & Oliveira, 2016b).

Therefore, and as a result of the discussion above concerning the gaps in the trust research in MB, this research attempts to bridge these gaps. One of the key contributions of this research is to examine the influence of trust on customer behaviour in the post-adoption stages of MB to address the gap in the MB literature in this field. Hence, to fulfil this aim, it is important to conduct a systematic review of the trust literature in MB to eliminate the irrelevant studies (those studies that focused exclusively on the pre-adoption stage of MB) and to identify the gaps and the limitations in this field of research.

## **2.5 Systematic Literature Review of Trust Research in MB**

In the present research, the systematic literature review approach is adopted as a method to organise and analyse the previously published literature related to trust in MB. Using this approach can provide insights into the relationships, contradictions in the literature and reveal gaps that need to be bridged (Ha, Canedoli, Baur, & Bick, 2012). The present research follows two main steps in order to conduct a systematic literature review on trust in the MB literature. The first step is to select the MB articles that are related to trust. The second step is to analyse the trust literature in MB to eliminate the irrelevant studies and to focus on the studies that have investigated overall trust in the post-adoption stage of MB. These steps are illustrated in figure (2.1).

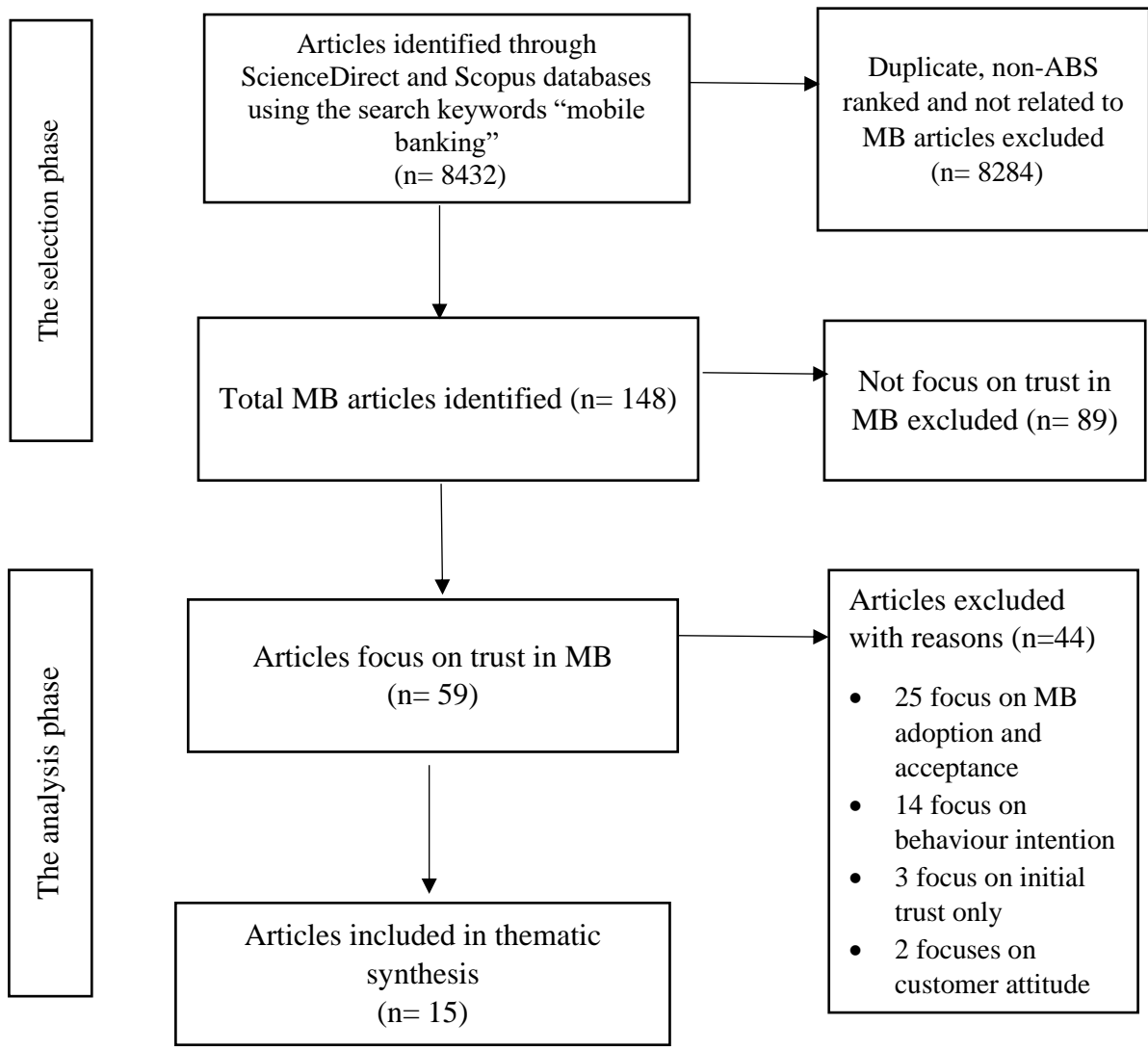
### **2.5.1 Literature Selection and Analysis Process**

In the first phase, two databases were searched; Scopus and Science Direct, because these databases comprise most of the leading journals in the domains of information systems and business. To achieve comprehensive results, the search timeframe for the literature was conducted from 2005 to 2021. The purpose of this phase was to use criteria to eliminate articles that were not related. The articles were selected based on their publication in peer-reviewed journals and did not include book chapters or proceedings from conferences. To assure the quality of the articles, each article must have a ranking of one star or above in the ABS journal ranking for business journals.

The selection phase began with a search for initial results. According to figure (2.1), 8432 items were returned when the search terms "mobile banking" were entered in the Scopus and Science Direct databases. The irrelevant results then were excluded in the next step. The articles that were duplicated in both databases, the articles that were not primarily linked to MB, and the articles that were not included in the ABS journal ranking were deemed irrelevant. After excluding irrelevant results, a total of 148 MB articles were obtained.

As previously discussed, the current study is focused on the impact of trust in the post-adoption consumer behaviour, more specifically on the impact of overall trust on the establishment of user satisfaction in MB. Hence, the third step of the selection phase was to eliminate from the identified MB articles those that were not focused on trust. This step led to 59 germane articles being identified (figure 2.1).

The second stage involved excluding articles that did not specifically address the impact of trust in the post-adoption customer behaviour. This process requires that any article that investigates initial trust, the impact of trust in accepting and adopting MB, or behavioural intention towards MB must not be taken into consideration. As a result, 44 articles were excluded from consideration for a variety of reasons. 25 articles addressed MB acceptance and adoption, 14 articles addressed behaviour intention toward MB use, three articles related to initial trust, and 2 articles covered user attitude towards MB. Consequently, 15 articles were selected for further discussion and to identify gaps in the literature regarding the role of trust in post-adoption consumer behaviour. Table 2.2 indicates the source of these 15 articles and also the number of articles published in each journal.



**Figure 2. 1 A systematic literature review of trust research in MB (Geebren & Jabbar, 2021)**



**Table 2.2 Sources of the articles included in the analysis of the trust research in MB**

Journals	Number of articles	Sources
International Journal of Bank Marketing	7	(Sampaio et al., 2017); (Berraies et al., 2017); (Arcand et al., 2017); (Thakur, 2014); (Poromatikul et al., 2019); (R. B. Mostafa, 2020); (Komulainen & Saraniemi, 2019)
Computers in Human Behaviour	1	(Malaquias & Hwang, 2016)
International Journal of Information Management	2	(Sharma & Sharma, 2019); (Malaquias & Hwang, 2019)
Interacting with Computers	1	(K. C. Lee & Chung, 2009)
Total Quality Management and Business Excellence	1	(Trabelsi-Zoghلامي et al., 2018)
Industrial Management and Data Systems	1	(Susanto et al., 2016)
Journal of Electronic Commerce Research	1	(Malaquias & Hwang, 2017)
Technology Analysis and Strategic Management	1	(Liébana-Cabanillas, Alonso-Dos-Santos, Soto-Fuentes, & Valderrama-Palma, 2017)

### 2.5.2 Key Studies

When analysing the 15 studies that investigate the impact of trust on customer behaviour in the post-adoption phase of MB, it is clear that trust has been examined from a variety of perspectives. Additionally, there are significant research gaps in this field that need to be addressed. The key studies used in the analysis of the trust research involving MB post-adoption consumer behaviour are summarised in Table (2.3).

**Table 2.3 Key studies included in the analysis of the trust research in MB** (Geebren & Jabbar, 2021)

Study	Knowledge Gap/Contribution	Trust Antecedents	Trust Outcome	Theory used	Theoretical Limitations
(K. C. Lee & Chung, 2009)	Investigating the impacts of service quality and system quality on trust and satisfaction.	System quality and information quality	Satisfaction	D&M model	The variables in the study do not represent the characteristics of the mobile setting.
(Thakur, 2014)	Characterising satisfaction and loyalty in MB.	N/A	Loyalty	trust – commitment theory	Other factors might affect perception of customers towards trust in MB need to be further explored.
(Malaquias & Hwang, 2016)	Analysing the determinants of trust in MB.	Risk, age, task characteristics, gender, social influence and personal innovativeness.	N/A	N/A	Further research is needed to investigate trust in MB.
(Susanto et al., 2016)	Examining the factors that influence the intention to continue use of MB.	confirmation following the initial use of MB, Perceived security, perceived usefulness	Satisfaction	Expectation Disconfirmation Theory (EDT)	N/A
(Sampaio et al., 2017)	Examining the role of perceived justice as a moderator in the relationship between the benefits of MB and the implications of satisfaction with MB.	Satisfaction	N/A	The theory of justice	N/A
(Malaquias & Hwang, 2017)	Analysing the relationship between trust in MB and hedonic/utilitarian perspective values.	Utilitarian value of mobile devices, social influence, gender and personal innovativeness	N/A	N/A	different measurement methods are needed to evaluate hedonic and utilitarian perspective values
(Liébana-Cabanillas et al., 2017)	Determining the variables of loyalty in MB	Satisfaction	loyalty	N/A	other precedents can be added such as security and privacy

(Berraies et al., 2017)	Determining the impact of MB's perceived values on customer trust, satisfaction, and loyalty	quality, price and emotional perceived values	Satisfaction and loyalty	N/A	Other variables are needed to investigate trust in MB, such as service quality. Further research to examine the mediating effect of trust and satisfaction
(Arcand et al., 2017)	Examining the multidimensional concept of MB service quality and its impact on the relationship with customers.	Security, privacy and practice.	Commitment and satisfaction	Trust commitment theory	N/A
(Trabelsi-Zoghalmi et al., 2018)	Understanding how consumers assess the quality of mobile services in MB.	Privacy Security, ease of use and reliability	Satisfaction and loyalty	N/A	Other variables can be considered to provide a better understanding of the study model
(Sharma & Sharma, 2019)	Understanding the actual usage of MB.	N/A	Satisfaction and intention to use	D&M model	N/A
(Poromatikul et al., 2019)	Examining the determinants of continuance intention to MB apps.	N/A	Continuance intention Satisfaction Perceived value	ECSI model	N/A
(Komulainen & Saraniemi, 2019)	Understanding customer experience and associated value of a new MB service.	N/A	Customer experience	N/A	N/A
(Malaquias & Hwang, 2019)	Comparing the determinants of MB use between Brazil and the US.	N/A	MB USE	TAM model	Inclusion of other constructs in the model.
(R. B. Mostafa, 2020)	Investigating the impact of the MB quality dimensions on customers' value co-creation intention.	N/A	Customer value co-creation intention	TAM model and (S-D) logic	Other moderating variables such as gender and social presence can be investigated

On reflection and an in-depth look at table 2.3, it is obvious that most studies have centred on limited aspects of MB. In addition, they ignored the characteristics of the MB system such the quality factors of the MB system and security issues associated with the use of MB (Arcand et al., 2017; Berraies et al., 2017; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2017; Thakur, 2014). For example, Malaquias and Hwang (2016) adopted a number of factors such as social influence, risk and task characteristics, and ignored other important sides of MB, such as the quality factors of the MB system, which are proved by many scholars as they have significant effects in the e-commerce and information systems contexts. Besides, Malaquias and Hwang (2017) considered only the impacts of social influence, gender, age, personal innovativeness and value perspectives. In contrast, Susanto et al. (2016) focused only on privacy, security factors of MB, and its usefulness, and neglected the other characteristics of the MB system.

While this may sound strange, some researchers have attempted to argue that customer behaviours such as satisfaction is an outcome of trust (Liébana-Cabanillas et al., 2017; Sampaio et al., 2017). Sampaio et al. (2017), for example, investigated how perceived justice affects the relationship between the benefits of MB and the effects of user satisfaction in MB. Their results revealed that trust is a consequence of customer satisfaction with the other two consequences: positive word-of-mouth and loyalty. Furthermore, some researchers have confused trust with its antecedents (Liébana-Cabanillas et al., 2017). Sharma and Sharma (2019), for example, investigated trust as one antecedent influencing satisfaction and intention to use in conjunction with other antecedents such as information quality and system quality, both of which are thought to be precursors of trust in other studies (Zhou, 2012b). Moreover, although some researchers proved that trust is a key factor in the MB post-adoption stage, they did not investigate how trust can be formed (R. B. Mostafa, 2020; Poromatikul et al., 2019; Sharma & Sharma, 2019).

Overall, it is clear from the findings of the systematic literature review of trust research in MB that no comprehensive study has been conducted to examine the factors affecting trust in the post-adoption stage of MB. Thus, it is essential to understand the concept of trust in MB by delving into its definitions, dimensions, and defining the conditions under which trust can exist (McKnight & Chervany, 2001). McKnight and Chervany (2001) highlight the need for a consistent conceptualisation of trust in e-commerce contexts. This enables researchers to communicate with practitioners effectively in order to provide them with practical solutions for trust concerns. Thus, the current study aimed to evaluate the impact of a range of factors on trust and, in turn, customer satisfaction.

## **2.6 Trust Definition**

The term trust has been widely studied in a range of various fields, such as Psychology, Business and Organisational Behaviour. Because of its multidimensional nature and complexity, trust can be studied from a variety of angles and applied to a variety of settings. This such nature of trust has led to a disparity between disciplines concerning trust concept (McKnight et al., 2002a). Trust concept involves thoughts from Sociology, Organisational Behaviour, Psychology, Marketing, Economics, Strategy, Information Systems and Decision Making. Table 2.4 shows a summary of some definitions of trust derived from many disciplines.

**Table 2.4 A summary of trust definitions in different disciplines**

Author	perspective	Trust Definition
(Rotter & Rotter, 1967)	Psychology	Trust is the expectation that a person or a group may rely on another individual or group's word, commitment, verbal or written declaration.
(Cook & Wall, 1980)	Psychology	Trust refers to the extent to which individuals are willing to pay attention to others and the level of confidence in their actions.
(Burke & Stets, 1999, p. 348)	Sociology	Trust is described as the belief that the other party is acting in our best interests.
(Doney, Cannon, & Mullen, 1998)	Sociology	Trust is about whether individuals have a willingness to rely on other parties.
<b>(Mayer, Davis, &amp; Schoorman, 1995)</b>	Institutional	Trust is the vulnerability of a party towards the action of another party depending on he/she expectations that the other party will act particular necessary actions regardless of the ability to observe or control these actions.
(Rousseau, Sitkin, Burt, & Camerer, 1998)	Institutional	Trust refers to a psychological condition characterised by a party's intention to show vulnerability in response to high expectations of another party's action or behaviour.
Moorman, Deshpande, and Zaltman (1993, p. 82)	Marketing	“Willingness to rely on an exchange partner in whom one has confidence.”

As shown in table 2.4, trust has been viewed from many perspectives. Psychologists view trust from the perspective of the personal characteristics of partners who are involved in trusting relationships, and the internal cognitions that these characteristics can produce (Rotter & Rotter, 1967). In addition, trust is seen from the sociology perspective as a construct of social characteristics embedded in relationships among individuals or organisations (Lewicki & Bunker, 1995). Furthermore, there is the integrated sociological and psychological perspective of trust, which views trust as the notion that partners expect positive behaviours regarding the

vulnerability of risk and willingness to rely on others (Doney et al., 1998; Rousseau et al., 1998). The institutional perspective, on the other hand, considers trust as the vulnerability to taking risks and the actions associated with this risk (Rousseau et al., 1998). Moreover, trust in the marketing field is the critical factor in the relationships established among exchange partners (Morgan & Hunt, 1994). Despite the differences in emphasis and approach, researchers' efforts to conceptualise trust have yielded similar characteristics of trust. The fundamental factors of trust are vulnerability, which describes the risk taken by a party to be involved in a certain environment, and how this party behaves in the interest of another part (Rousseau et al., 1998).

## **2.7 Trust Concept in E-Commerce**

As the current research aims to investigate the factors which affect trust in MB and the role trust plays in shaping user satisfaction within MB, it is a cognitive rationale to consider the trust concept in e-commerce in order to conceptualise trust in MB. The concept of trust in the e-commerce context stems from sociology, psychology and institutional discipline. It can be noticed that most of the trust definitions in e-commerce agree with the state of being vulnerable to expecting a particular action from one party towards the interest of the other party (Gefen, 2002; Jarvenpaa, Tractinsky, & Vitale, 2000; Mayer et al., 1995). According to Mayer et al. (1995)'s definition, trust is considered as a behaviour (willingness) that provides a condition for a party to trust others, which is the risk associated with another party's action. Also, it highlights the trustee's characteristics in conducting this action. These characteristics are known as the key trusting beliefs, which form the trust concept, according to Mayer et al. (1995). These trusting beliefs are ability, integrity and benevolence.

In general, trust has been described as a vital determinant of individuals' engagement in e-commerce. However, there is no consensus regarding the construction and outcomes of trust. For example, Pavlou (2003) studied trust only from the interpersonal view and concluded that reputation of vendors and satisfaction with previous transactions have positive impacts on trust

and negative impacts on perceived risk. Although these factors provided insights into the construction of trust in e-commerce in the early stage, Pavlou (2003) neglected other factors that can affect trust in e-commerce such as security, privacy and quality of the vendor's website. Cheung and Lee (2006) empirically studied trust in e-commerce from three theoretical perspectives (institutional-based trust, interpersonal-based trust and personality-based trust). They found that perceived competence, perceived integrity, perceived security control, third-party recognition and legal framework influence customer trust in e-commerce. W.-T. Wang, Wang, and Liu (2016) adopted the interpersonal perspective of trust to evaluate the role of ability, integrity and benevolence as dimensions of trust concept in e-commerce. The authors used these three dimensions to investigate the influence of trust on relationship commitment and stickiness intention of e-commerce. Similarly, Bao, Li, Shen, and Hou (2016) used competence, integrity and benevolence to assess the influence of overall trust on the intention of purchase online. On the other hand, Hallikainen and Laukkanen (2018) used only the personality-based trust to study the impacts of the Hofstede's cultural dimensions on consumers' disposition to trust in e-commerce.

### **2.7.1 Trust Types and Dimensions**

Based on the discussion in the previous section regarding the trust concept in the e-commerce literature, this research argues that there is no consensus among researchers about the dimensions of trust in e-commerce. Thus, scholars have considered the dimensions of trust in e-commerce, relying on their views of trust and the phenomena they have intended to investigate. According to some scholars, trust is a common belief that can influence parties' willingness to be vulnerable to the actions of others (Gefen & Straub, 2000). Others, on the other hand, view trust as a set of distinct antecedents involving three dimensions, namely ability, integrity, benevolence (Hallikainen & Laukkanen, 2020; Skard & Nysveen, 2016).



Other researchers, however, view trust as a broad belief that can be extracted from a variety of factors (Mayer et al., 1995).

Regarding trust structure in e-commerce, researchers have investigated trust by adopting two main approaches. Some researchers consider trust to be multi-dimensional, based on one particular perspective, such as interpersonal trust (Fang et al., 2014; Gefen, 2002) or institutional-based trust (McCole, Ramsey, Kincaid, Fang, & Li, 2019a). Others considered trust also as multi-dimensional but based on more than one perspective of trust (Mayer et al., 1995; Y. Wang, Asaad, & Filieri, 2019).

The present research adopts the perspective of Gefen (2002), which considers trust in the e-commerce context as a multi-dimensional framework of more than one perspective. Hence, in order to deeply understand the trust concept in the e-commerce context, researchers should take into account the construction, types, dimensions and antecedents of trust (McKnight & Chervany, 2001).

The existing e-commerce literature has distinguished between three perspectives of trust, namely, interpersonal-based trust, institutional-based trust and personality-based trust (Cheng, Fu, & de Vreede, 2017; McKnight, Cummings, & Chervany, 1998). These three types can be utilised to conceptualise trust in various rang of e-commerce and information systems settings (Gefen, 2002; McKnight et al., 2002a). This research, therefore, intends to discuss these three types of trust, and to critically analyse how they can be used to conceptualise trust in MB in the three following subsections.

#### **2.7.1.1 Personality-based Trust**

This type of trust conceptualises trust as a set of individuals' characteristics (Rotter & Rotter, 1967). In other words, this notion considers trust as a psychological construct developed during an individual's early development. (M. K. Lee & Turban, 2001). Personality-based trust is

described as the extent to which one party consistently demonstrates a willingness to rely on another party or parties in a variety of circumstances (McKnight & Chervany, 2001). According to Mayer et al. (1995), willingness to trust shows how much trust a trustor expects from a trustee. Therefore, individuals vary in their willingness to trust, depending on their personality traits. Such a tendency is particularly essential in the initial stages of relationships, especially in e-business contexts (Mayer et al., 1995). However, over time, when individuals engage with a trusted party, it becomes less important due to the fact that individuals are impacted by the nature of the engagement itself (McKnight et al., 2002a)

In addition, personal characteristics cannot predict certain behaviours in many contexts, such as e-commerce. For example, it is difficult to explain why a customer tends to distrust a new online seller even if he or she has a great propensity to trust. Furthermore, the propensity to trust is an uncontrollable factor, which online vendors cannot change or impact. This makes it difficult to control individuals' actions (Yousafzai, Pallister, & Foxall, 2009). Therefore, and because of the nature of the current research, the personality-based trust type will not be considered in the conceptualisation of trust in MB.

### **2.7.1.2 Institutional-Based Trust**

The notion of institutional-based trust is derived from sociology. The institutional-based trust may be defined as the uncertainty linked to the exchange process within and between institutions and the behaviour that individuals expect from others (Yousafzai et al., 2009; Yousafzai, Pallister, & Foxall, 2003; Zucker, 1986). In other words, it refers to individuals' beliefs regarding impersonal structures and appropriate conditions that a business offers so individuals can feel safe to rely upon (McKnight et al., 1998). In the e-commerce environment, the institutional-based trust is commonly characterised by situational normality and structural assurance.

### **2.7.1.2.1 SITUATIONAL NORMALITY**

Situational normality refers to “one believes that the situation in a venture is normal or favourable or conducive to situational success” (McKnight & Chervany, 2001, p. 48). For example, the quality of an e-commerce website has a positive impact on customers (D. J. Kim, Ferrin, & Rao, 2008). When customers believe that their role and the seller's role in a particular website is normal, they will trust the seller in this situation. Many researchers have supported this view of trust. For example, Chen and Barnes (2007) confirmed that there is a strong association between initial online trust and users' perceptions of the websites. Ensuring situational normality is essential in building initial trust in e-commerce. This is due to the fact that to develop trust in a specific website, clear policies concerning privacy and security issues are required. Besides, online vendors should be willing to customise products and improve their reputation (McKnight et al., 2002a). Thus, these components of situational normality can remove customer doubts and underpin trust in e-commerce (Chen & Barnes, 2007).

Similarly, in the MB context, an MB app can impact customers' trust to use such services. However, MB customers cannot easily assess the quality of the MB app because customers usually have one account with one bank (Yousafzai et al., 2009). Therefore, it will not be straightforward to compare their MB app with many other MB apps. In addition, as mentioned, situational normality is essential in building initial trust in technology in the pre-adoption phase. However, as users are familiar with using specific technology, considering situational normality becomes less important in investigating trust in the post-adoption stage. Hence, because of the nature of the present research, which focuses on studying the influence of trust on consumer behaviour in the post-adoption stage of MB, situational normality will not be investigated in the current research.

### **2.7.1.2.2 STRUCTURAL ASSURANCE**

Structural assurance in the online environment has been considered as a central predictor of trust (Gefen et al., 2003; Gu et al., 2009; Zhou, 2012b). Structural assurance relates to a customer's belief that institutional frameworks such as assurances, rules, commitments, legal redress, or other processes are in place to facilitate success (McKnight et al., 2002a). In the MB context, for example, structural assurance implies that specific conditions such as security and safety should be provided to customers in order to enhance their feeling of protection when they transact using MB (McKnight et al., 2002b). In order to build institutional-based trust relying on structural assurance, three components should be included, namely perceived security, perceived privacy and third-party assurance (Bonsón Ponte, Carvajal-Trujillo, & Escobar-Rodríguez, 2015).

#### ***Perceived Security***

Security has been widely known as a key component in the acceptance, adoption and continuous use of new technology and information systems (Yousafzai et al., 2003). Security in the online environment refers to the process by which a business creates rules and actions to protect against attacks and threats over the Internet, such as destruction and disclosure of data and fraud (Pavlou, 2003). In the e-commerce context, security threats can carry more severe forms, such as unauthorised access to accounts (Pavlou & Gefen, 2004). Perceived security, therefore, measures users' perception of the level of protection they have against security threats. Security provides users with technical and operational support in order to ensure that transactions are carried out accurately and on time, along with protection from fraud and manipulation by the third party (Bonsón Ponte et al., 2015). Prior research has revealed that perceived security has a substantial positive impact on trust in the e-commerce context (Furnell & Karweni, 1999; Pavlou, 2003; Pavlou & Gefen, 2004). In particular, perceived security

significantly influences user trust in MB (Arcand et al., 2017; Susanto et al., 2016; Trabelsi-Zoghلامي et al., 2018).

### ***Perceived Privacy***

Perceived privacy in the online environment refers to users' perceptions concerning the level of privacy protection when they connect to the internet (Martin, 2018). Privacy includes the protection of personal and financial information, and online activities such as preferences, communications and ensuring anonymity (P. Riquelme & Román, 2014). Hence, privacy is essential in the e-commerce context because, unlike traditional retail, e-commerce transactions usually contain personal and financial data, shipping address and billing information (C. Liu, Marchewka, Lu, & Yu, 2005). Thus, users need to have the confidence that their personal information is safe from online threats and invasion to engage in interactions with online businesses (Martin, 2018). It is firmly clear from e-commerce research that perceived privacy plays a vital role in enhancing customer trust (Bonsón Ponte et al., 2015; Yousafzai et al., 2003). Perceived privacy has also been confirmed as a key factor in enhancing customer trust within the MB context (Arcand et al., 2017; Trabelsi-Zoghلامي et al., 2018).

### ***Third-Party Assurance***

Outsourcing is a growing orientation in the e-commerce context. Businesses increasingly rely on third-party suppliers to provide critical services (Giri & Sarker, 2017). Therefore, businesses are seeking third-party assurance to address their customers' concerns regarding the internal control environment (Kotabe, Mol, & Murray, 2008). This is because customers cannot control the process and quality of online transactions and engagement. Thus, certifications such as CPA WebTrust and TRUSTe privacy certifications and verifications can enhance user trust in e-commerce websites or apps. Hence, e-commerce customers feel safe when conducting transactions or engaging with online vendors (Perdikaki, Peng, & Heim, 2015). Third-party

assurance is a vital ingredient in the MB context, and it is instrumental in establishing user trust. The MB systems are built on cellular connections which have previously been thought to be vulnerable to hacker attacks or data interception. Therefore, to improve user trust in MB, solid third-party assurance, such as transport layer security protocol TLS, is needed (Oliveira et al., 2014).

The current study intends to examine the impact of institutional-based trust on enhancing the level of user trust within MB using the structural assurance process, which includes perceived security, perceived privacy, and third-party assurance.

### **2.7.1.3 Interpersonal-Based Trust**

This concept of trust is the most prevalent form of trust in the e-commerce context (Yousafzai, Pallister, & Foxall, 2005). This perspective of trust is also called trusting beliefs (Mayer et al., 1995). From this point of view, trust is regarded as a social connection between a trustor and a specific trustee (Mayer et al., 1995). In other words, it defines trust as a party's willingness and expectation about specific actions taken by another party and the risk involved in those actions (McKnight et al., 1998). Some researchers in the e-commerce and information systems fields have classified interpersonal-based trust into two categories, namely emotional trust and cognitive trust (Lewis & Weigert, 1985). The following two subsections discuss these categories and explain the suitability to be used in this research to understand interpersonal-based trust.

#### **2.7.1.3.1 EMOTIONAL TRUST (AFFECTIVE TRUST)**

Emotional trust is distinguished from cognitive trust by its nature, which depends on emotions (Lewis & Weigert, 2012). It is defined as trusting behaviour that is primarily driven by a significant positive impact on the trust object (Lewis & Weigert, 1985). Although it has been argued that emotional trust plays a critical role in inspiring feeling secure (Xiao & Benbasat,

2003), Rempel, Holmes, and Zanna (1985) argue that emotional trust can only be developed if the relationship between the trustor and trustee is personal. Thus, this relationship does not exist in non-physical contexts such as e-commerce, in particular, e-finance services when customers and businesses engage in risky online activities (Yousafzai et al., 2009). However, according to Lewis and Weigert (2012), there are reflexive interactions between emotional and cognitive trust, and they have common and unique antecedents. Since emotional trust involves a feeling of self-trust, it has effects on trustors' confidence in their ability to judge the trustworthiness of other parties.

As discussed in the following section, cognitive trust is primarily interpreted by three trusting beliefs: integrity, ability, and benevolence (Lewis & Weigert, 1985). While integrity and ability are considered as cognitive dimensions, benevolence can be considered as an emotional and cognitive dimension because it is the trustor's belief that the trustee is concerned about the interests of the trustor not just its benefits. (Y. Wang et al., 2016). For example, MB users will be motivated to adopt and continue to use a bank's services via MB if they believe it supports them and does not act as opportunists. Furthermore, emotional trust plays a critical role in maintaining trusty relationships between customers and service providers (Hudson, Roth, Madden, & Hudson, 2015; Laroche, Habibi, Richard, & Sankaranarayanan, 2012). These relationships can enhance customer trust in a specific brand or a service provider such as MB services.

#### **2.7.1.3.2 COGNITIVE TRUST**

The cognitive-based trust refers to cognition of a trustor motivated by good rational reasons (Johnson & Grayson, 2005; Moorman, Zaltman, & Deshpande, 1992). It can be established if a trustee identifies rational reasons for having a relationship with a particular trustee (Lewis & Weigert, 1985). In elections, for example, if an elector believes that one of the candidates

possesses certain characteristics, such as the ability to keep election promises, the elector will develop cognitive trust in that candidate.

Similarly, in the field of e-commerce, such as the MB system, cognitive trust is formed when customers believe their bank possesses the essential qualities to provide banking services via the MB app. Cognitive trust is also called trustworthiness, which refers to trustors' perception regarding specific characteristics of the trustee (McKnight et al., 1998). Hence, trustworthiness can be developed from a set of desirable characteristics of the trustee (Gefen et al., 2003). In the e-commerce literature, three characteristics of the trustee have been considered repeatedly in trust research as contributors to cognitive trust or trustworthiness, namely ability, integrity and benevolence (Mayer et al., 1995; Yousafzai et al., 2009). Although these three characteristics are independently different, they are interrelated and simultaneously contribute to enhancing the overall customer trust (Bao et al., 2016). The three following subsections discuss these characteristics, focusing on how they can be used to explain interpersonal-based trust in the MB context.

### ***Ability (Competence)***

Ability or Competence is the trusting belief that explains one party's belief in the ability of another party in meeting his/her needs (Mayer et al., 1995). Ability In the e-commerce context refers to a set of skills and competencies that allow an online business to fulfil promises made with the customers, such as providing goods and services to customers in a proper way (Mayer et al., 1995). The more positive interactions customers have about a business's ability to fulfil its promises, the higher the level of trust the business has (Bao et al., 2016). Similarly, perceived ability in the MB context can be defined as customers' perception regarding MB's capabilities to provide them with the banking services conveniently and adequately. Thus, if



MB customers believe that MB has the required capabilities, their uncertainty about using such services will be reduced (Zhou, 2012b).

### ***Integrity***

Integrity is the trustor's expectation that the trustee will adhere to a set of standards that the trustor deems appropriate (Mayer et al., 1995). In the e-commerce context, integrity can be achieved when a customer believes that a specific vendor or company acts ethically, honestly and reliably to fulfil their obligations (McKnight & Chervany, 2001). Therefore, integrity is more about the online vendor's characteristics than about the relationship between the vendor and customers (McKnight & Chervany, 2001). Hence, to achieve integrity, the online vendor should act sincerely and keep to its obligations and keep personal details of customers secure (Bao et al., 2016). In the MB domain, integrity implies users' belief that their bank offers them timely and accurate information through MB and fulfils its obligations (Zhou, 2012b).

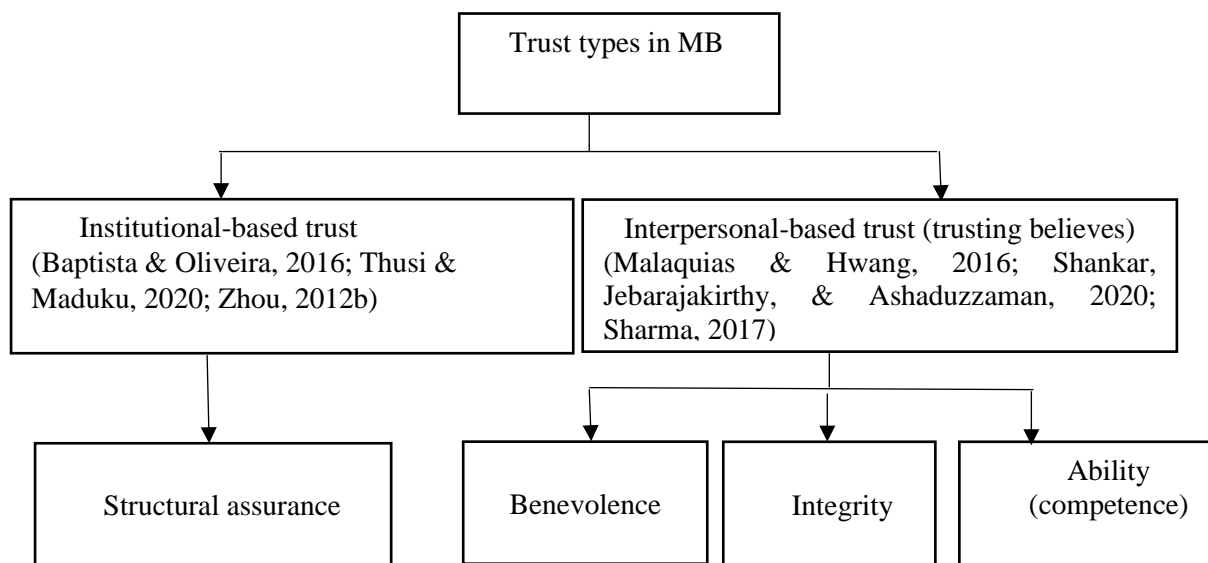
### ***Benevolence***

Benevolence may be defined as the trustor's belief that the trustee will always be willing to act in the best interest of the trustor (Mayer et al., 1995). Benevolence in e-commerce refers to the ability of an online vendor to keep customer interests ahead of their own interests and to be concerned with the customers' wellbeing (Bao et al., 2016). Hence, perceived benevolence occurs when customers believe that the online vendor maintains a positive and long-term relationship with its customers, and does not take advantage of customers opportunistically (McKnight & Chervany, 2001). For example, benevolence toward customers can be obtained in e-banking services if customers expect that the bank will reimburse them if money is taken from their accounts by fraudulent transactions (Yousafzai et al., 2009). Similarly, in the MB context, benevolence can be achieved if MB customers believe that their bank will always support them in doing their tasks through MB (Tam & Oliveira, 2016b).

The present research adopts and draws on these three dimensions of cognitive trust to investigate the role of the interpersonal-based trust in forming overall trust in MB by focusing on the factors that affect customer trust, which are related to the MB characteristics.

## 2.8 Conceptualisation of Trust within the MB Context

After reviewing and analysing the trust concept in e-commerce, two main types of trust are considered to conceptualise trust in MB. This research argues that institutional-based-trust and interpersonal-based trust can explain the structure of trust, and can be used to identify the factors affecting trust in MB. First, the institutional-based trust seems to be most relevant for understanding customer trust in MB as it deals with uncertain situations such as transactions. The trust-related behaviours here is determined by factors in the environment or the situation (McKnight & Chervany, 2001; Yousafzai et al., 2003). Second, interpersonal-based trust (trusting beliefs) can measure customers' perceptions of the desirable characteristics of MB. As discussed, the three trusting beliefs of interpersonal-based trust (ability, integrity and benevolence) can interpret the trustworthiness of MB. Figure 2.2 depicts the proposed trust types in MB.



**Figure 2. 2 Proposed trust types in MB** (Geebren & Jabbar, 2021)

Based on the discussions regarding the results of the systematic literature review of trust research in MB and the conceptualisation of trust in MB, the present research argues that there are two clear gaps in the trust research in MB. First, the majority of the trust research in MB has focused on studying initial trust at the expense of overall trust (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef et al., 2018; Sharma et al., 2017; Zhou, 2011, 2012b). This creates a gap in the MB literature, especially that the MB services nowadays are widespread and commonplace. Thus, the focus should be centred on investigating the structure of the overall trust. Second, the majority of the existing trust literature in MB has focused on investigating the impact of trust on behavioural intention to accept, adopt or use MB, and just very few studies have investigated trust impact in the post-adoption related customer behaviours (Tam & Oliveira, 2017a). Therefore, the current study aims to bridge these two research gaps by examining the factors that affect trust in MB from the overall trust perspective. In addition, this research investigates the impact of trust on customer behaviour in the post-adoption stage, focusing on user satisfaction with MB. Furthermore, the indirect influences of some independent variables on user satisfaction via trust. Thus, this research aims to explain how trust in MB can be formed and its role in enhancing customer satisfaction.

## **2.9 Trust and Customer Satisfaction**

In human social relationships, trust has long been recognised as a critical component that affects individuals' behaviour in many ways (McCole et al., 2019a). As a definition, it is critical for influencing consumer behaviour (Ding, Veeman, & Adamowicz, 2013). Prior research confirms that establishing trust in an online context is a complex process that is difficult to achieve but easily lost (Y. Liu & Tang, 2018; Martin & Martin, 2019). Hence, previous e-commerce research has demonstrated that trust has a positive effect on a variety of aspects of

consumer behaviour (Bao et al., 2016; Mutz, 2005; W.-T. Wang et al., 2016). One important effect is the influence of trust on consumer satisfaction. Trust has generally been recognised as a motivating factor in the development of numerous satisfactory business relationships in a variety of online contexts, most notably the e-finance domain (Yousafzai et al., 2003). As trust is concerned with a party's expectation of another party's specific behaviour and the associated risk (McKnight & Chervany, 2001). Likewise, MB users expect banks to provide convenient and adequate banking services through MB. (Malaquias & Hwang, 2016). Therefore, if these expectations have been confirmed, customers will trust MB, resulting in the achievement of a high level of satisfaction (Abdullah M. Baabdullah et al., 2019; Tam & Oliveira, 2016b). Thus, low levels of satisfaction can result in the loss of customers (Chung & Kwon, 2009).

Satisfaction has long been regarded as a valuable indicator of continued use and success in the e-commerce and information systems contexts (DeLone & McLean, 2003). It refers to the post-purchase assessment by customers based on their experience. Therefore, customer satisfaction is an essential goal for businesses to ensure that their goods and products receive good responses from customers, and customers are willing to continue to use them in the long term. In this research, customer satisfaction is defined as customers' overall positive experience of the MB services offered.

Although trust and satisfaction are conceptually linked in the e-commerce literature, only a few studies have examined the relationship between the two constructs in MB research. In prior studies (Poromatikul et al., 2019; Sharma & Sharma, 2019), trust has been recognised as a crucial factor affecting customer satisfaction within MB. However, these studies did not explain how trust can be built in MB. Other studies have investigated the influence of trust on customer satisfaction, considering various factors that can be used to understand trust structure. However, trust has been investigated in these studies using limited factors, which this research argues that are not sufficient to explain trust in MB and its role in enhancing customer

satisfaction. For example, K. C. Lee and Chung (2009) considered only system quality and information quality to explain trust in MB. Also, Susanto et al. (2016) investigated the influence of trust on customer satisfaction using security, privacy, user confirmation and perceived usefulness. Berraies et al. (2017) used quality value, monetary value and emotional value to study trust in MB. (Arcand et al., 2017; Trabelsi-Zoghalmi et al., 2018) focused mainly on security to assess the effect of trust on user satisfaction. Hence, identifying and understanding the factors that affect users' trust in MB and, in turn, satisfaction remains a major challenge. Thus, the present research aims to investigate a comprehensive set of factors which affect trust and customer satisfaction within MB by examining the mediating effect of trust between these factors and user satisfaction.

### **2.10 Gaps in Previous Research on Trust in MB**

The systematic review of trust literature conducted in this research in MB has enabled the researcher to identify some significant gaps regarding the effect of trust on consumer behaviour in the post-adoption stage of MB, specifically user satisfaction. Most importantly, the majority of the trust research in MB has focused on studying initial trust at the expense of overall trust (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef et al., 2018; Sharma et al., 2017; Zhou, 2011, 2012b). This creates a gap in the MB literature, especially given that MB services nowadays are widespread and commonplace. Therefore, the emphasis should be on investigating the structure of overall trust and its impact on consumer behaviour.

Another significant gap in the MB trust literature is that the majority of existing studies have focused on the impact of trust on behavioural intention to accept, adopt, or use MB, with only a few studies investigating trust impact in post-adoption related customer behaviours (Tam & Oliveira, 2017a). In addition, there is a lack of studies that investigate trust as a mediator factor that can explain customer behaviour in MB, in particular customer satisfaction. Trust has long

been known as an important mediator that shapes consumer behaviour in several contexts, in particular in the online business environment (Y. Yu, Li, Li, Zhao, & Zhao, 2018). Therefore, the current study aims to bridge these two research gaps by examining the factors that affect trust in MB from the overall trust perspective. In addition, this research investigates the impact of trust on customer behaviour in the post-adoption stage, focusing on user satisfaction with MB. Furthermore, the indirect effects of variables on user satisfaction via trust.

### **Chapter Summary**

In summary, chapter 2 shed light on the prior literature related to trust in MB and highlighted the major gaps in this literature after conducting a systematic literature review on trust in MB. It also conceptualised trust in MB based on two types of trust, namely interpersonal-based trust and institutional-based trust. The next chapter discusses the theories that have been used to investigate consumer behaviour in the e-commerce domain and criticisms of each theory. The chapter then discusses and justifies the selection of the information system success model as the theoretical underpinning of the current research.

## **Chapter 3 Literature Review: Consumer Behaviour within the MB Context**

### **3.1 Introduction**

The previous chapter discussed the systematic literature review conducted in this research about trust research in MB. It also reviewed trust research in e-commerce to explain the conceptualisation of trust in MB. Then it discussed the relationship between trust and satisfaction in MB. This chapter discusses consumer behaviour in the MB context. It provides an overview of consumer behaviour in the e-commerce and information systems fields in the first section. Then the second section discusses the theories that have been used to investigate consumer behaviour in the information systems and e-commerce literature, and how these theories have been applied in the MB context, and the criticism that each theory has received. The chapter ends with the introduction of the information systems success model as the adopted model in the current research.

### **3.2 Consumer Behaviour in the E-Commerce Domain**

In general, consumer behaviour encompasses all behaviours associated with the purchase, usage, and disposal of products and services by individuals, groups, and organisations (Noel, 2009). These activities involve the cognitive, behavioural and affective responses of consumers before or after performing these activities (Schiffman & Wisenblit, 2019). As a sub-discipline, consumer behaviour encompasses thoughts from different disciplines such as behavioural sciences, marketing, psychology and economics (S. A. Wagner, 2002). Although consumer behaviour has been studied in multiple social science fields, it has long been associated with marketing (MacInnis & Folkes, 2009). Examples of the use of consumer behaviour in marketing, studying behaviours of consumers when launching a campaign to introduce new products or when developing new marketing strategies.

Over the last three decades, the concept of consumer behaviour has experienced rapid growth due to the advent of the internet and the advancement of information technology (Close, 2012). Other disciplines such as information systems also contributed to the growth of the consumer behaviour concept (Koufaris, 2002). This development in studying consumer behaviour reflects the increased penetration of e-commerce, which is growing at a tremendous rate (G. Wagner, Schramm-Klein, & Steinmann, 2020). Hence, it is important to study how individuals behave when conducting online business activities, for example, the virtual engagement between consumers and vendors in order to complete a purchase process. One of the most important characteristics of e-commerce is that customers can access all producers in less time and effort (Solomon, 2018). This creates a major challenge in predicting consumer behaviour in the online environment due to the lack of physical communication with consumers (Mpinganjira, 2016). Thus, if businesses fail to increase customers' willingness to accept and entirely use such innovations, they cannot gain the target benefits of developing these systems, which in turn affect the implementation of the development strategies. Therefore, in order to win customers in this competitive environment, there is a clear need to understand customer behaviour not only in the pre-adoption stage such as acceptance, adoption and intention to use, but also in the post-adoption behaviour stage such as use, customer satisfaction. This need has inspired many researchers to adopt and develop well-known theories in the field of consumer behaviour to investigate consumer behaviour in the e-commerce context.

### **3.3 Theories and Models of Consumer Behaviour**

This section provides a summary of the prominent theories and frameworks that have been used routinely in investigating consumer behaviour in the information systems and e-commerce literature. These theories have been widely approved to predict and explain consumer behaviour towards acceptance, adoption and use of technological innovations. Reviewing previous theoretical frameworks enables selecting an appropriate theory to



investigate specific phenomenon or integration of two or more models or constructs based on research aims and objectives (Ridley, 2012).

In general, the most theories and models developed to investigate consumer behaviour in e-commerce and information systems derived from technology acceptance and adoption theories such as the Diffusion of Innovation theory (DOI), the Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM), Revised Technology Acceptance Model (TAM2), the Unified Theory of Acceptance and Use of Technology (UTAUT). The following subsections deliberately discuss the aims, constructs and use of a number of these theories, and the criticisms which they have received. In addition, how these theories have been used in the MB context. This discussion leads to the selection of the theory used in the current research.

### **3.3.1 Innovation Diffusion Theory (IDT)**

The Innovation Diffusion Theory IDT was developed in 1962 by (Rogers, 1983). It was published in the well-known book (Diffusion of Innovations) which was first published in 1962. This theory aims to explain how new technology can be diffused. It argues that new ideas, products or behaviours can be adopted and spread over time through a specific population or social system depending on their characteristics. The theory offers a conceptual framework that can enhance the understanding of new innovations' acceptance and diffusion. According to (Rogers, 2010), the process of diffusion of new innovations consists of five stages as following:

*First, in the knowledge stage*, innovations should be introduced to individuals to understand the main characteristics of the innovations and how they work.

*Second, in the persuasion stage*, the attitudes towards innovations are shaped and whether these attitudes are favourable or unfavourable.

*Third, in the decision stage*, individuals decide whether they will accept or reject the innovation according to their perception and understanding of the previous stages.

*Fourth, the implementation stage* only occurs if the decision of individuals in the third stage is to accept the innovation.

*And finally, in the confirmation stage*, individuals reinforce their decision by adopting and entirely using the innovation.

In order to interpret the IDT theory and its constructs, Rogers (2003) identifies five characteristics of innovations (figure 3.1), which explain the process of the adoption of innovations as following:

1. Relative advantage refers to the extent to which an invention is considered to be superior to the preceding idea.
2. Compatibility means the degree to which an invention is viewed as being compatible with the current principles, prior experiences, and desires of potential adopters.
3. Complexity refers to how difficult it is to understand the application of an invention.
4. Trialability implies to what extent an invention can be experienced on a limited basis.
5. Observability refers to the extent to which individuals may see the implications of an invention.

Rogers (2003) states that individuals' perceptions towards the above five characteristics predict the diffusion rate of a specific innovation. In addition, the author argues that individuals' perceptions towards an innovation depend on their learning from a variety of communication channels such as mass media. Regarding the characteristics of users of innovations, the theory classifies adopters into five categories:

*“innovators, early adopters, early majority, late majority, and laggards” (Rogers, 2003, p. 298).*

Innovators (2.5%) are the individuals who are willing to take risks to be the first adopters of innovation. These adopters are usually the youngest.

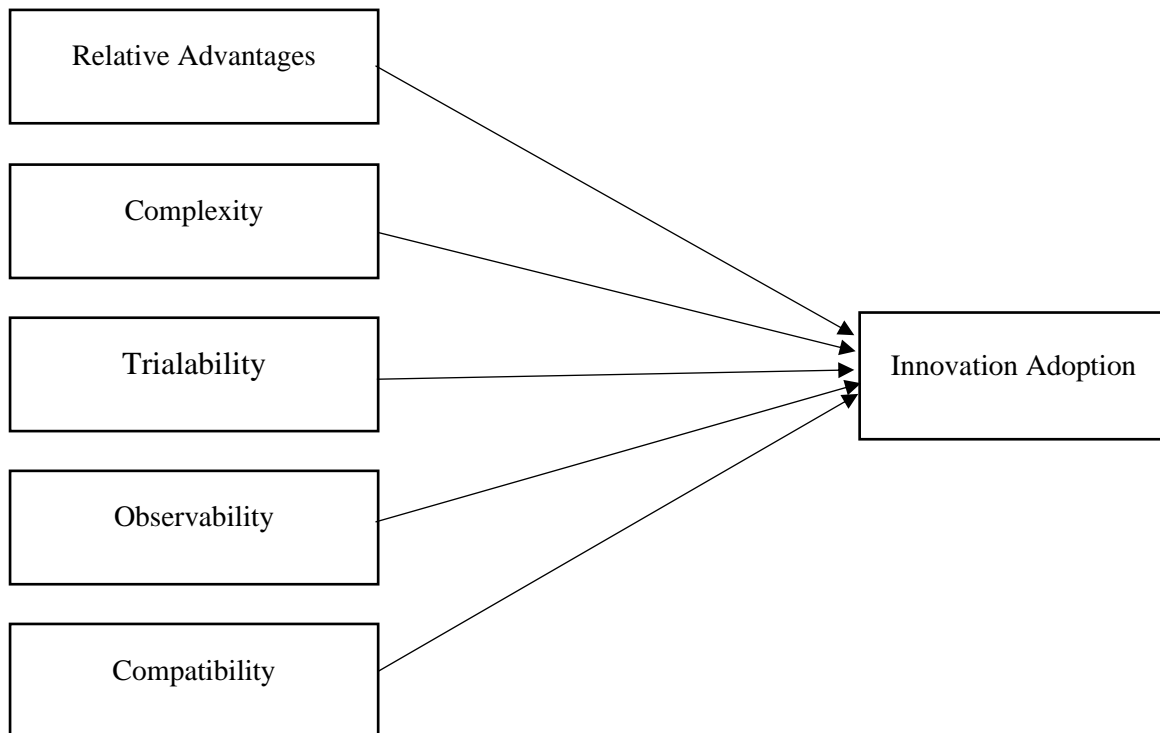
Early Adopters (13.5%) are the fastest category of adopters with a high degree of opinion leadership among the other adopters. Also, they have a higher social status.

Early Majority (34%) are the adopters who take a longer time than the innovators and early adopters to adopt an innovation. Also, they rarely have positions of opinion leadership.

Late Majority (34%) are adopters who typically adopt an innovation after the average individual of a society. This category of adopters is sceptical about new inventions, and they have a lower social status.

Laggards (16%) are the last to adopt innovation and have little or no opinion leadership. These adopters are typically advanced in age who mainly focus on traditional aspects when evaluating new innovations.

The IDT theory is one of the earliest theories that has been used extensively to study acceptance and adoption of a variety of technological innovations such as energy conservation interventions (Völlink, Meertens, & Midden, 2002), the utilisation of e-government services (Carter & Bélanger, 2005), the adoption of e-marketplaces (Joo & Kim, 2004) and the adoption of online recruitment (Parry & Wilson, 2009).



**Figure 3. 1 Innovation Diffusion Theory (IDT)**

(Rogers, 2003).

### **3.3.1.1 Criticism of the Innovation Diffusion Theory (IDT)**

Although the wide application of the IDT theory as a consistent theory in studying the acceptance and adoption of new technologies, it has received many criticisms related to its assumptions. The IDT theory assumes that individuals can make reasonable decisions to adopt an innovation. However, it has been argued that this assumption cannot be applied to the more advanced technologies, which have sophisticated characteristics. Thus, users cannot rely on their cognitive power to make the adoption decision (Eveland & Tornatzky, 1990).

Another important downside of the IDT theory, which was highlighted by some scholars, is that the theory does not pay attention to the issues of trust and risk which are considered as fundamental elements in any business or social relationship, especially in the e-finance contexts

which are associated with high levels of risk (Pavlou, 2003). Furthermore, the IDT theory does not show an adequate explanation of the usage and performance mechanism of information technology. Instead, it is only focused on consumer behaviour in the pre-adoption stage, i.e., acceptance and adoption (Goodhue, 1995). Finally, the applying of the various independent variables in the IDT theory can lead to inconsistent findings in research, which in turn affects the heuristic value (Downs & Mohr, 1976).

### **3.3.1.2 The IDT Theory in the MB Literature**

Many prior studies in the MB field have used the IDT theory to investigate MB adoption as an innovation in banking service delivery (G. Kim et al., 2009; Lin, 2011; Püschel, Afonso, & Mauro, 2010; Tran & Corner, 2016). Lin (2011) conducted a quantitative study to investigate the impact of the characteristics of innovation on attitude and behavioural intention towards adoption and continuous use of MB. The author extended the IDT theory by including attitude towards MB to mediate the relationships between the independent variables influencing behavioural intention to adopt MB. The study found that competence, integrity, compatibility, perceived relative advantage and ease of use have significant influences on attitude, and attitude positively influences behavioural intention towards MB adoption.

The integration with other theories is an attribute of the IDT theory in the MB research (Püschel et al., 2010; Tran & Corner, 2016). For example, Püschel et al. (2010) integrated the IDT theory with the TAM model (Davis, Bagozzi, & Warshaw, 1989) and the decomposed theory of planned behaviour (DTPB) (Taylor & Todd, 1995) to propose an integrated framework to investigate customer behavioural intention to adopt MB. The authors examined the behavioural intention towards MB adoption through 660 survey questionnaires representing MB users and non-users. (Püschel et al., 2010) incorporated some of the independent variables of the three theories to be antecedents of attitude towards MB. These variables are: compatibility, relative advantages, trialability, visibility, results demonstrability, image and perceived ease of use.

The attitude then has a positive impact on the intention to adopt/continue using MB. Other independent variables in the framework (subject norms and perceived behavioural control) have a direct effect on the intention to adopt/continue using MB.

Another integration of the (IDT) theory was conducted by (Tran & Corner, 2016). The authors integrated the (IDT) theory with the unified theory of acceptance and use of technology (UTAUT), the technology acceptance model (TAM) and the theory of reasoned action (TRA). The study aimed to investigate the impacts of different communication channels, in particular social media, interpersonal networks and mass media, on the intention of using MB. To collect relevant data, the study employed two methodological approaches (a survey of 183 young adults and focus groups). The findings revealed that face-to-face communication with bank staff is the most reliable channel to obtain banking-related information followed by mass media. However, social media channels have less impact on the intention of MB use. The findings also found that perceived usefulness, perceived credibility and perceived costs are the most factors affecting the intention to use MB.

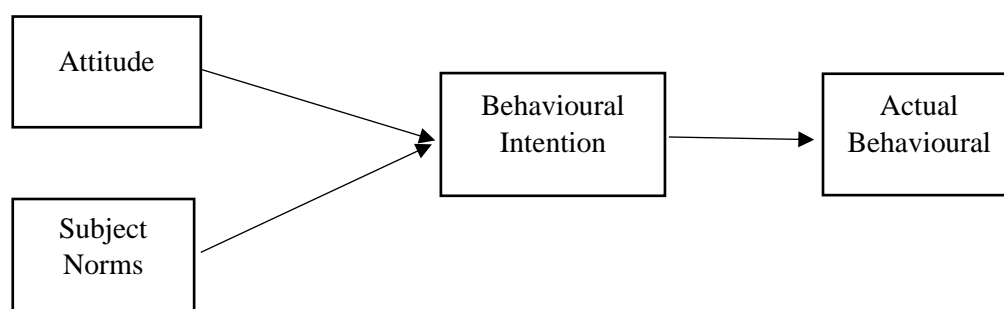
Despite the wide use of the IDT theory in the MB context, this research argues that it is not the appropriate choice to investigate the research questions. This is because of the main focus of the theory, which is the adoption of innovations. As the aim of this research is to study consumer behaviour in the post-adoption stage, i.e., customer satisfaction, the focus should be on theories that consider post-adoption consumer behaviour. Besides, as mentioned earlier, the IDT theory does not consider trust issues, which is the predictor of customer satisfaction in this research.

### **3.3.2 Theory of Reasoned Action (TRA)**

The theory of reasoned Action TRA was established by (Fishbein & Ajzen, 1975). It was derived from the social psychology discipline. The aim of this theory is to enhance the

prediction and understanding of individuals' behaviour (Fishbein & Ajzen, 1975). The TRA theory, as shown in (figure 3.2), assumes that an individual's behaviour is always rational and systematic. According to this theory, behavioural intention determines the individual's actual behaviour and it mediates the relationships between attitude and subject norms (social influence), and actual behaviour. Behavioural intention refers to the cognitive process of performing a specific behaviour by individuals (Fishbein & Ajzen, 1975). The TRA theory involves two independent variables, which affect behavioural Intention, namely subjective norms and attitude.

Fishbein and Ajzen (1975, p. 216) defines the attitude towards behaviour as “an individual positive or negative evaluation of performing the behaviour”. The authors argue that the individuals' attitude towards a behaviour is assumed to be determined by their salient beliefs regarding the outcomes of the behaviour multiplied by the evaluation of those outcomes. For example, when a customer believes that engaging in a certain behaviour will result in gaining benefits such as saving time, effort and funds. On the other hand, subjective norms are the feature of normative assumptions of individuals about the probability that significant referent individuals or groups will approve or reject a particular behaviour (Schepers & Wetzels, 2007)



**Figure 3. 2 Theory of Reasoned Action**

(Fishbein & Ajzen, 1975)

### **3.3.2.1 Criticism of the Theory of Reasoned Action (TRA)**

Like other theories, TRA has received many theoretical criticisms. The main criticism was provided by Davis et al. (1989) who stated that the TRA is a general theory and the distinction of the two independent variables in the model is ambiguous. Thus, it does not specify the beliefs that are aligned with certain behaviours. Thus, before employing this model, scholars should ascertain the central beliefs of subjects about the behaviour under investigation (Davis et al., 1989). In addition to this criticism, Ajzen and Fishbein (1980) acknowledged that applying the model can help in predicting current behaviours but it is not straightforward to achieve the prediction of future behaviours because there is a time interval between intention and behaviour. Finally, the TRA theory views that a behaviour is determined by an individual's volitional control. However, it ignored behavioural actions that are determined by factors over which individuals have no volitional control. Therefore, according to the TRA theory, in order to successfully predict a particular behaviour, that behaviour has to be under control (Foxall, 1997).

### **3.3.2.2 The TRA Theory in the MB Literature**

The TRA theory has grabbed considerable attention in several information systems and e-commerce fields, including the MB context to predict intention and actual behaviours (Cruz, Barretto Filgueiras Neto, Muñoz-Gallego, & Laukkanen, 2010; Tran & Corner, 2016). In line with its aim and constructs, the use of the TRA theory in the MB research has centred on the investigation of intention to adopt MB. For example, Cruz et al. (2010) applied the TRA theory to investigate the obstacles that hinder the adoption of MB. The data for the study were collected from 3,585 bank customers who use internet banking but do not use MB. The findings revealed that the majority of e-banking customers do not use MB. According to the study, the



reasons for rejection of such services include risk, complexity, low perceived relative advantage and perception of cost.

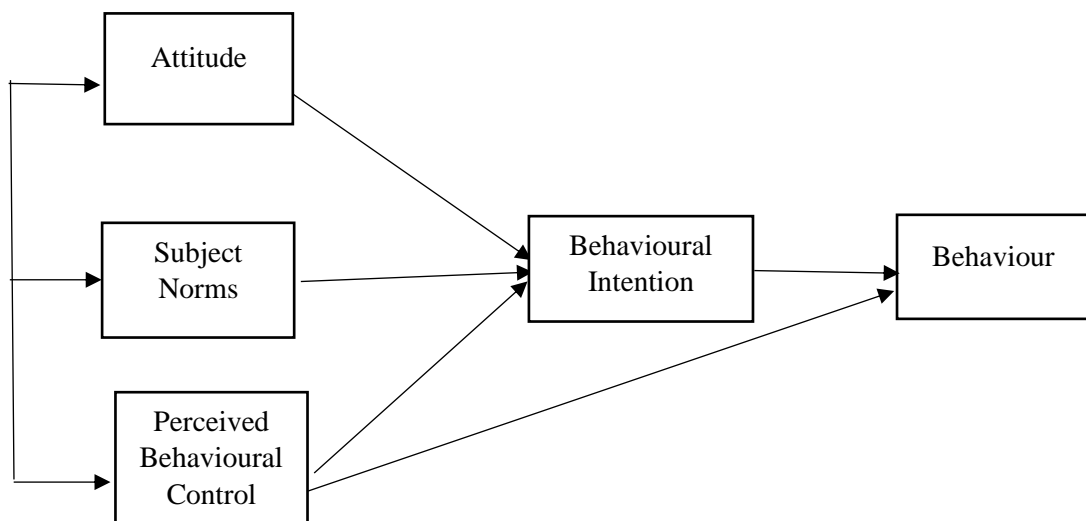
Based on the aim and objectives of the current research, the TRA theory cannot be applied as a theoretical underpinning for many reasons: First, the main two factors in the TRA model are associated with the individuals' beliefs and attitudes. However, the theory ignores the characteristics of other research subjects such as quality of systems or security and privacy issues. This contrasts with the nature of this research, which mainly focuses on studying the main characteristics of MB and customers' perception of these characteristics. Second, as discussed, the TRA was criticised for adopting volitional control as a determinant of individuals' behaviour, which is not possible to be adopted in this research since the nature of the population from which the research sample is taken, i.e., the current MB customers. Finally, the TRA theory centres on consumer behaviour in the pre-adoption stage. However, the current research focuses on consumer behaviour in the post-adoption stage, i.e., customer satisfaction.

### **3.3.3 Theory of Planned Behaviour (TPB)**

In responding to the limitations of the TRA theory, in particular, the prediction of non-control behaviours, Ajzen (1991) extended the TRA model by adding the perceived behavioural control construct to shape the theory of planned behaviour (TPB) (figure 3.3). This extension provides a deep understanding of consumer behaviour in non-control situations. The TPB theory has been confirmed as one of the most effective theories in predicting and explaining a wide range of behaviours in several contexts (Elliott, Armitage, & Baughan, 2003; Lebek, Uffen, Neumann, Hohler, & Breitner, 2014; Ramayah, Yusoff, Jamaludin, & Ibrahim, 2009). Apart from attitude and subjective norms, Ajzen (1991) indicates that a third construct, namely perceived behavioural control, should be investigated. This factor influences actual behaviour directly and indirectly through behavioural intentions. Perceived behavioural control is characterised as an individual's perception of the extent to which they possess or lack the

necessary resources and opportunities to conduct the desired behaviour, and the obstacles that may hinder such behaviour (Ajzen, 1991).

According to Ajzen (1991), behavioural actions are derived from three dimensions. These dimensions are behavioural attitudinal beliefs and the outcome evaluation, normative beliefs and motivation to comply with the normative expectations, and control beliefs about perceived facilitation and the obstacles toward achieving the target behaviour. The author stated that in addition to its impact on behavioural intention, perceived behavioural control directly influences actual behaviour. This is because if individuals have constant intention to perform a behaviour, with perceived behavioural control, their effort required to conduct the behaviour is likely to increase. Furthermore, perceived behaviour control is frequently used interchangeably with actual control of actual behaviour (Ajzen, 1991).



**Figure 3. 3 Theory of Planned Behaviour**

(Ajzen, 1991)

### **3.3.3.1 Criticism of the Theory of Planned Behaviour (TPB)**

Despite the wide use of the TPB theory in predicting behavioural intention and actual behaviour in multiple settings, it has been criticised in many regards. Most importantly, similar to the TRA theory, the TPB theory assumes that the relationship between behavioural intention and actual behaviour is contiguous (Foxall, 1997). Therefore, this theory is appropriate for predicting current behaviours rather than future behaviours. Foxall (1997) argues that accurate prediction requires precise situational correspondence. In addition, while the TPB demonstrates an extraordinary power to predict the theoretical variance, a considerable proportion remains unexplained. In order to tackle this unexplained variance, adding other moderator variables could be an effective solution (Conner, Sheeran, Norman, & Armitage, 2000).

### **3.3.3.2 The TPB Theory in the MB Literature**

Like other consumer behaviour theories, the TPB theory has grabbed considerable attention from scholars in MB research, in particular the adoption and behavioural intention towards MB services (Riquelme & Rios, 2010; Sripalawat, Thongmak, & Ngramyarn, 2011). It can be noticed from the MB literature that researchers have integrated the TPB with the TAM model to investigate behavioural intention and adoption of MB as both theories measure the same constructs, i.e., intention and actual behaviour. For example, Riquelme and Rios (2010) consider the two main variables in TAM; perceived ease of use and perceived usefulness, and subjective norms from the TPB theory to examine the factors which influence MB adoption. The authors extended both theories by adding relative advantage as an antecedent of perceived usefulness and risk as independent variables that directly affect adoption. The study gathered opinions about behavioural intention towards MB adoption from 600 current users of e-banking services. The findings revealed that all independent variables have significant impacts on MB adoption.

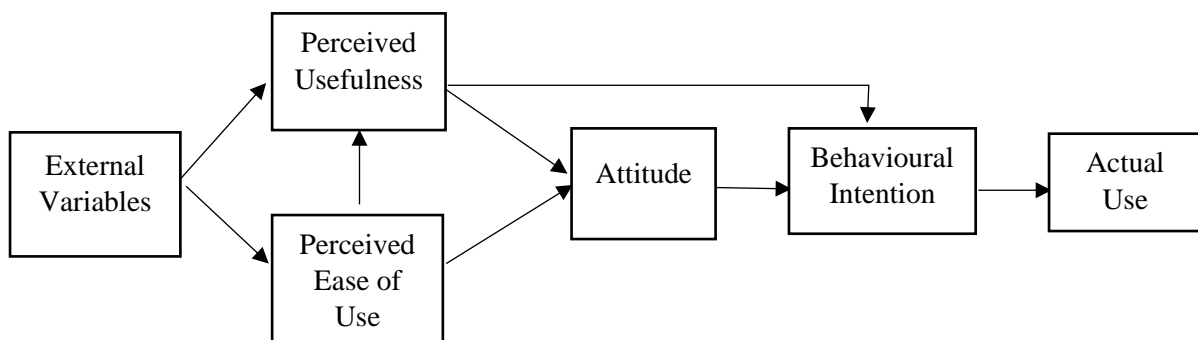
Sripalawat et al. (2011) also adopted both theories to investigate the behavioural intention and acceptance of MB. The authors aimed to develop a framework of the factors influencing acceptance of MB from adoption and barriers sides. In addition to the main variables in TAM and TPB, five other factors were added to evaluate the barriers to accepting MB, which are self-efficiency, perceived risk, lack of information, device barrier and perceived financial cost. After collecting and analysing data from 200 survey questionnaires of bank customers and mobile users, the study proved that all independent variables in the proposed model influence MB acceptance.

As discussed, the TPB has been considerably used in e-banking research, including MB. However, the majority of the TPB research in the MB context is centred on investigating adoption and behavioural intention. Thus, the TPB does not appear as an appropriate theoretical framework for the current research which aims to examine customer behaviour in the post-adoption stage. As can be noticed from the current research, the current trend in MB research is to adopt theories that support the study of new practices in the consumer behaviour field, such as the impact of MB on individual performance (Tam & Oliveira, 2017b) and the influence of service quality (Trabelsi-Zoghalmi et al., 2018).

### **3.3.4 Technology Acceptance Model (TAM)**

The TAM model was developed by Davis (1989) based on the Theory of Reasoned theory TRA (Fishbein & Ajzen, 1975). The TAM aims to examine new technology acceptance based on positive attitudes toward two factors: perceived utility and perceived ease of use (see figure 3.4). The model explains the determinants of a user's actual behaviour towards technology acceptance (Davis et al., 1989). Most importantly, TAM focuses on investigating the influence of external factors on attitudes and behavioural intention. The acceptance of new technology by individuals is dictated by behavioural intention according to the model. In addition, an individual's attitude towards technology usage and perceived usefulness determines

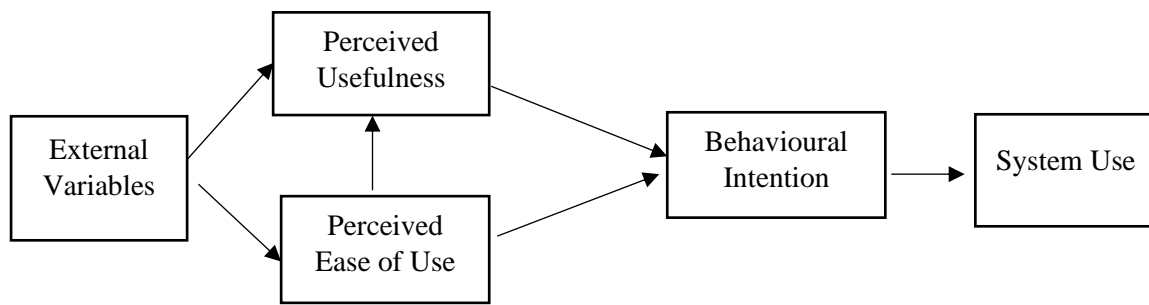
behavioural intention. Attitude is shaped by two beliefs which an individual holds about the use of technology (perceived usefulness (PU) and perceived ease of use (PEOU)). Davis et al. (1989, p. 985) define perceived usefulness (PU) as “the prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organisational context”. Perceived ease of use (PEOU) refers to “the degree to which the prospective user expects the target system to be free of effort” (Davis et al., 1989, p. 985).



**Figure 3. 4 Technology Acceptance Model**

(Davis, 1989)

Davis et al. (1989) then updated the TAM theory to form the TAM 2 model (figure 2.5) after conducting a comparison study between the TAM model and the TRA theory regarding the prediction power of both theories. According to the findings of Davis et al. (1989)’s study, perceived usefulness and perceived ease of use have a strong predictive power of behaviour intention to use new technology. Therefore, Davis et al. (1989) omitted the attitude construct from the original TAM model because they found that attitude does not fully mediate the relationship between perceived usefulness and perceived ease of use, and behavioural intention. The other factors in the original TAM model were kept as Davis et al. (1989) found that perceived usefulness is determined by both perceived ease of use and external factors.



**Figure 3. 5 Updated Technology Acceptance Model TAM 2**

(Davis et al., 1989)

### 3.3.4.1 Criticism of the Technology Acceptance Model (TAM)

Despite the extensive use of the TAM theory in predicting behavioural intention and actual use of several information systems and technology innovations, it has been criticised in many respects. The most important criticism which the TAM 1 and TAM 2 models have been received by many scholars, is that the TAM model has only two main factors affecting behavioural intention and actual use (perceived ease of use and perceived usefulness) (Bagozzi, 2007; Benbasat & Barki, 2007). It has been argued that these variables limit the prediction ability of the model in explaining consumer behaviour. Scholars have highlighted the need for other independent variables (Zhang et al., 2018).

In addition, the TAM theory has received important criticism regarding neglecting the role of trust and risk. It has been argued that the TAM model should integrate trust and risk, especially that the model is mainly used in investigating acceptance in information systems and information technology, which are risky and uncertain environments (Pavlou, 2003). Furthermore, the TAM model assumes that external variables such as social influence affect behavioural intention through perceived usefulness and perceived ease of use. However, many scholars have criticised this assumption, claiming that external variables can also have a direct effect on actual behaviour (Benbasat & Barki, 2007).

### **3.3.4.2 The Technology Acceptance Model (TAM) in the MB Literature**

The TAM model has been widely used to predict and enhance the understanding of acceptance, adoption and use in various e-commerce contexts. In MB research, the TAM model has been the most used theory in studying behavioural intention and adoption of MB. Examples of over-reliance on the TAM model are (Albashrawi & Motiwalla, 2017; Gu et al., 2009; G. Kim et al., 2009; Koksal, 2016; Malaquias & Hwang, 2019; Priya et al., 2018; Zhou, 2011, 2012b). According to (Tam & Oliveira, 2017a), approximately 50 percent of the MB studies have relied on the TAM model to develop new theoretical models. This may be attributed to the fact that the majority of MB studies have focused mainly on behavioural intention and adoption of MB and paid a little attention to consumer behaviour in the post-adoption stage. As mentioned, the TAM theory has only two main independent variables, i.e., perceived ease of use and perceived usefulness.

In order to deal with this limitation in the TAM model, researchers have attempted to integrate other factors into the model. For example, Gu et al. (2009) attempted to fill the theoretical gap in the TAM model regarding neglecting trust and risk influences. The author added trust with the two independent variables in the TAM model to develop a new framework to examine behavioural intention towards MB. The results of the study revealed that perceived ease of use, perceived usefulness and trust significantly affect behavioural intention towards MB. In line with this study, Zhou (2011) considered the impact of initial trust as a key factor in adopting MB services. The study developed a conceptual model based on the TAM model by adding system quality and information quality as antecedents of perceived usefulness. In addition, the authors neglected the impact of the perceived ease of use variable. The study's findings, based on 210 responses collected through a survey questionnaire from bank customers, indicate that initial trust and usefulness significantly influence MB usage intention.

The study (Albashrawi & Motiwalla, 2017) is one of the very few studies that endeavoured to pay attention to frequent and continued use of MB as the focus in MB literature has been increasingly given to MB adoption. The study integrated customer satisfaction in the TAM model as a mediator variable between perceived usefulness, perceived ease of use, and continued usage intention of MB. In addition, other two variables: privacy and personalisation, were included in the theoretical framework to moderate the relationships between perceived usefulness and perceived ease of use and customer satisfaction. The analysis of the data that were collected through a survey questionnaire from 486 MB customers found that perceived usefulness and perceived ease of use are significant antecedents of customer satisfaction with MB. Besides, customer satisfaction determines continued usage intention of MB.

Furthermore, Malaquias and Hwang (2019) used the TAM model to compare the determinants of MB usage between developed and emerging countries. The framework of the study comprises six factors which the study argued that are the determinants of MB usage. These factors are social influence, ease of use, trust, usefulness, age and gender. 375 students were used as the study sample to test the hypotheses. The findings demonstrated that the perceptions of participants in developing and developed countries do not vary significantly. However, the study revealed that the key factors to understanding MB use in Brazil are social influence, trust and perceived usefulness. While for the USA, perceived ease of use and trust.

As discussed above, the TAM model has been extensively used in MB research. However, it is not applicable in the current research for many reasons: First, trust is the mediating variable in this research's conceptual model, which determines customer satisfaction. Although many of the TAM model studies in the MB literature has considered the impact of trust, the focus has been only on initial trust (Afshan & Sharif, 2016; Oliveira et al., 2014; Zhou, 2011). It is reasonable to consider initial trust in the pre-adoption stage. However, many scholars have highlighted the need to study the impact of trust on actual behaviours. This can provide insight



into the characteristics of MB and other relevant factors that banking executives can use to improve consumer satisfaction with MB (G. Kim et al., 2009; Oliveira et al., 2014).

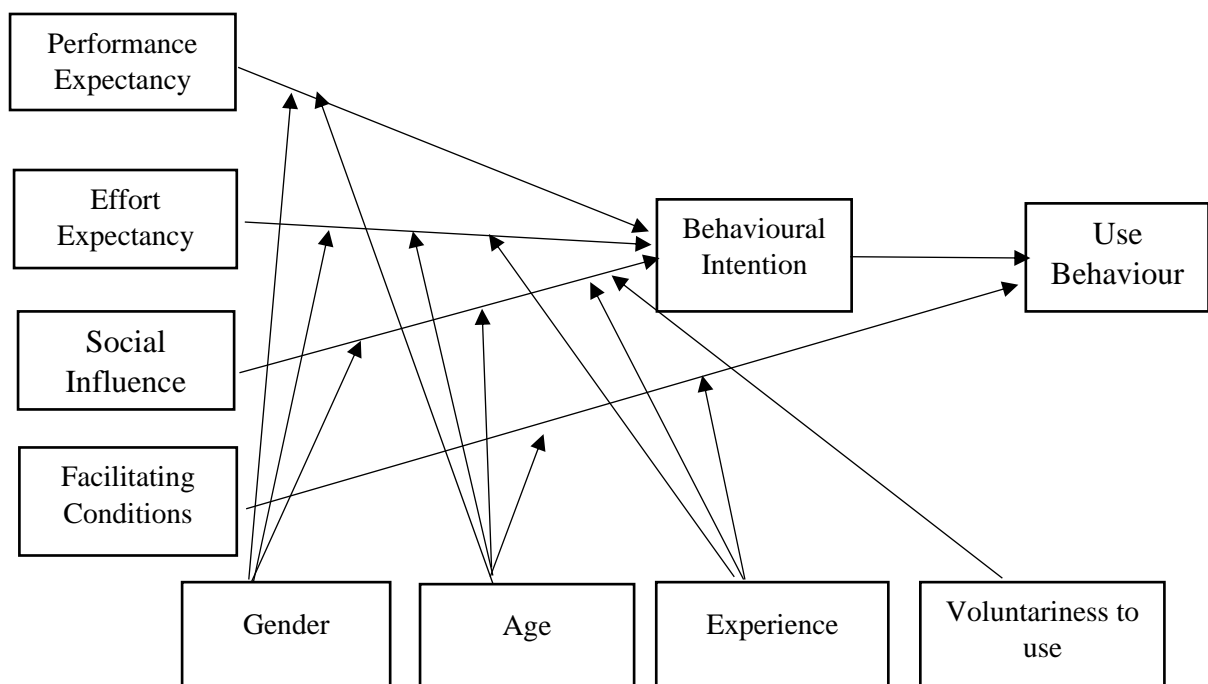
### **3.3.5 Unified Theory of Acceptance and Use of Technology (UTAUT)**

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh, Morris, Davis, and Davis (2003) who integrated factors and constructs from eight different theories into a unified model to formulate the UTAUT model (figure 3.6). These eight theories are the TRA theory, the TPB theory, the TAM model, the combined TAM and TPB, the Motivational Model, the PC Utilisation Model, the IDT theory and the Social Cognitive theory. The UTAUT theory focuses on four factors that affect users' behavioural intention towards the acceptance and use of new technology, namely effort expectancy, performance expectancy, facilitating conditions and social influence. Furthermore, the model includes four moderator variables: age, gender, willingness to use, and experience.

Performance expectancy indicates the extent to which users believe that utilising a specific system will support their performance (Venkatesh et al., 2003). Effort expectancy is defined as users' perceptions of the degree of ease and the effort required to use a specific system (Dhir, Kaur, & Rajala, 2018). Social influence refers to the impact of others in a social network, such as peers and relatives, on the usage behaviour of an individual for a specific system (Li, 2013). Facilitating conditions refers to an individual's perception regarding the availability of the required organizational and technical infrastructure to support the use of a specific system (Venkatesh et al., 2003).

Three constructs, namely performance expectancy, effort expectancy, and social influence, have significant indirect influences on use behaviour via behavioural intention, according to the UTAUT theory. In addition, facilitating conditions has a direct impact on use behaviour. The study also revealed that gender and age have a moderating effect on the relationship

between performance expectation and behavioural intention. The relationship between effort expectancy and behavioural intention is moderated by gender, age and experience. Also, all moderators in the model affect the relationship between social influence and behavioural intention. The relationship between facilitating conditions and usage behaviour is moderated by age and experience.



**Figure 3. 6 Unified Theory of Acceptance and Use of Technology (UTAUT)**

(Venkatesh et al., 2003)

After nine years, the UTAUT model was expanded to the UTAUT2 by Venkatesh, James, and Xu (2012) to include three more independent variables which are price value, hedonic motivation and habit. The aim of this expansion was to tailor it to the consumer use framework. UTAUT2 neglected the moderating role of voluntariness to use. However, it kept the other three moderators (age, experience and gender) (Venkatesh et al., 2012).

### **3.3.5.1 Criticism of the Unified Theory of Acceptance and Use of Technology (UTAUT)**

The UTAUT model is considered as a robust framework, which has a strong ability to assess and predict behavioural intention, adoption and acceptance of several information systems and technology contexts (Venkatesh et al., 2003). However, the UTAUT has received strong criticism, which was highlighted by Bagozzi (2007) on the use of a large number of independent variables to predict behavioural intention and usage behaviour. Bagozzi (2007) stated that using a large number of independent variables can lead to a stage of chaos. Another critique was made by van Raaij and Schepers (2008) who argue that the UTAUT model is more parsimonious than the TAM because its strong explanatory ability can only be accomplished by moderating the key relationships with the model's four moderator variables.

### **3.3.5.2 The Unified Theory of Acceptance and Use of Technology (UTAUT) in the MB Literature**

The UTAUT model is one of the most applied theories in the MB research, particularly in the last five years (Afshan & Sharif, 2016; Ahmed et al., 2017; Alalwan et al., 2017; Albashrawi, Kartal, Oztekin, & Motiwalla, 2019; Abdullah M. Baabdullah et al., 2019; Baptista & Oliveira, 2015; Oliveira et al., 2014; Tran & Corner, 2016). This can be attributed to its comprehensive framework involving various factors, which were derived from eight different theories.

The UTAUT model has been widely used to investigate behavioural intention to adopt and use of MB. Alalwan et al. (2017) proposed a conceptual model to examine the factors influencing behavioural intention toward adopting MB in Jordan. Their model involves factors from the UTAUT2 model (effort expectancy, performance expectancy, price value, facilitating conditions, motivation and social influence). Additionally, trust was integrated into their model to have a direct positive impact on behavioural intention and an indirect positive effect on behavioural intention through performance expectancy. The theory was tested through a survey questionnaire of 343 bank customers. The study revealed that the independent variables in the

model positively influence behavioural intention to adopt MB. Furthermore, Albashrawi et al. (2019) also adopted the UTAUT model to identify the determinants of MB success. After developing their conceptual model, the authors combine an objective data analytic approach and measuring usage experiences in MB to test the data. The empirical analysis of their model found that effort expectancy positively impacts behavioural intention and MB usage.

The UTAUT model has also been used to explain the impact of other cultural and social factors on acceptance of MB. For example, Baptista and Oliveira (2015) applied the UTAUT2 with the cultural factors from Hofstede insights to investigate factors influencing acceptance and use of MB in Africa. Their model was examined using data collected from 252 bank customers. The study findings revealed that performance expectancy, hedonic motivation, and habit are the antecedents of behaviour intention toward MB.

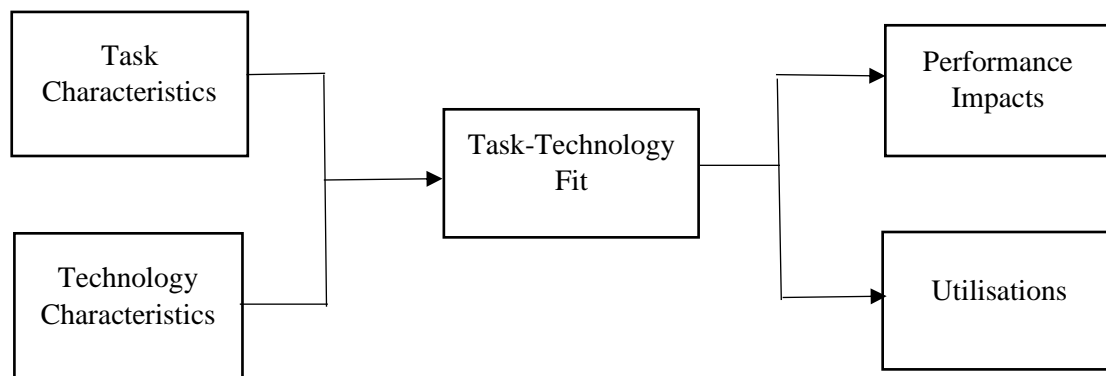
Like most of the information technology theories, the UTAUT model has been used mainly to predict behavioural intention to adopt and use innovations. Similarly, in the MB literature, the use of the UTAUT model has been focused mainly on the adoption and behavioural intention to use MB. Therefore, the UTAUT model does not seem to be the appropriate theoretical underpinning in this research which focuses on consumer behaviour in the post-adoption stage of MB, i.e., customer satisfaction. Besides, the UTAUT model does not consider the factors that can be used to estimate characteristics of the MB system, such as system quality, information quality, security and privacy. These characteristics are key factors in the current research. Thus, it is important to identify theories which support the prediction of consumer behaviour, taking into account the characteristics and functions of MB.

### **3.3.6 Task-Technology Fit Theory (TTF)**

The task-technology fit theory TTF was developed based on the TAM model by (Goodhue & Thompson, 1995). The main aim of this theory is to investigate the impact of information

systems on individual task performance. The theory argues that new technology is more likely to be used and have a positive influence on individual performance if its capabilities support the tasks that users need to perform. There are several models that have been developed from the TTF model. However, the typical model consists of one independent variable (task technology fit) and two dependent variables (utilisation and performance impacts) as exhibited in (figure 3.7). The antecedents of task-technology fit are task characteristics and technology characteristics.

According to (Goodhue, 1995, p. 1828), technology in the field of information systems refers to “computer systems (hardware, software, and data) and user support services (training, help lines, etc.) provided to assist users in their tasks”. The characteristics of technology, such as design, output and function, can affect users’ perceptions of technology usage. Task Characteristics, refers to the actions that users take to perform their tasks by using specific technology (Goodhue, 1995).



**Figure 3. 7 Task Technology Fit Theory (TTF)**

(Goodhue, 1995)

### 3.3.6.1 Criticism of the Task-Technology Fit Theory (TTF)

Regardless of its wide use in predicting adoption and performance improvement, the TTF theory has received many criticisms (Bere, 2018). Most important, the TTF model has been

criticised for its lack of focus on individuals' perceptions concerning technology (Bere, 2018; Strong, Dishaw, & Bandy, 2006). According to Hong, Thong, Wong, and Tam (2015), an individual's perception towards new technology can influence behavioural intention and usage.

### **3.3.6.2 Task-Technology Fit Theory (TTF) in the MB Literature**

The TTF model has been used in a range of technology and information systems contexts to investigate the impact of technology on users' performance. In the MB literature, the TTF model has been integrated with other theories to evaluate the impact of technology on customers' use and performance. For example, Zhou, Lu, and Wang (2010) integrated the TTF model into the UTAUT model to investigate the reasons behind the low adoption rate of MB compared to the other mobile services. The authors used the TTF model to evaluate the support that customers obtain from MB to do their tasks properly and effectively, which contributes to MB adoption. The study found that task technology fit, performance expectancy, facilitating conditions and social influence significantly influence MB adoption.

Recently, researchers have tended to consider the impact of MB on users' performance. Therefore, the TTF model has become the most widely used theory in this area, either independently or in combination with other theories. For example, Tam and Oliveira (2016b) proposed a theoretical model incorporating the TTF model and information systems success model (DeLone & McLean, 2003) to assess the influence of MB on individual performance. In order to evaluate this impact, 233 responses were collected to gather opinions from current MB users. The results confirmed that use and user satisfaction are antecedents of individual performance. In addition, information quality, system quality and service quality influence user satisfaction. This manner of integration with other theories has become an attribute of the TTF model in the MB context (Afshan & Sharif, 2016; Oliveira et al., 2014; Tam & Oliveira, 2016a).

The TTF model has been used in the MB literature to assess the impact of MB on consumer behaviour in the post-adoption stage, particularly, individual performance. Besides, the model has a strong ability to predict the influence of task characteristics on consumer behaviour. Although task characteristics is one of the main factors in the present research, the model does not pay attention to other measures to assess how customers perceive the characteristics of MB. As discussed, the focus in the present research is on customers' perception concerning all aspects of MB, which can affect trust and satisfaction. Hence, the TTF cannot be used in its original version as the theoretical underpinning in this research.

### **3.4 Movement towards a cross-disciplinary framework of MB**

The characteristics of the MB system have many effects on the way customers behave towards MB. The ubiquity of MB can enable customers to do banking anytime and anywhere. Customers can also interact with banks through MB to gain pertinent banking information (Malaquias & Hwang, 2016). However, the lack of physical interaction can raise concerns regarding security and privacy issues (Zhou, 2011). In addition, the lack of quality in the MB system can also affect customer use and satisfaction with such services (Abdullah M. Baabdullah et al., 2019). These issues can result in hesitation from customers to use MB or conduct complicated transactions through MB, such as international fund transfer and updating account details.

As this research investigates customer trust and satisfaction within MB, it is important to shed light on the literature of consumer behaviour in MB, indicating the theories that have been used in this regard. A review of the MB literature reveals that researchers have mainly relied on technology acceptance and adoption theories to study behavioural intention and actual behaviours towards MB. These overused theories in this field include the Innovation Diffusion Theory (IDT) (Lin, 2011), the Unified Theory of Acceptance and Use of Technology Model (UTAUT) (Alalwan et al., 2017; Choudrie et al., 2018) and the Technology Acceptance Model

(TAM) (Malaquias & Hwang, 2019; Sharma, 2017). Table 3.1 shows a summary of selected empirical studies in the MB research.



**Table 3. 1 A summary of selected MB literature**

Author	Aim	setting	Theory used	Sample	Findings
(Gu et al., 2009)	To examine the determinants of users' behavioural intention towards MB.	South Korea	TAM	910 of current MB customers	Ease-of-use, trust and usefulness influence behavioural intention towards MB.
(G. Kim et al., 2009)	To understand how initial trust can be formed in MB.	South Korea	TAM	192 of mobile phone users who do not use MB apps.	Relative benefits, personal propensity to trust and Structural assurances are the determinants of initial trust in MB.
(K. C. Lee & Chung, 2009)	To assess the influences of information quality, interface design quality and system quality on satisfaction and trust.	South Korea	D&M	276 of current MB customers.	Trust significantly influences customer satisfaction. System quality and information quality have significant impacts on trust and satisfaction. Interface design quality does not affect trust and satisfaction.
(Cruz et al., 2010)	To investigate the obstacles to adopt MB.	Brazil	TRA+ TAM+ DOI	3,585 of bank customers who do not use MB.	Most customers do not use MB. The main factors behind the low rate of MB adoption are cost, risk, low perceived relative advantage and complexity.
(Riquelme & Rios, 2010)	To examine the factors, which influence MB adoption.	Singapore	TPB + TAM	600 current users of e-banking services.	Social norms, social risk and usefulness, are the factors affecting the intention to adopt MB.
(Püschel et al., 2010)	To develop an integrated framework to investigate customer intention to adopt MB.	Brazil	IDT+ DTPB+TAM	333 MB users and 333 MB non-users	The framework could explain 69 % of behavioural intention to adopt MB of non-users and only 27% of MB current users. The use of MB is mainly restricted to account balance checking and bill payments.
(Lin, 2011)	To investigate the influence of innovation attributes on attitude and behavioural intention to MB adoption and continuous use.	Taiwan	IDT	177 of potential and 191 of repeat MB customers.	Ease of use, competence, compatibility and perceived relative advantage, and integrity considerably affect attitude, and attitude in turn positively impact behavioural intention to adopt MB.

(Zhou, 2011)	To examine the effect of initial trust on MB adoption.	China	TAM	210 of current MB customers	Initial trust and usefulness affect the usage intention of MB.
(Sripalawat et al., 2011)	To investigate the factors influencing acceptance of MB.	Thailand	TPB + TAM	200 of bank customers and mobile phone users.	Eight factors impact acceptance of MB: subject norms, usefulness, cost, risk, ease of use, self-efficiency, device barriers and lack of information.
<b>(C.-S. Yu, 2012)</b>	to investigate factors which influence intention to adopt MB.	Taiwan	UTAUT	441of current MB customers.	Perceived financial cost, performance expectancy, perceived credibility and social influence affect the intention to adopt MB.
(Zhou, 2012a)	To examine the factors affecting MB adoption.	China	TAM	200 of mobile phone users.	Trust and flow experience determine intention to use MB, which in turn affect actual usage.
(Oliveira et al., 2014)	To examine the relationship between customer perceptions of MB, initial trust in MB, and task characteristics.	Portugal	TTF+ ITM+ UTAUT	194 of current MB users.	Initial trust, performance expectancy, task characteristics affect behavioural intention towards MB. Facilitating conditions and behavioural intentions have significant impact on MB adoption.
(Thakur, 2014)	To characterise user loyalty and user satisfaction in the MB services.	India	Commitment-trust theory	433 of current MB users.	User satisfaction with MB has a significant impact on user loyalty. Customer service and usability have significant impacts on user satisfaction.
(Baptista & Oliveira, 2015)	To propose a theoretical model to study factors affecting acceptance of MB.	Mozambique	UTAUT	252 of bank customers who mobile phone users.	Hedonic motivation, habit and performance expectancy are the antecedents of behaviour intention towards MB.
(Tam & Oliveira, 2016b)	To evaluate the impact of MB on individual performance.	Portugal	D&M and TTF	233 of current MB users.	Use and user satisfaction of MB are antecedents of individual performance. Information quality, service quality and system quality have significant influences on customer satisfaction with MB.
(Afshan & Sharif, 2016)	To analyse the environmental, technological and behavioural	Pakistan	UTAUT, TTF and ITM	198 of university students.	Significant impacts of task technology fit, initial trust and facilitating condition on the behavioural intention to adopt MB.

	dimensions of the acceptance of MB.				
(Koksal, 2016)	To specify the variables that differentiate customers who have high intention to adopt MB from others.	Lebanon	TAM	776 of university students.	Trialability, ease of use, perceived usefulness, perceived compatibility, trust and perceived credibility have positive impacts on the adoption rate of MB.
(Susanto et al., 2016)	To investigate the determinants of continuance intention to use MB.	South Korea	ECM	301 of smartphone users who are online banking users.	Confirmation use of MB has a significant influence on perceived usefulness, user satisfaction, trust, and perceived security. Perceived security has significant impact on trust. Perceived usefulness has a significant effect on user satisfaction, intention to continuance use and trust. Self-efficacy and user satisfaction have significant influences on intention to continuance use. Trust significantly influences user satisfaction.
(Tran & Corner, 2016)	To investigate the impacts of different communication channels on the intention to use MB.	New Zealand	TRA+ TAM + IDT+ UTAUT	183 of young adults.	Perceived credibility, perceived usefulness and perceived costs are the most factors influencing behavioural intention to use MB.
(Albashrawi & Motiwalla, 2017)	To investigate the behavioural intention to continued usage of MB.	The U. S	TAM	486 of current MB customers.	Usefulness and ease of use are significant antecedents of satisfaction with MB. Satisfaction determines continued usage intention of MB.
(Tam & Oliveira, 2017a)	To review and analyse the existing MB literature.	N/A	D&M+ TTF	64 journal articles published between 2002 and 2016.	MB behavioural intention and adoption topics dominate most of the MB literature. perceived ease of use and perceived usefulness are the two most significant determinants of intentions to adopt MB.
(Alalwan et al., 2017)	To examine the factors influencing behavioural intention towards MB adoption.	Jordan	UTAUT	343 of bank customers.	Performance expectancy, effort expectancy, hedonic motivation, price value and trust positively influence behavioural intention to adopt MB.

(Ahmed et al., 2017)	To investigate the factors affecting customers' perceptions toward MB adoption.	Bangladesh	TTF + UTAUT	296 of university students.	The social influences and task technology fit influence users' perceptions of MB adoption.
(Arcand et al., 2017)	To investigate the multidimensional concept of MB service quality.	Canada	Commitment-trust theory	375 of current MB customers.	Trust positively influences commitment and satisfaction with MB. MB service quality dimensions influence trust and commitment/satisfaction with MB.
(Priya et al., 2018)	To analyse the factors affecting MB adoption.	India	TAM	269 of university students.	Behavioural intention to use MB and customer satisfaction are significantly influenced by perceived ease of use, perceived credibility, perceived usefulness and structural assurance.
(Trabelsi-Zoghalmi et al., 2018)	To explain how users, assess mobile service quality in the MB context.	Tunisia	N/A	337 of MB apps users.	There is moderating impact of age and gender between mobile service quality and e-trust. E-trust determines e-satisfaction. E-trust and e-satisfaction influence e-loyalty, which in turn affect e-WOM
(Sharma & Sharma, 2019)	To understand customers' actual usage of MB.	Oman	D&M	227 staff and senior students in two Omani universities.	Satisfaction and intention to use are antecedents of MB usage. Satisfaction mediates the relationship between service quality, information quality and trust and the intention to use MB.
(Malaquias & Hwang, 2019)	To compare the determinants of MB use between the USA and Brazil.	Brazil and the U. S	TAM	375 of university students.	The key factors to understand MB use in the USA are trust and perceived ease. In Brazil are perceived usefulness, trust and social influence.
(Abdullah M. Baabdullah et al., 2019)	To examine the factors that could predict MB use and how MB use contributes to customer satisfaction and loyalty.	Saudi Arabia	UTAUT2 + D&M	221 of Saudi bank customers.	Facilitating conditions, , motivation, habit, performance expectancy, hedonic, system quality, service quality and price value significantly influence actual use behaviour of MB.

(Albashrawi et al., 2019)	To test the UTAUT model in order to investigate factors affecting success of MB usage.	The U. S	UTAUT	472 of bank customers	Effort expectancy positively influences behavioural intention and use of MB.
(Motiwalla et al., 2019)	To assess the influences of service quality, system quality and information quality on user satisfaction and usage intention of MB using three segments to discover unobserved heterogeneity bias in the information systems success model.	The U. S	D&M	445 of current MB users from local midsized bank.	The explanation power of the study model is higher in the segments compared to the full sample. The influences of system quality, information quality and service quality on user satisfaction and intention to use MB were varied significantly among the segments.
(Abdullah M Baabdullah et al., 2019)	To identify the main factors which predict the continuous behavioural intention towards adoption of MB.	Saudi Arabia	TAM+TTF	434 of current MB users.	Task technology fit, perceived security, perceived privacy and perceived usefulness, have significant impacts on continuous behavioural intention to adopt MB.
(Elhajjar & Ouaida, 2019)	to explain the key factors influencing MB adoption.	Lebanon	TAM	320 of current MB users.	Resistance to change, perceived risk, digital literacy, perceived usefulness and perceived ease of use are the key factors influencing customers' attitudes toward adoption of MB.
(Shankar et al., 2020)	To investigate the role of positive e-WOM in enhancing MB adoption.	India	ELM	1153 of users of social networking websites.	Argument quality, valence, and consistency enhance intention to adopt MB.

TAM technology acceptance model, D&M the information success model; TRA theory of reason action; DOI diffusion of innovations; TPB theory of planned behaviour; IDT innovation diffusion theory; DTPB decomposed theory of planned behaviour; UTAUT the unified theory of acceptance and use of technology model; TTF task-technology fit theory; ITM initial trust model; ECM the expectation-confirmation model; ELM the elaboration likelihood model.

According to table 3.1 and the discussion in this chapter about the theories that have been used in the MB context, the stream of MB research has mainly centred on investigating behavioural intention toward acceptance and adoption of MB. Scholars have attempted to identify the determinants and predictors of behavioural intention towards MB in order to predict acceptance and adoption at the expense of post-adoption consumer behaviour such as customer satisfaction (Tam & Oliveira, 2017a). However, it is essential to study the post-adoption behaviour to evaluate the effectiveness and success of (G. Kim et al., 2009; Oliveira et al., 2014)

As discussed in (chapter 1, section 1.3), recent patterns and statistics about MB indicate that users tend to utilise a limited number of MB services, which may lead them to perceive MB as unsatisfactory. Thus, many banks' motivation is to convince customers to use more MB services, which can result in increased customer satisfaction. This is succinctly stated as follows: While usage must precede customer satisfaction in a process sense, positive user experience would result in increased user satisfaction in a causal sense (DeLone & McLean, 2003).

Therefore, this research argues that the key factor in evaluating effectiveness and success in the MB context is customer satisfaction. User satisfaction, according to DeLone and McLean (2003), is a crucial predictor of continued use of a particular system. Hence, if customers are satisfied with MB, they will continue to use it, resulting in the success of such services.

Regarding the theoretical underpinning in studying the role of customer satisfaction in the information systems and e-commerce contexts, it may be argued that the most significant contribution in this regard is the information systems success model which was proposed by (DeLone & McLean, 1992, 2003). This research, therefore, proposes a conceptual framework based on the information systems success model (DeLone & McLean, 2003) to investigate the factors which influence customer trust and satisfaction with MB. The proposed model of this research integrates trust in the information systems success model as a key predictor of user

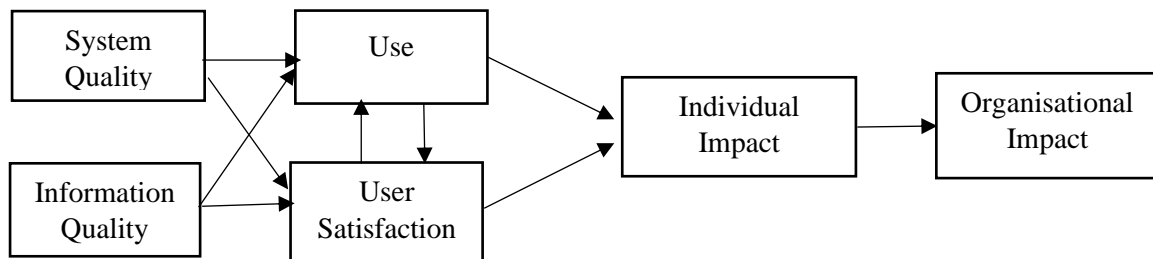
satisfaction and as a mediating factor between the independent variables in the model and customer satisfaction. This mechanism is explained as follows: MB users expect that their banks will offer them banking services conveniently and properly. Therefore, if these expectations have been confirmed, users will trust MB, resulting in the achievement of a high level of satisfaction (Abdullah M. Baabdullah et al., 2019; Tam & Oliveira, 2016b).

### **3.5 DeLone and McLean Information System Success Model**

The information system success model was first established by DeLone and McLean (1992). DeLone and McLean (1992) relied on (Shannon & Weaver, 1949)'s mathematical theory of communication to develop the information systems success model. Shannon and Weaver (1949) suggest that information systems success can be evaluated at various levels, including the technological, effectiveness and semantic levels. In addition, DeLone and McLean (1992) adapted (Mason, 1978)'s view of information system effectiveness as a sequence of events beginning with antecedents and ending with outcomes.

DeLone and McLean (1992) reviewed 180 articles regarding the effectiveness of various range of information systems contexts in order to develop their model. This review of the information systems literature led the authors to identify more than 100 factors which have been utilised in evaluating the effectiveness of information systems. These factors were then used to establish nine interrelationships between six independent and dependent variables in a conceptual framework. The aim of developing this taxonomy of variables in the information systems success model (figure 3.8) was to offer scholars a framework for evaluating information systems success at both an individual and organisational level. These variables are system quality, information quality, user satisfaction, use, individual impact and organisational impact. Since then, the information systems success model has been widely applied to assess various information systems and e-business contexts such as e-commerce (Y.-S. Wang, 2008); e-government (Y.-S. Wang & Liao, 2008); mobile banking (Tam & Oliveira, 2016b); mobile

learning system (H.-H. Lin, Wang, Li, Shih, & Lin, 2017). As a result of the widespread adoption of the information systems success model, the term information systems success has gradually become a synonym of information systems effectiveness (Petter, DeLone, & McLean, 2012).



**Figure 3. 8 Information Systems Success (DeLone & McLean, 1992)**

*DeLone and McLean (1992) defined the six variables in their model as follows:*

***System Quality:***

The term system quality refers to the quality of the system itself that is used to produce specific information. System quality can be evaluated using various features of the system, such as system reliability, response time, perceived ease of use, perceived usefulness, system accessibility and flexibility.

***Information Quality:***

Information quality is described as the quality of the information as outputs of a specific information system. The measures of information quality include accuracy, relevance, completeness, sufficiency and timeliness of the information.

***Use:***

The variable (use) refers to the extent to which the end-users continuously use the system and its outputs. There are numerous measures of use in the literature depending on the type of



information systems, such as frequency of use, intention to use, motivation to use, extent of use and use in support of cost reduction.

***User satisfaction:***

Satisfaction in the information systems domain has become one of the most important determinants of success and effectiveness (DeLone & McLean, 1992). User satisfaction refers to the extent to which the outputs of a specific information system satisfy users. Different measures have been used to evaluate user satisfaction in the information systems contexts, such as information satisfaction, top management satisfaction and decision-making satisfaction.

***Individual impact:***

The individual impact construct refers to the impact of a specific information system on individuals' behaviour. It captures attention in the relevant literature as a measure of information systems success. It has been measured in several contexts, such as performance improvement (Tong, Tan, & Teo, 2015), project managers' success (Raymond & Bergeron, 2008), task performance (Benlian & Darmstadt University of, 2015) and user creativity (Pacauskas & Rajala, 2017).

***Organisational Impact:***

The organisational impact construct in the framework refers to the impact of a specific information system on organisational performance. Many measures have been used to examine the effect of information systems on organisational performance, including cost reduction, profitability, manager productivity, return on assets and stock price.

To understand the mechanism of evaluating information systems in their framework, DeLone and McLean (1992) explain the paths between the six variables in the model in the following manner: System quality and information quality affect both user satisfaction and use, which

mutually affect each other. User satisfaction and use can positively or negatively affect individual impact or organisational impact depending on the focus of the investigation.

### **3.5.1 Criticisms of the Original Information Systems Success Model**

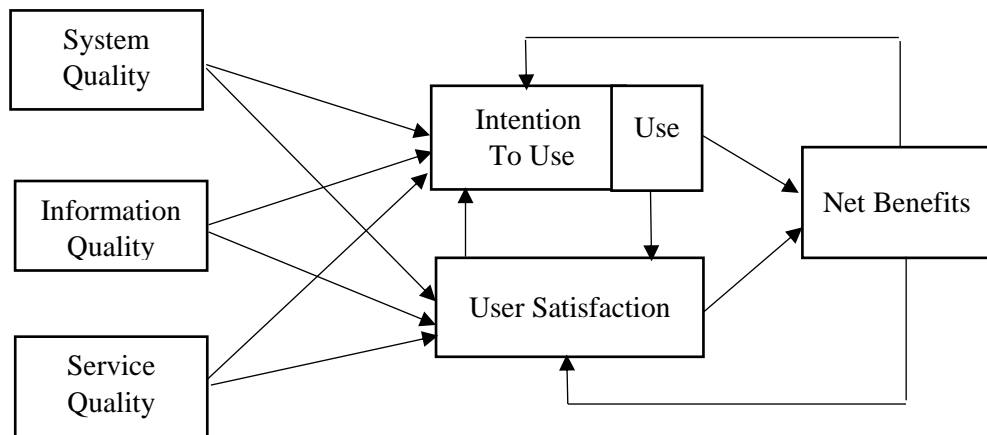
After establishing the information system success model, DeLone and McLean (1992) invited scholars to test their model. In their conclusion, they highlighted the need for testing and extending the model to assess its capabilities in predicting and explaining consumer behaviour in the information systems and e-commerce contexts. During the next ten years after establishing the model, it has been widely applied and consequently received intense criticism. The most important criticism was presented by Seddon (1997), who argued that the model is confusing as it is developed using a combination of variance and process models, including temporal and causal influences. Therefore, Seddon (1997) concluded that the model lacks theoretical clarity, which leads to inconsistency in interpreting the model. Furthermore, due to its conceptual nature, the role of stakeholders in evaluating information systems is not specified. Seddon (1997) suggests that the construct (use) in the model should be replaced with perceived usefulness to represent the net benefits that are produced from information systems use.

In response to the criticisms of (Seddon, 1997), DeLone and McLean (2003) revised the original information system success model to deal with the limitations of the model. Their revision resulted in the development of the updated information systems success model (figure 3.9). The main feature of the revised model is the combining of individual and organisational impacts into the net benefits construct. This integration enables capturing the wider impact beyond the use of information systems for all other relevant stakeholders rather than just individuals and organisations. Stakeholders can also comprise other parts such as groups, customers and industries (Petter et al., 2013; Seddon, 1997).

In addition, the service quality construct was added to the model as an independent variable to show the support provided to the information systems by the IT department. Services quality can be assessed by a set of measures such as technical competence, empathy of IT staff and reliability. However, the service quality construct has encountered several issues about its position in the model. In other words, is service quality an indicator of information technology quality, or is it a dimension of the information systems? Furthermore, service quality carry different meaning rather than information quality and system quality? (Tate, Sedera, McLean, & Burton-Jones, 2014).

Some researchers have argued that service quality is solely a component of system quality. However, DeLone and McLean (2003) defend their idea by attributing the reason behind the addition of service quality to the changes in the role of information systems over the last decades, which require a separate variable to measure the quality of the service. For example, DeLone and Mclean (2004) argue that service quality is essential in the e-commerce setting, “because the users are now customers rather than employees, and therefore, poor user support will translate into lost customers and lost sales” (DeLone & Mclean, 2004, p. 34).

Another feature of the updated information system success model is the extension of the relationship between use and user satisfaction to incorporate the intention to use construct. The intention to use construct was added to address Seddon (1997)’s criticism of the volitional vs. mandatory use debate. Furthermore, to the previous changes to the original model, mutual relationships between net benefits with user satisfaction and intention to use were added.



**Figure 3. 9 the updated information systems Success Model (DeLone & McLean, 2003)**

### **3.5.2 The Updated DeLone and McLane Information System Success Model**

The updated version of the information systems success model has caught more interest in the information system field. It has also led to further empirical testing and adjustments. In their updated model, DeLone and McLean (2003) assume that the model lends itself to being employed in new and developing systems rather than just the already existing information systems. In particular, DeLone and Mclean (2004) address how the updated information systems success model can be utilised to measure information systems success in the e-commerce context. The authors suggested definitions for each variable in the information systems success model in the context of e-commerce. (DeLone & Mclean, 2004) argue that e-commerce is different from other information systems contexts that organisations implement due to its volitional use.

In addition, users in e-commerce are potential customers. Therefore, the system must be easy to use in order to encourage customers to use it. If customers do not or cannot use the system, the target benefits would not be gained. Therefore, system quality is an essential determinant of e-commerce success. System quality assesses the optimal characteristics of a specific e-

commerce vendor (DeLone & Mclean, 2004). The measures of system quality include availability, response time, reliability, adaptability, and usability (Molla & Licker, 2001; Spiller & Lohse, 1997). In addition, there are new measures for systems quality used in e-commerce, which are customisation and ease of navigation (Molla & Licker, 2001; Palmer, 2002). These additional measures deal with online interaction when customers engage with online vendors (DeLone & Mclean, 2004).

Regarding information quality, it refers to the content generated from the engagement in an e-commerce setting. Since the online environment is uncertain, the content provided should have a high level of quality. For example, the information should be understandable, personalised, relevant, secure and complete. These characteristics of information can reduce customer uncertainty when they interact with vendors online (DeLone & Mclean, 2004; Molla & Licker, 2001). Service quality in the e-commerce context refers to the support given to the customers by the online vendor before, during and after the exchange cycle (DeLone & Mclean, 2004). It can include providing information, answering questions and solving problems. Service quality can be evaluated by many measures such as responsiveness, assurance, and empathy with the customer (DeLone & Mclean, 2004).

The construct of (system use) indicates any interaction that customers have with e-commerce websites even if it does not end with conducting transactions. There are two types of measures that have been used to evaluate system use in e-commerce. First, the nature of the interaction, for example, receiving customer orders, customer service requests and information search (Young & Benamati, 2000). Second, the amount of use, for example, the number of e-commerce website visits and the length of stay engaged (D'Ambra & Rice, 2001; DeLone & Mclean, 2004; Molla & Licker, 2001).

In the e-commerce context, customer satisfaction is considered as a measure of individual satisfaction rather than organisational satisfaction. Customer satisfaction is a measure that captures consumers' views and feelings about an e-commerce system over the course of the service cycle (DeLone & Mclean, 2004). Finally, the net benefits construct seeks to assess the system's effect on "customers, vendors, workers, organisations, economies, businesses, economics, and even our communities" (DeLone & McLean, 2003, p. 25). In the e-commerce domain, net benefits can be measured depending on the level of investigation. Customers' net benefits refer to the benefits that customers can gain from the system, such as improved customer knowledge and experience, reduced information search time, and reduced shopping costs (D'Ambra & Rice, 2001; Hoque & Lohse, 1999; Loftus, 1997). On the other hand, organisational net benefits can be evaluated by several measures such as stickiness, customer responsiveness, customer loyalty and customer acquisition (DeLone & Mclean, 2004; Molla & Licker, 2001; Thompson & Too, 2000).

It can be noticed from the e-commerce literature that numerous investigations have applied the information systems success model to predict and explain consumer behaviour in various e-commerce contexts. However, very few studies have used the model in e-banking research, in particular MB (Motiwalla et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016b). The study of (K. C. Lee & Chung, 2009) was the first study that applied the information systems success model in investigating MB. The authors attempted to evaluate the impact of quality factors in the MB system on satisfaction and trust in Korea. Based on data gathered from 276 MB customers, the findings revealed that trust significantly influences customer satisfaction. In addition, system quality and information quality have significant impacts on customer trust and satisfaction. Although this study investigates aspects of MB consumer behaviour in the post-adoption phase, it focuses only on limited aspects of the MB characteristics which are system

quality and information quality, while ignoring other factors that can have a significant impact on user satisfaction, such as service quality, task characteristics, and security.

The information system success model was integrated with the task-technology fit model TTF by (Tam & Oliveira, 2016b) to evaluate the impact of MB on individual performance. More recently, (Sharma & Sharma, 2019) and (Abdullah M. Baabdullah et al., 2019) used the information system success model to examine MB use. Although both studies proved the critical role of satisfaction, they did not explain how customer satisfaction was formed. Regarding the role of trust, (Abdullah M. Baabdullah et al., 2019) did not consider the important impact of trust in shaping customer satisfaction and loyalty. On the other hand, Sharma and Sharma (2019) consider trust as an antecedent of satisfaction. However, they did not explain the formation of trust and its impact on customer satisfaction.

After reviewing consumer behaviour theories in the information systems and MB literature, the information systems success model is selected to be the theoretical underpinning of the current research. The main reason for selecting this model is the focus on investigating consumer behaviour in the post-adoption stage. In addition, the independent variables in the information systems success model are in the interest of this research. Full justifications for selecting the information system success model are discussed in detail in chapter 4 section 4.2.

### **3.6 Gaps in Previous Research on Theory used to Study MB**

Given that this research examines customer trust and satisfaction in MB, it is important to review the literature on consumer behaviour in MB, identifying the theories that have been applied. According to the review of the MB literature conducted in this research and other systematic literature reviews on adoption of MB, researchers have mainly relied on technology acceptance and adoption theories to study behavioural intention and actual behaviour toward MB, such as the Innovation Diffusion Theory (IDT) and the Technology Acceptance Model

(TAM) (Malaquias & Hwang, 2019; Sharma, 2017). These theories are effective for investigating pre-adoption consumer behaviour in the context of MB because they focus primarily on the usefulness and functionalities of MB and their impacts on how new MB users perceive MB. However, MB services have been increasingly popular in recent years. Thus, it is critical to shed light on customer perceptions of MB in the post-adoption stage and how customer behaviour can influence the success of such services. Thus, the current research is the first to incorporate trust as a mediator to study consumer behaviour within the MB context into the updated information systems success model (DeLone & McLean, 2003). This resulted in the development of a consistent conceptual framework that contributes to a better understanding of the role of trust in MB post-adoption behaviours, particularly customer satisfaction.

### **Chapter Summary**

Chapter 3 discussed consumer behaviour in the online environment and the e-commerce context. It also discussed the consumer behaviour theories and the theories and models that have been used in investigating consumer behaviour in MB. Based on this chapter and after reviewing MB literature, it has been concluded that the most appropriate theory to develop a conceptual framework for the current research is the information systems success model (DeLone & McLean, 2003). The literature review discussed in chapter 2 and chapter 3 provides the basis for the next chapter, which is the development of the proposed conceptual model and hypotheses for trust and satisfaction of MB.



## **Chapter 4 Conceptual Model and Hypotheses**

### **4.1 Introduction**

The second chapter provided a discussion of the trust concept in the e-commerce context, and trust in MB was conceptualised based on the trust concept in e-commerce. In addition, in the third chapter, the theories and models that have typically been used in investigating consumer behaviour towards e-commerce were reviewed. The discussions in the last two chapters pave the way to propose a conceptual model for the present research and formulate the research hypotheses. This chapter aims to develop a framework for MB customer trust and satisfaction. As mentioned in the discussion in (chapter 3 section 3.5), the information system success model (DeLone & McLean, 2003) is partially adopted and boosted by additional constructs in the current research. Trust is integrated into the model as a mediating factor. Besides, the independent variables in the information systems success model are extended to include task characteristics and structural assurance. The first section in this chapter presents justifications for selecting the information system success model. The second section discusses the conceptual framework and the development of the research hypotheses.

### **4.2 Justifications for Selecting the Information System Success Model**

The proposed model in the current research (see figure 4.1) is primarily drawn on the information systems success model (DeLone & McLean, 2003). From a broad perspective, the conceptual framework of this research is based on the conceptualisation of trust in the MB context that was discussed in chapter 2. Further, the inclusion of trust as a mediator in the model enhances the understanding of user satisfaction in the MB context due to the explanation power of trust in e-business settings, in particular e-finance (Sinha & Mukherjee, 2016). The information system success model was chosen as the theoretical foundation for this study for the following reasons:

First, the application of the information system success model is relevant to the main aim of the present research, which is investigating customer satisfaction in the MB context. After reviewing the existing theories that studied consumer behaviour in information systems and e-commerce in chapter 3, it is obvious that (DeLone & McLean, 2003)'s model is the most appropriate to establish the proposed conceptual framework for this research. This is because it is the most important theoretical framework in studying user satisfaction. The information systems success model has been widely utilised to evaluate usage and user satisfaction in a variety of information systems and e-business contexts, including e-commerce (Y.-S. Wang, 2008); mobile learning system (H.-H. Lin et al., 2017) and e-government (Y.-S. Wang & Liao, 2008); Thus, It has demonstrated a strong ability to investigate customer satisfaction as an essential determinant of success and effectiveness in the online environment.

The information systems success model differs from the other information technology theories as it is more appropriate than the other theories to assess innovations in the post-adoption stage (Petter et al., 2013). The other information technology theories focus mainly on investigating the acceptance, adoption and behavioural intention to use technology, such as the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT).

Second, in their model, DeLone and McLean (2003) proposed specific factors relevant to the quality of the information systems, namely system quality, information quality and service quality. As discussed in chapter 3, the conceptualisation of trust in MB conducted in this research resulted in determining a set of key dimensions that reflect the characteristics of MB. In addition, these factors explain the mediating role of trust in enhancing customer satisfaction in MB. According to the discussion of interpersonal-based trust, system quality, information quality and service quality can effectively explain MB characteristics that are related to ability and integrity dimensions of trust. Therefore, the information system success model is the

appropriate model to investigate the influences of these three trusting beliefs on trust and in turn on customer satisfaction through the mediating effect of trust.

Third, eminent scholars including Petter et al. (2013) have emphasised the importance of including additional independent variables in the updated information system success model in addition to the three quality factors in the model. Petter et al. (2013) conducted a review of the information system success model's literature and application in a variety of information systems contexts. They emphasised that the variables in the original and updated models are not adequate to examine all aspects that can explain the influence of information systems. The authors then recommended that researchers should expand the range of factors in the model to provide a better understanding of the information systems success. Therefore, the current research attempts to add to the information system success literature by extending the range of factors that can explain customer satisfaction in the MB context to include structural assurance and task characteristics.

### **4.3 The Conceptual Framework for Customer Satisfaction with MB and the Formulation of the Research Hypotheses.**

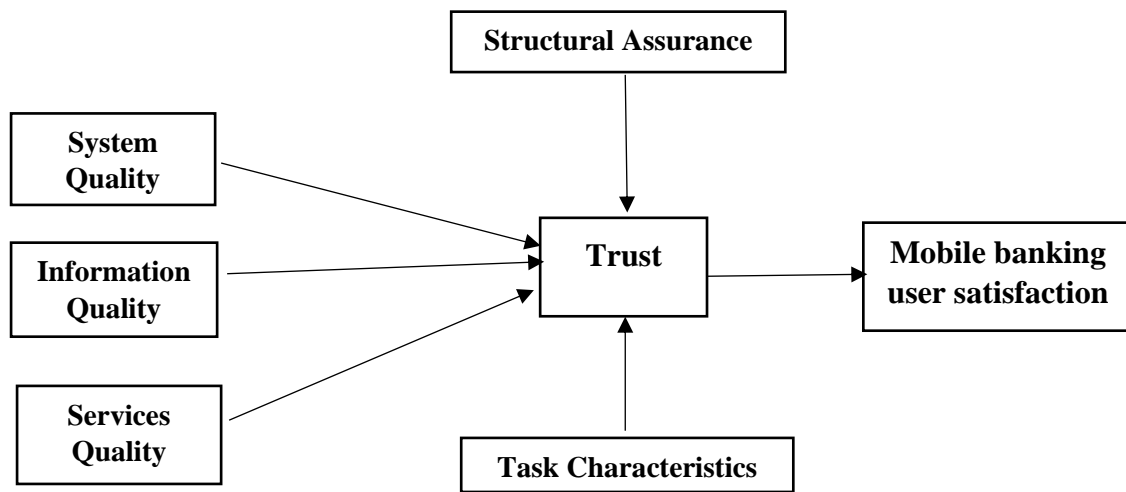
#### **4.3.1 Conceptual Framework**

The conceptual framework developed in the current research (see figure 4.1) extends the independent variables in the information system success model (DeLone & McLean, 2003) to include structural assurance and task characteristics alongside the three quality variables. This inclusion aims to enhance the understanding of customer trust and satisfaction in MB. The rationale behind the consideration of the five factors in the research framework is twofold. First, as discussed in chapter 3 regarding the conceptualisation of trust, the current research considers two types of trust, which this research argues that are the key components in understanding the influence of trust on online consumer behaviour in general, in particular,

user satisfaction in MB. These types are the interpersonal-based trust and the institutional-based trust.

To investigate interpersonal-based trust (trusting beliefs), this research uses four factors (system quality, information quality, service quality and task characteristics). These factors can explain the three dimensions of the interpersonal-based trust in MB (ability, integrity and benevolence), which are required components to deal with the concerns regarding MB characteristics. While system quality, information quality and service quality deal with the ability and integrity of MB, task characteristics is used to explain benevolence in MB. Furthermore, structural assurance is included in the conceptual model to investigate the institutional-based trust, which addresses customers' concerns regarding security and privacy of MB.

Second, many scholars, such as Petter et al. (2013) argue that additional independent variables should be added to the three quality factors in the information systems success model (DeLone & McLean, 2003) in order to improve our understanding of information system success. Thus, this study considers it necessary to include task characteristics in order to emphasise the effect of the MB system on user satisfaction with the support they gain from their banks through MB. Besides, structural assurance is added to the model to cover users' concerns about security and privacy issues in MB.



**Figure 4. 1 MB customer satisfaction model**

In addition, these five variables have been used and demonstrated to have a substantial impact on consumer behaviour in the MB setting by other researchers. Table 4.1 shows several research contributions, which use one or more of the five variables in the research model:

**Table 4. 1 Factors that influence customer behaviour in MB** (Geebren, Jabbar, & Luo, 2021)

Factors	Sources
System quality	(Abdullah M. Baabdullah et al., 2019; Choudrie et al., 2018; K. C. Lee & Chung, 2009; Motiwalla et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016a, 2016b, 2017b; Zhou, 2011, 2012b).
Information quality	(Abdullah M. Baabdullah et al., 2019; K. C. Lee & Chung, 2009; Motiwalla et al., 2019; Sharma & Sharma, 2019; Tam & Oliveira, 2016b, 2017b; Trabelsi-Zoghlami et al., 2018; Zhou, 2011, 2012b).
Service quality	(Abdullah M. Baabdullah et al., 2019; Choudrie et al., 2018; Sharma & Sharma, 2019; Tam & Oliveira, 2016b, 2017b; Thakur, 2014; Zhou, 2012b)
Task characteristics	(Abdullah M Baabdullah et al., 2019; Choudrie et al., 2018; Malaquias & Hwang, 2016; Oliveira et al., 2014; Tam & Oliveira, 2016b)
Structural assurance	(Baptista & Oliveira, 2016; Gu et al., 2009; G. Kim et al., 2009; Oliveira et al., 2014; Priya et al., 2018; Susanto et al., 2016; Zhou, 2011, 2012b)

### **4.3.2 Research Hypothesis**

The following sub-sections discuss the conceptual model in further detail and the formulation of the research hypothesis.

#### **4.3.2.1 Trust and Customer Satisfaction**

As discussed in chapter 2 and chapter 3, trust is a crucial predictor of consumer behaviour in the e-commerce context. Therefore, the role of trust in consumer behaviour research has received considerable attention in investigating information systems and e-commerce fields. Most importantly, the influence of trust on user satisfaction as a measure of information systems success and effectiveness (DeLone & McLean, 2003). In the online environment, trust has long been recognised as a catalyst for the establishment of satisfying business relationships (Fang et al., 2014; McCole, Ramsey, Kincaid, Fang, & Li, 2019b). This is because trust is perceived as one party's expectation of particular actions from another party and the risk involved (McKnight & Chervany, 2001). Similarly, in the MB domain, MB users always expect to receive proper and convenient services when using MB. Thus, if MB meets the expectations of users, MB users are more likely to develop trust in MB services (Malaquias & Hwang, 2016). Building trust in MB contributes to the achievement of a high level of user satisfaction, which is essential for such services to succeed (Abdullah M. Baabdullah et al., 2019; Tam & Oliveira, 2016b).

Thus, like in other e-business contexts, the use of MB may increase users' concerns about privacy and security issues related to banking in the online environment. Also, using MB can raise concerns about the required three dimensions of interpersonal-based trust, namely ability, integrity and benevolence of MB. Therefore, the current research takes into consideration all dimensions of overall trust which can be used to illustrate how trust influences user satisfaction. There have been very few studies in the current MB research that have studied the influence of trust on user satisfaction (Berraies et al., 2017; K. C. Lee & Chung, 2009; Sharma & Sharma,

2019). However, these studies are not based on a systematic conceptualisation of overall trust in MB. For example, (Sharma & Sharma, 2019) focused only on the security and privacy of MB and ignored the role of MB characteristics such as ability, integrity and benevolence. Other researchers consider only factors related to interpersonal-based trust such as information quality, quality value, system quality and argument quality. (Berraies et al., 2017; K. C. Lee & Chung, 2009; Shankar et al., 2020). Furthermore, these studies have not considered the mediating effect of trust on user satisfaction. Hence, through this study and based on the systematic discussion and conceptualisation of trust in MB, the following hypothesis is formulated:

***H1:** Trust positively influences customer satisfaction within MB.*

#### **4.3.2.2 System Quality**

DeLone and McLean (1992) explained the notion of system quality in information systems as perceptions of users concerning the overall performance quality of a specific system. Due to the anonymity of the service providers, system quality is highly relevant in the e-commerce environment (Choudrie et al., 2018). According to the discussion in chapter 2 about the conceptualisation of trust in MB, system quality is used in this study to assess the ability of MB to provide banking services in a proper and convenient manner. It stands to reason that if MB users believe the MB system is of high quality, they will have more trust in its abilities (Choudrie et al., 2018; McKnight et al., 2002b).

The MB system's essential capabilities include good navigation, ease of use, an attractive vision and accessibility (Zhou, 2012b). Ease of use measures the usability by intended users of a certain system (DeLone & McLean, 1992). Navigation refers to the degree to which a particular information system is easy to navigate to find products, services and information (Zhou, 2011). Accessibility measures convenience in accessing a specific information system. For example,

does the MB app load and open fast? (DeLone & Mclean, 2004). Attractiveness measures whether users perceive a particular information system as visually appealing. For example, does the design of the MB app appear aesthetically pleasing and has user-friendly colours? (Motiwalla et al., 2019).

This study argued that system quality has a major effect on trust, leading to the achievement of high user satisfaction. This perspective is confirmed by several previous research that argues that systems quality significantly affects user satisfaction (Abdullah M. Baabdullah et al., 2019; Motiwalla et al., 2019; Tam & Oliveira, 2017b). However, Sharma and Sharma (2019) argue that there is no relationship between these two variables. In addition, the MB research has paid little attention to the impact of system quality on trust (K. C. Lee & Chung, 2009; Zhou, 2011). Thus, the current study contributes to the existing literature by examining the effect of system quality on overall MB trust. Furthermore, this study investigates the role of trust as a mediating factor between system quality and user satisfaction, which has not been addressed in the MB literature. Therefore, this research attempts to test the following two hypotheses:

*H2a: System quality has a positive influence on trust within MB.*

*H2b: Trust acts as a mediator between system quality and customer satisfaction within MB.*

#### **4.3.2.3 Information Quality**

In a variety of e-business and information systems contexts, information quality has been described as a critical factor affecting trust, satisfaction, and usage (Bao et al., 2016; Motiwalla et al., 2019). It is defined as the desirable characteristics of a particular information system's outputs (DeLone & McLean, 2003). Thus, (Xu, Benbasat, & Cenfetelli, 2013) suggest that the characteristics of high-quality information include relevance, accuracy, completeness, and accessibility and timeliness. Accuracy refers to the correct and precise information that



customers can obtain from a specific information system (Zhou, 2011). Relevance measures whether the available information is relevant to the required tasks from users (K. C. Lee & Chung, 2009). Timeliness implies the up to date information that users can gain from a specific information system (Zhou, 2011). Completeness evaluates the sufficiency of the information (K. C. Lee & Chung, 2009). Accessibility refers to the availability of information when it is needed by users (Zhou, 2012b).

In several scenarios in non-physical settings, including MB, users' online experiences are significantly influenced by information quality. MB users need to depend on their expectations about the quality of the information provided by MB (Gao & Waechter, 2017). From a customer standpoint, the poor quality of information obtained by users from a particular system may trigger major issues. Out-of-date, irrelevant and inaccurate information in the MB context may lead to concerns regarding the integrity and ability of the MB system (Zhou, 2011). Customers may have a low level of trust in MB services as a result of these concerns. As a result, a lack of trust will lead to a lack of user satisfaction (K. C. Lee & Chung, 2009; Sharma & Sharma, 2019). Thus, the present research argues that information quality significantly influences MB user trust and satisfaction.

Information quality has been confirmed as a key influencing trust, satisfaction, and use in the MB literature (K. C. Lee & Chung, 2009; Sharma & Sharma, 2019; Tam & Oliveira, 2017b; Trabelsi-Zoghalmi et al., 2018; Zhou, 2011, 2012b). However, to the best of the researcher's knowledge, no definitive studies have been conducted to examine the impact of information quality on customer satisfaction indirectly via trust. Hence, the current research investigates information quality with a set of factors that reflect the conceptualisation of trust in MB to provide a better understanding of the impact of the overall trust on consumer behaviour in MB. In addition, this research aims to study the mediating effect of trust between information quality and user satisfaction in MB. Therefore, the following two hypotheses are proposed:

*H3a: Information quality has a positive influence on trust within MB.*

*H3b: Trust acts as a mediator between information quality and customer satisfaction within MB.*

#### **4.3.2.4 Service Quality**

Services quality assesses reliability, promptness, personalisation, and whether or not services are professional (Gefen, 2002). Reliability refers to the degree to which users can rely on a specific system (Zhou, 2012b). Promptness refers to the quality of obtaining services from a specific system quickly and precisely when they are needed (H.-W. Kim, Xu, & Koh, 2004). Personalisation implies meeting the user's needs more effectively and efficiently and interacting faster and easier to increase the repeat visit rate (DeLone & Mclean, 2004). The professional service refers to providing special support for users (Zhou, 2012b). As described in Chapter 3, service quality was incorporated into the revised information systems success model (DeLone & McLean, 2003) to assess the services provided by a particular system.

In the context of MB, users expect to receive high-quality banking services using MB apps. In order to meet these expectations, banks are compelled to invest funds and effort in consistently improving MB service quality (Choudrie et al., 2018). MB users will perceive MB services as having good ability and integrity to deliver them with high-quality banking services when they receive high quality banking services, such as timely, dependable, personalised and professional services through MB. This results in a higher level of user trust, which can be translated into increased user satisfaction (K. C. Lee & Chung, 2009; Zhou, 2013).

The use of service quality as a measure of the overall quality of MB and its effect on initial trust have been investigated in the MB area (Gao & Waechter, 2017; Zhou, 2012b). In addition, its effect on customer satisfaction (Abdullah M. Baabdullah et al., 2019; Sharma & Sharma, 2019). This research argues that there are gaps in the MB literature regarding the role of service

quality in establishing customer overall trust in the post-adoption stage of MB. In addition, the indirect impact of service quality on customer satisfaction via trust, which is a strong antecedent of customer satisfaction. Thus, the following two hypotheses have developed:

*H4a: Service Quality has a positive influence on trust within MB.*

*H4b: Trust acts as a mediator between service quality and customer satisfaction within MB.*

#### **4.3.2.5 Task Characteristics**

Technology characteristics refer to “computer systems (hardware, software, and data) and user support services (training, help lines, etc.) provided to assist users in their tasks” (Goodhue & Thompson, 1995, p. 216). User habits, behaviour, and expectations of products and services can all be influenced by the characteristics of technology such as design, usability and function (Choudrie et al., 2018). Technology adoption has the potential to enhance user performance if it is perceived as a valuable tool that brings flexibility and ease of use to daily life (Tam & Oliveira, 2019). Therefore, new technology can optimise tasks for effectiveness, efficiency and positive user experience (Oliveira et al., 2014).

Task characteristics, according to Abdullah M. Baabdullah et al. (2019), is the motivation that stimulates individuals to accept innovations. Thus, in MB, the incentive for adoption to drive innovation is enormous; performing routine daily tasks such as transferring money, inquiring about accounts, and managing accounts are antecedents to building trust in MB (Malaquias & Hwang, 2016). MB services are perceived in the literature in this area as benevolent practices that make user life simpler and more convenient. (Abdullah M Baabdullah et al., 2019; Tam & Oliveira, 2016b).

As discussed in section 4.1, many scholars, including Petter et al. (2013) suggest that other independent variables should be included in the information system performance model to improve the understanding of satisfaction and usage of information systems. Thus, in this

research, according to the conceptualisation of trust in MB conducted in chapter 2, task characteristics can be used to assess MB's benevolence. Customers who need to transact banking services anywhere and anytime, such as transferring money, inquiring about their accounts and managing their accounts, tend to develop trust in MB (Malaquias & Hwang, 2016). This is because they perceive MB service as benevolent that supports them in doing their daily activities. In recent studies, task characteristics have been used to predict customer behaviour in MB (Abdullah M Baabdullah et al., 2019; Malaquias & Hwang, 2016; Malaquias, Malaquias, & Hwang, 2018). However, the study of the direct and indirect effect of task characteristics on customer satisfaction remains a gap in MB research.

The present research argues that trust can act as a critical mediator in the relationship between task characteristics and customer satisfaction. Thus, this study examines the effect of task characteristics on the overall trust in MB. Besides, this research assesses the mediating impact of trust on the relationship between task characteristics and customer satisfaction. Therefore, this research attempts to examine the two following hypotheses:

*H5a: Task characteristics has a positive influence on trust within MB.*

*H5b: Trust acts as a mediator between task characteristics and customer satisfaction within MB.*

#### **4.3.2.6 Structural Assurance**

According to the discussion of the trust concept in chapter 2, structural assurance is used in the present research as the main dimension of the institutional-based trust. Structural assurance has been proved as a critical contributor in building users' overall trust in the online business setting, where there are uncertain situations (Pavlou & Gefen, 2004). Structural assurance indicates the essential technological and legal structures that can ensure security and privacy

for users as essential components to engaging in online business relationships and conducting transactions.

In the MB context, structural assurance is a crucial element as the MB system is based on wireless networks and cellular data points, which have previously been seen as vulnerable to hacker attacks and information interception. Therefore, solid structural assurances like government regulations and transport layer security protocol TLS are crucial to ensure security and privacy and act as the basis for users to establish their trust in MB (Oliveira et al., 2014). Thus, customer satisfaction can be enhanced by having a high level of trust in the MB infrastructure. Examples of structural assurances in MB can be the certification and regulations that are used to enhance customers' perception of security and privacy in the MB system.

Prior research has substantiated this view, emphasising the critical role of structural assurance in establishing customer trust in MB (Baptista & Oliveira, 2016; Oliveira et al., 2014; Zhou, 2012b). However, to the best of the researcher's knowledge, no study has examined the direct influence of structural assurance on user satisfaction and the indirect effect via trust as a mediator between the two variables.

The present research argues that in the electronic banking domain, in particular, the MB system, the consideration of structural assurance can play an important role in enhancing the level of user satisfaction. Hence, this research first, examines the effect of structural assurance on the overall trust in MB, and second, it assesses the indirect effect that trust can play as a mediator between structural assurance and user satisfaction. Thus, this research suggests the following two hypotheses:

***H6a: Structural assurance has a positive influence on trust within MB.***

*H6b: Trust acts as a mediator between structural assurance and customer satisfaction within MB.*

### **Chapter Summary**

In summary, chapter 4 justified the adoption of the information systems success model in the first section. Then, it justified the selection of the independent variables used in the research model and discussed the development of the conceptual framework of customer satisfaction in MB based on the review of the MB literature discussed in chapters 2 and chapter 3. The conceptual model resulted in the formulation of eleven hypotheses. One hypothesis is related to the positive relationship between trust and customer satisfaction. In addition, five hypotheses are related to the relationships between the independent variables in the research model and trust. Furthermore, the other five hypotheses are related to the indirect relationships between the independent variables in the model and customer satisfaction through trust as a mediator. These five independent variables are system quality, information quality, service quality, task characteristics and structural assurance. The following chapter will provide in detail a discussion of the methodology of the current research.

## **Chapter 5 Methodology**

### **5.1 Introduction**

This chapter aims to provide an overview of the methodology used in this research. The first section presents the philosophical assumptions and indicates the ontological and epistemological positions of this research. The research design and justification of the research approach and strategy applied in this research are discussed in the second section. The third section discusses the development of the research instrument used to collect data for the current research. A discussion of the research population and the sampling procedure is presented in the fourth section. Finally, the data analysis procedure is discussed in the fifth section, indicating the rationale for selecting structural equation modelling (SEM) with partial least squares (PLS) as the data analysis technique for this research.

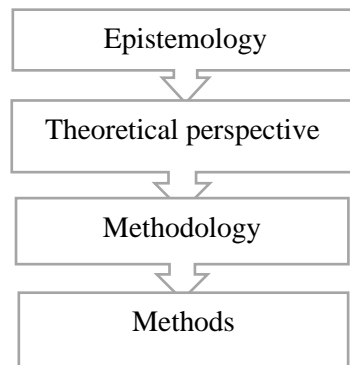
### **5.2 Introduction to the Research Design Process**

The term research refers to the process by which researchers make systematic efforts to deal with problems or answer specific questions (Creswell, 2012). According to Crotty (1998), in order to conduct effective research, researchers should consider answering the following four questions:

- 1-What is the epistemology that can inform the theoretical perspective?
- 2-What is the theoretical perspective that determines methodology and provides context, logic and criteria?
- 3-What type of methodology governs the choice of certain methods?
- 4-What are the proposed methods to collect and analyze the research data? C

These four questions offer an important guideline for scholars in selecting the appropriate approach to design and control research (Creswell, 2002). Crotty (1998) clarifies the systematic

process by which researchers can take decisions regarding each stage of conducting valid research (see figure 5.1).



**Figure 5. 1 Elements of the research design process**

(Crotty, 1998)

On an in-depth look at figure 5.1, these four components are linked closely together, and every component determines the next component. Therefore, any decision made on one part of this process influences the other decisions on the other parts.

These previous elements are explained in detail in the following subsections to gain a thorough understanding of the research design process.

### **5.3 Research Philosophy**

Research philosophy has been considered as a fundamental component in developing scientific research. It determines the research question type and research methods used to investigate the research problem (Crotty, 1998). In order to determine scientific research philosophy, researchers should adopt a specific scientific research paradigm. Research philosophical paradigm refers to the fundamental beliefs that guide the researcher throughout the research process (Guba & Lincoln, 1994). Selecting a suitable research paradigm is a crucial decision based on several considerations. These considerations comprise the nature of the problem under investigation, research aim, objectives and questions, and the theoretical and philosophical assumptions of the research (Bryman, 2012; Hussey & Hussey, 1997; Saunders, Lewis, &



Thornhill, 2012; Yin, 2014). The scientific research paradigm consists of ontology, epistemology, methodology and methods.

### **5.3.1 Ontological and epistemological considerations**

According to Guba and Lincoln (1994), the research paradigm consists of three key components, namely ontology, epistemology and methodology. These three elements provide an understanding of the theoretical concepts that shape our view of the world, what we think can be known about it and how we know what we know. While ontology deals with the nature of reality, epistemology deals with identifying the reasonable knowledge of a specific research context (Bell, Bryman, Harley, & Bryman, 2018). These two assumptions are fundamental in designing research as they underpin research strategy and methods (Saunders, Lewis, & Thornhill, 2007).

#### **5.3.1.1 Ontology**

Ontology is the branch of philosophy that is traditionally known as metaphysics, which studies the nature of beings and reality (Denzin & Lincoln, 2008). The key question in ontology is what entities there are in the universe and how these entities can be grouped regarding similarities and differences (Bell et al., 2018). Ontology is widely classified into two different elements: subjectivism and objectivism.

*Subjectivism* denies that there is any objective moral truth, and the answer to a particular question can be true or false depending on the mental choices and the experience of individuals (Bryman, 2012). Therefore, for subjectivists, perception and consciousness of a person is the reality (Saunders, Lewis, & Thornhill, 2016). *The objectivist* perspective, on the other hand, argues that there is one reality, which exists entirely independent of the experience, consciousness and mental choices of the observer (Bryman & Bell, 2011; Saunders et al.,

2007). Hence, Objectivism holds that there is one objective truth and it can be increasingly known through the accumulation of conceptual knowledge (Blaikie, 2007).

### **5.3.1.2 Epistemology**

Epistemology refers to “*The theory of knowledge embedded in the theoretical perspective and thereby in the methodology*” (Crotty, 1998, p. 3). Epistemology deals with what is considered as acceptable knowledge in a particular domain of research (Bryman, 2016). It determines the nature of knowledge and how someone knows or captures this knowledge (Bryman, 2016). In addition, how much knowledge individuals do or can know (Saunders et al., 2016). Thus, epistemology is one crucial component in identifying the research philosophy (Collis & Hussey, 2013). There are various schools of thought regarding the methods that can be considered to determine the epistemological position of research. However, interpretivism and positivism are the two prevalently known philosophical research paradigms.

*The interpretive perspective* of epistemology argues that reality is subjective, and there are several significant differences between the social and natural sciences regarding the subject matter (Blaikie, 2007). This view sees that the methods of natural sciences investigations cannot be used to study social sciences. This is attributed to the fact that the study of a social phenomenon requires researchers to understand the meaning of the social world shaped by individuals who participated in the research (Blaikie, 2007). According to interpretivism, researchers should interact with the research's social subjects in order to understand phenomena from their point of view (Saunders et al., 2016). In addition, it refuses the assumption that researchers are independent of reality. The advocates of this view support the idea that researchers can bring their beliefs about a certain phenomenon to the research, which, in turn, can influence their interpretations (Creswell, 1994). Regarding the methodology that is consistent with the interpretivism approach, interpretive researchers typically employ

qualitative methods. These methods enable researchers to collect data from the research potential participants, who rely on their interpretations and view of reality (Creswell, 1994).

*The positivist perspective* of epistemology, in contrast, supports the argument which assumes that social sciences can be studied using natural sciences methods regardless of the differences in the nature of the subjects under investigation (Blaikie, 2007). This perspective of epistemology believes that the world is external, and there is only one objective reality phenomenon (Crowther & Lancaster, 2008). This means that the observer should maintain minimal interaction with the subjects when conducting research (Wilson, 2014). Hence, it is based on an extremely structured methodology in order to minimise research bias (Crowther & Lancaster, 2008). Statistical and numerical methods are the main techniques for positivist research. Accordingly, positivism depends on quantifiable observations and through developing hypotheses and collecting numerical data that lead to statistical analyses (Wilson, 2014). Table 5.1 outlines the major differences between the interpretivist and positivist paradigms.

**Table 5. 1 The main differences between the positivist and interpretivist research paradigms**

(Hussey & Hussey, 1997)

Criterion	Positivist paradigm	Interpretivist paradigm
Data type	Generates quantitative data	Generates qualitative data
Sample size	Uses a large sample size	Uses a small sample size
Aim	Deals with hypothesis testing	Deals with generating theories
data specification	Highly specific and precise data	Highly subjective data
Study type	Artificial location	Natural location
Reliability and validity	High reliability and low validity	Low reliability and high validity
Generalisation	Ability to generalise from sample to entire population	Ability to generalise from one setting to another

## **5.3.2 The Ontological and Epistemological Positions of the Present Research**

### **5.3.2.1 Ontological Position**

Based on the nature of this research and the required data type, this research adopts the objectivism ontology approach. This approach argues that reality can be objectively captured into broader contexts by keeping the subjects (research participants) under investigation detached from the objective investigator (Hussey & Hussey, 1997). The reason for selecting the objectivist approach is to make the inquiry objective. Consequently, the study's context can be generalised from the research sample to the entire research population (Bell et al., 2018).

### **5.3.2.2 Epistemological position**

Considering the aim and the theoretical framework of the current research, the epistemological position lies in the positivist paradigm. The rationale for selecting this paradigm over the interpretivist paradigm is attributed to the aim of this research. The aim is to test a number of hypotheses that represent relationships between seven constructs in order to identify the factors that influence customer trust and satisfaction in the MB system. Therefore, the positivist paradigm is the best fit for this study because it deals with quantitative data, a large sample size, and hypothesis testing.

In addition, the positivist paradigm is prevalent in the information systems and e-commerce literature due to the large sample size required to investigate customers and systems users in these contexts. According to Orlikowski and Baroudi (1991), 96.8% of publications in the information systems field use the positivist paradigm. Furthermore, adopting this approach can ensure the neutrality of the researcher's position throughout the research process. Moreover, the data collection methods associated with the positivist paradigm, such as the survey questionnaire, are economic techniques that enable researchers to compare data easily (Hussey & Hussey, 1997).

## **5.4 Research Design**

The term "research design" refers to a method by which a researcher is guided through the data collection, analysis, observation, and interpretation phases of the research process (Nachmias & Nachmias, 1996). In other words, it is a method that typically determines the components that require investigations and the steps of the research process (Creswell, 2018). The research design process involves specific systematic steps, including the determination of research approach, purpose of the research design, the research strategy and methods (Panke, 2018). Based on the discussion in the previous section regarding the ontology and epistemology positions, the design of the current research includes determining the appropriate research approach, recognising the purpose of the research design, identifying the research strategy and proposing the research methods. The following subsections discuss each phase of the research design process.

### **5.4.1 Research Design Approach**

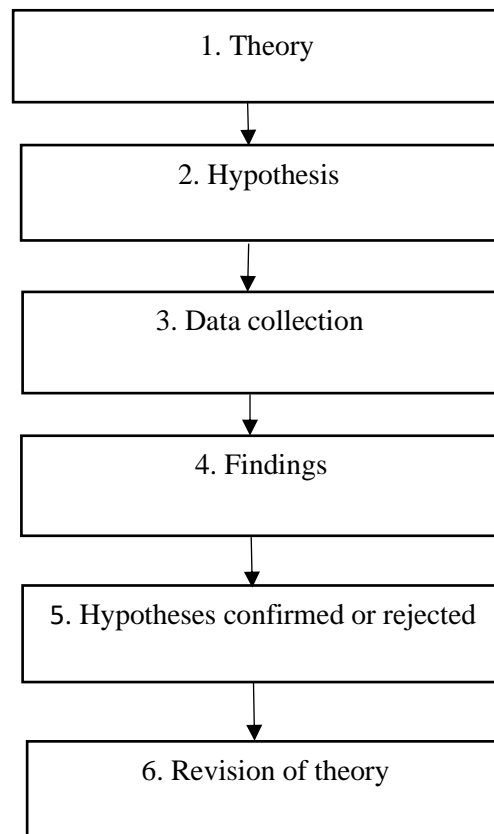
The first step of the research design process is to determine the appropriate research approach (Saunders et al., 2007). There are two main research design approaches, namely inductive and deductive. Scholars have identified several differences between these two approaches. The main difference is that while the inductive approach uses findings to build theories, the deductive approach applies theories to obtain findings. In addition to these approaches, there is the abductive approach when the researcher collects data to produce a new theory or modify an existing theory, which can be then tested using another data collection method (Saunders et al., 2016). Table 5.2 depicts the major differences between these three approaches.

**Table 5. 2 Major differences between deductive and inductive and abduction approaches**

source: (Saunders et al., 2016)

Criteria	Deductive	Inductive	Abductive
Reasoning	The deductive approach argues that the validation of the research conclusion depends on the research structure; if the structure is right, the research conclusion should also be correct.	The inductive approach applies recognised structures to generate untested conclusions.	The abductive approach employs recognised structures to generate testable conclusions.
Generalisability	Generalisability moves from general principles to particular instances.	Generalisability begins with particular instances and concludes with general statements or principles.	Generalisability derives from interactions between both the general principles and particular instances.
Data usage	The data collection procedure aims to test hypotheses proposed from existing theories.	The data collection procedure aims to identify patterns and themes, which can be used to build new theories.	The data collection procedure aims to identify patterns and themes, which can be used to develop conceptual frameworks and subsequently examine them through the use of additional data collection methods.
Theory	The purpose of investigations is to refuse or confirm existing theories.	The purpose of investigations is to build or generate theories.	The purpose of investigations is to modify existing theories or to develop new theories.

The current study takes a deductive approach to collecting and analysing research data. Deductive reasoning works by moving from broader generalisation and theories to a specific conclusion. This means that the researcher first develops a conceptual framework and then examines it empirically in order to verify or reject it (Saunders et al., 2012). There are typically six stages to perform this process, as shown in figure 5.2, they begin with deducing a theory and hypotheses and end with modifying the theory if needed:



**Figure 5. 2 The process of deduction theory**

(Bryman, 2012, p. 24)

The rationale for using a deductive approach in this study is twofold: first, the investigation of customer behaviour in MB and other e-commerce settings in the research context, i.e., Libya, has received little attention from researchers, and it lacks its own theories. Several theories have been used to investigate customer acceptance, adoption and use of MB, such as the information systems success model (DeLone & McLean, 2003) and the technology acceptance model (TAM) (Davis et al., 1989). Thus, developing conceptual frameworks relying on such theories can guide researchers to investigate this area of research in the Libyan context. Therefore, the deductive approach is the appropriate choice to conduct this research since it deals with examining existing theories.

Secondly, the nature of the research questions advocates the use of the deductive approach to develop a comprehensive conceptual framework for trust and satisfaction in MB. This

conceptual framework, in turn, can be validated and tested using quantitative techniques, which are associated with the deductive approach. The research questions of the current research seek answers regarding the factors that influence trust in MB and the mediating role of trust in enhancing customer satisfaction. Thus, to answer these questions, a representative and large sample size is required. Hence, applying the deductive approach can ensure achieving these requirements since it offers data collection methods that enable collecting a large sample size from the entire population.

#### **5.4.2 The Purpose of the Research Design**

The second step is to identify the purpose of the research design. Saunders et al. (2016) state that the most common research design types are exploratory, descriptive and explanatory. Scholars typically select one or more research types to conduct research depending on the research questions and objectives. Each one of these research types is distinguished according to its purpose.

*The descriptive research* aims to develop a detailed profile of people, activities, or conditions (Robson, 2002). It is an appropriate approach to answer research questions which start with ‘What’ (Whetten, 1989). Therefore, the primary purpose of applying this approach is to describe the research phenomenon that can be verified through testing hypotheses.

*The exploratory research* is an effective method to discover what is happening by asking open questions to find out insights and ideas regarding problems and issues of interest, especially that are not well understood (Robson, 2002). Furthermore, the exploratory research is the proper method when researchers need to identify the key variables and produce hypotheses for further study (Wilson, 2014). The questions of this research type are likely to start with what or how (Saunders et al., 2016). Thus, the main objective of the exploratory approach is to deeply understand the factors that are relevant to the research problem or phenomenon (Selltiz,



1959). In order to conduct exploratory research, there are three techniques, namely: reviewing the literature, doing a focus group and interviewing experts (Saunders et al., 2016).

***The explanatory research***, on the other hand, involves the use of causal relationships between variables. This type of research answers the how and why questions (Saunders et al., 2016). Hence, it explains the relationships between causes (variables) and effects (the phenomenon or problem being investigated) (Zikmund, Babin, Griffin, & Carr, 2013). Therefore, this type of research design can enable researchers to connect ideas to understand antecedents and outcomes (Creswell, 2009).

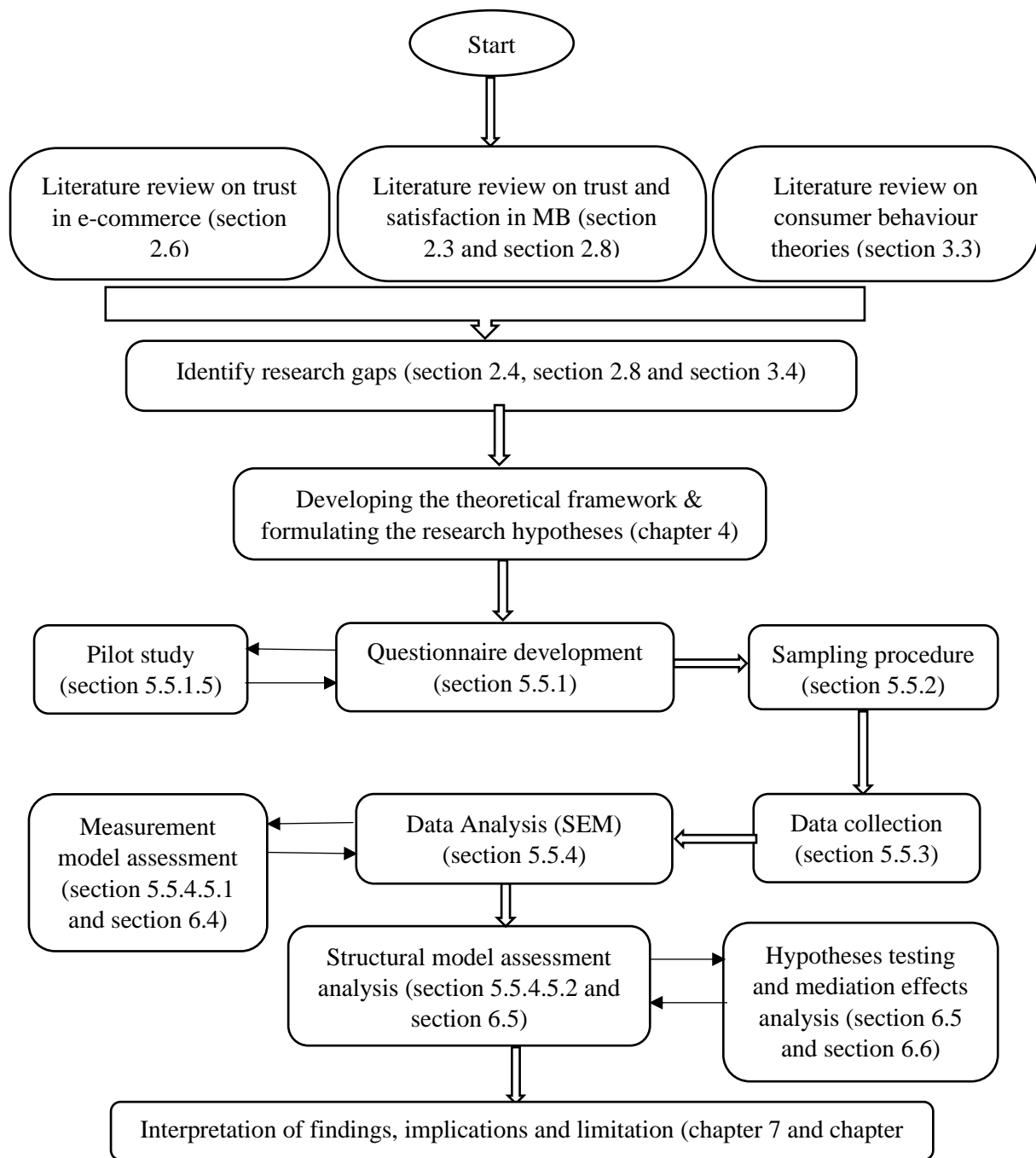
The current study uses a combination of the exploratory, descriptive and explanatory research types (Iacobucci & Churchill, 2010). In the first stage, ***the exploratory research*** is applied in to gather initial knowledge about the phenomenon under investigation in the present study (Iacobucci & Churchill, 2010). This knowledge contributes to achieving the first and third objectives of this research by extending the understanding of the trust concept in MB. This was achieved by reviewing the trust research in the e-commerce literature in order to conceptualise trust in the MB context. Besides, the reviewing of the trust and satisfaction literature in MB enables the researcher to identify a set of factors that can be used to comprehensively investigate trust and satisfaction in MB. Hence, the use of the exploratory research is conducted through the literature review stage, which leads to the formation of the proposed conceptual model and development of the study hypotheses (Hussey & Hussey, 1997).

In the second stage, ***the descriptive research*** is used in the data analysis procedure to describe the characteristics of the survey respondents. This step provides a deep insight into the patterns of customer experience and use of the MB services and to omit responses that do not have any experience with MB. This requirement is essential because of the nature of the study phenomenon as the survey participants must be current MB users. In addition, the descriptive

research design enabled the researcher to illustrate the demographic variables considered in this research, which are age, gender, education and occupation. Furthermore, the descriptive research offers an understanding of the descriptive Statistics Analysis of the Latent Variables in the research model such as mean, standard deviation and frequencies.

Lastly, *the explanatory research design* is used to explain the relationships between the constructs in the research model as the descriptive approach cannot assess relationships among variables (Iacobucci & Churchill, 2010). Examining the relationships between the independent and dependent variables in the research model leads to confirming or rejecting the research hypotheses. Furthermore, the explanatory research is used in the present research to explain the mediating role of trust between the independent variables in the research model and customer satisfaction. This step leads to the achievement of the fourth objective of this research regarding assessing the mediating effect of trust in enhancing customer satisfaction.

Based on the theoretical framework, a questionnaire was developed as the data collection tool for this research through a cross-sectional study using an online survey. Besides, this research applies the structural equation modelling technique with partial least squares (PLS-SEM) to analyse the collected data (Hair, Black, Babin, & Anderson, 2018) (the data collection and analysis procedures for this research are discussed in detail in section 5.5.3 and section 5.5.4). Figure 5.3 depicts the research design for the current research.



**Figure 5. 3 A Map of the research design**

### 5.4.3 Identifying Research Strategy

The research strategy refers to an overall plan for conducting a systematic study (Bryman & Bell, 2011). In addition, it guides researchers in implementing and monitoring their studies (Wilson, 2014). The research strategy is an essential component in the research design process. As the research design seeks to develop a plan to answer the research questions, and the

research strategy is employed to execute that plan (Bryman & Bell, 2011). Thus, an effective research strategy leads to answering research questions successfully (Saunders et al., 2016). The adoption of an appropriate research strategy is based on the ontology position, epistemology position and other methodological consideration in the research design stages (Wilson, 2014). Two main research strategies have been widely used by scholars in the business and management disciplines, namely, quantitative and qualitative research (Bell et al., 2018). These two research strategies distinguish the data collection and analysis methods (Saunders et al., 2016). The next two subsections discuss the features of each research strategy, concluding by illustrating the significant differences between them.

#### **5.4.3.1 Qualitative Research Strategy**

The qualitative research strategy centres on collecting non-numerical data rather than collecting statistical or numerical data (Denzin & Lincoln, 2008). It provides a meaningful and deep understanding of social phenomena (Creswell, 2013). Furthermore, the qualitative research strategy focuses on the participants' perspective when investigating actions, values, norms, and events that enable the researcher to deeply understand the situation under study (Yin, 2018). This research strategy is the best to deal with how and why questions regarding human experience (Given, 2008). In-depth interviews and focus groups are the most used techniques to collect data using the qualitative approach (Bryman, 2012).

#### **5.4.3.2 Quantitative Research Strategy**

On the other hand, the quantitative research strategy concerns numerical and mathematical data collection and analysis (Creswell, 2009). This type of research strategy allows for the description or prediction of social phenomena, and the explanation of causal relationships between variables (Oppenheim, 2000). The quantitative analysis approach usually employs standardised data collection methods such as questionnaires or structured interviews to collect

data (De Vaus, 2001). Table 5.3 outlines the significant differences between the quantitative and qualitative research strategies.

**Table 5. 3 The significant differences between Qualitative and Quantitative Research Strategy adapted from** (Bell et al., 2018; Creswell, 1994, 2018)

Criterion	Quantitative research	Qualitative research
Ontology position	The objectivism approach	The subjectivism approach
Epistemology position	The positivism paradigm	The interpretivism paradigm
Purpose	Testing hypotheses, developing predictions and explaining causal relationships.	Interpreting and understanding of social interactions.
Data type	Number-based data	Text-based data
Sample size	Large sample size	Small sample size
Data collection tools	Questionnaires, structured interviews and experiments	In-depth interviews, focus group, observations, case studies and document review.
Data analysis methods	Statistical tests	patterns, themes, features, and relationships
The role of the researcher	Not-existent	Existent
Generalisability	More generalisable	Less generalisable

The methodology cannot be true or false and selecting of quantitative, qualitative or mixed method research strategy depends on the research question type, the research objectives, the ontological and epistemological positions (Saunders et al., 2016; Yin, 2014). Based on the previous discussions of these elements, and the objectives of this research, the methodological position of the present research lies in the utilisation of the quantitative strategy. The quantitative research strategy is the most appropriate strategy for this research for many reasons. Firstly, the quantitative methods provide accurate data and significant statistical results that can enhance the quality of the study findings (Bryman & Bell, 2011). Secondly, the aim of the data collection process in this research is to gather opinions from the current MB users

in Libya. Thus, it is logic to use a large sample size to be representative of the entire research population. Therefore, quantitative research methods, such as questionnaire, can facilitate collecting a large sample size (Manheim, 2008). Finally, the quantitative research strategy supports the generalisability of the research findings from the sample to the entire population, which is essential when dealing with a large population such as the MB customers (Creswell, 2018).

## **5.5 Research Methods**

The term research method is different from the term (methodology); methodology is more comprehensive and concerned with the aim of data collection, type of data, time of data collection and data collection and analysis techniques (Collis & Hussey, 2013). Research methods, on the other hand, refer to the techniques used to collect and analyse data in a systematic manner. These procedures allow the researcher to answer the research questions by collecting and analysing accurate empirical data to gain valid results (Ghauri & Grønhaug, 2006). The following subsections discuss the research methods of this study, which include the research instrument, the sampling, data collection and data analysis procedures.

### **5.5.1 Research Instrument**

Research instrument refers to the tool used to collect data on a subject of interest (Iacobucci & Churchill, 2010). In the business and management contexts, three research instruments are typically used for collecting quantitative data, namely survey, experimentation and observation (Saunders et al., 2016). However, the survey is the most common data collection technique in quantitative research (Bennett, 1983). The survey can be defined as the process by which the researcher can collect data from some members of the population to identify the opinion of the population regarding specific variables (Gay, Mills, & Airasian, 2012). The survey technique

can be conducted using questionnaires or interviews. However, the questionnaire survey has several advantages over the interview questionnaire.

The use of a questionnaire survey enables the researcher to analyse the data in a more scientific and objective manner than other methods, which contributes to assessing and explaining relationships among variables effectively (Saunders et al., 2016). In addition, the collection of data through questionnaire allows the researcher to collect large amounts of standardised data in a relatively cost-effective way and in a short period of time (Hair et al., 2018). Furthermore, questionnaires are considered as a more anonymous method. Therefore, it ensures the confidentiality of the research and enables achieving ethical considerations in research (Saunders et al., 2012).

In this research, cross sectional research using the questionnaire survey technique is applied as the data collection tool for several reasons. Firstly, this research aims to examine hypotheses, which are formulated to assess relationships between constructs in the conceptual model and to assess the mediating effect of trust in enhancing customer satisfaction. Therefore, the questionnaire is the most appropriate tool to accurately collect comprehensive data and compare and contrast the research findings with other studies (Bryman, 2016). Secondly, the questionnaire survey is appropriate when the population of a study is large, as in the case of the MB users in Libya when the population is spread in many regions and different banks (Bell et al., 2018). Finally, the process of collecting data using questionnaires is cost-effective and more comfortable than conducting the interview questionnaire (Saunders et al., 2016).

A questionnaire refers to a type of research instrument that consists of a series of questions designed to elicit information from respondents (Oppenheim, 2000). In general, the questionnaire survey can be categorised into two main types: the self-administered questionnaire and the structured interview questionnaires (Bryman, 2008). All respondents

should answer the same questions in the self-administered questionnaire in a specific chronological order (Oppenheim, 2000). On the other hand, in structured interview questionnaires, the interviewer introduces identical questions to the respondents (Bryman & Bell, 2011). In the present research, the self-administered questionnaire is used in order to increase the response rate. The self-administered questionnaire survey can be distributed in several ways. It can be, for example, administered online, delivered by hand or posted by mail to the respondents (Sue & Ritter, 2012).

#### **5.5.1.1 The Rationale of Using Online Survey**

In this research, the questionnaire is distributed online as the research is aimed at online users, and the context of the research is associated with internet technology, i.e., the MB system. The online survey involves sending a link of a web page to potential respondents, containing a questionnaire that needs to be answered online. There are adequate justifications for adopting the online survey as a medium for the distribution of the questionnaire.

Firstly, the online survey is becoming increasingly common in business research due to the evolution of the internet and the widespread use of email and social networking sites (Manfreda & Vehovar, 2016). Secondly, in comparison to other survey methods such as paper-and-pencil surveys and personal interviews, the online survey is a systematic and fast way to collect data from the target audience (Dillman, Smyth, & Christian, 2014). Thirdly, the online survey enables the researcher to collect large-scale data. Hence, it increases the response rates because it offers respondents convenience in selecting time and preferences to answer questions (Wright, 2005). Fourthly, online surveys offer tools to design flexible questionnaires. In particular, it is suitable for conducting questionnaires that include more than one type of response format, like the case of the present research's questionnaire (Yun & Trumbo, 2006). Fifthly, it helps in excluding the non-targeted respondents; for example, in this research, the online survey is the easiest way to exclude the non-users of the Internet, resulting in obtaining



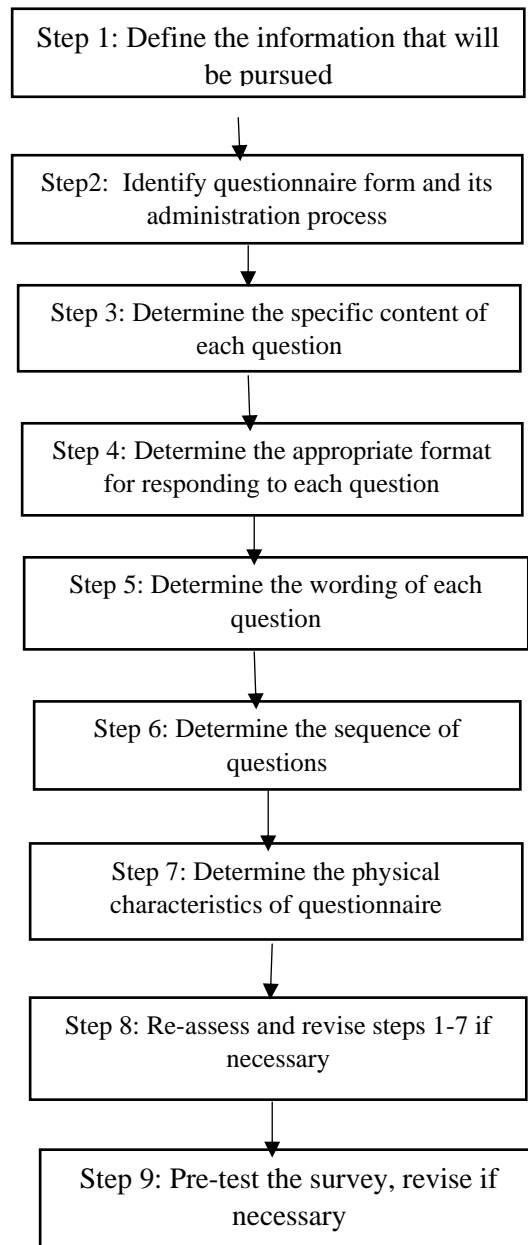
relevant results (Dillman et al., 2014). Finally, in contrast to conventional surveys, the online survey provides an inexpensive method for conducting surveys with a large population (Watt, 1999).

The current research uses the Bristol Online Survey (BOS) to administrate the research questionnaire. The BOS is a web-based survey tool that can create and design small or large scale surveys over the internet for education and research purposes. The research questionnaire was created on [onlinesurveys.ac.uk](http://onlinesurveys.ac.uk), so the URL of the survey can be easily accessed online and distributed to the target population. The URL was sent to the respondents by posting it in the most popular banking online communities in Libya (this is discussed in detail in the data collection procedure section 5.5.3). The cover letter of the survey is placed on the first page. It consists of a description of the purpose of the research. It also includes information about ensuring the confidentiality of the data. In addition, the researcher explains that participation in the survey is completely voluntary, and the respondents have the right to withdraw from the survey at any time. Furthermore, the researcher's contact details are provided to the participants if they have any inquiries about the questionnaire or the results of this research.

#### **5.5.1.2 Questionnaire Development Process**

The development of a questionnaire is an essential procedure for several considerations which can arise while designing the questionnaire. These considerations can affect the quality of the questionnaire if researchers don not handle them properly and effectively (Iacobucci & Churchill, 2010). According to Bryman and Bell (2011), researchers can encounter a number of issues in the survey design process, such as determining the appropriate structure, specifying the required information or selecting the right words for the questions. Failure to address these issues effectively may result in failure in achieving the research objectives (Bell et al., 2018). To deal with such issues, the present research adopts the guidelines recommended by (Iacobucci & Churchill, 2010). Iacobucci and Churchill (2010) developed a systematic

approach that can successfully guide researchers to design and develop questionnaires. Figure 5.4 summaries the procedure of developing a questionnaire according to (Iacobucci & Churchill, 2010).



**Figure 5. 4 Procedure for developing a questionnaire** (Iacobucci & Churchill, 2010)

***Step 1: Define the information that will be pursued***

Specifying the required information when studying a specific phenomenon is an essential step for the researcher. This step can be conducted by systematically defining and developing the

initial ideas of the research relying on the related literature (Brace, 2018). Thus, clarity in exploring the research problem is important to formulate the research questions and hypotheses. This leads to determining the audience and the information and opinions that need to be gathered. In the present research, the required information is specified in the concepts of the variables in the conceptual framework. This information allows the researcher to formulate hypotheses that are used to investigate the relationship between trust and customer satisfaction in MB. Besides, the factors that affect trust and user satisfaction in MB (Iacobucci & Churchill, 2010).

***Step 2: Identify questionnaire form and its administration process***

After specifying the required information in the questionnaire, the researcher needs to identify the method that should be used to collect this information. This process includes the researcher's decisions regarding the structure and administration of the questionnaire such as mail, telephone or online survey (Iacobucci & Churchill, 2010). Selecting the administration method of a questionnaire depends on the type of the questionnaire. For example, a structured questionnaire or self-administered questionnaire. As mentioned in section 5.5.1.1, the current research uses a self-administered questionnaire through the use of the BOS online survey involving closed-ended questions.

***Step 3: Determine the specific content of each question***

After determining the type of questionnaire, the next step is to identify the content of each question in the questionnaire. A comprehensive review of the MB, e-commerce and consumer behaviour literature was conducted to explore items (questions) that can be used to investigate the research questions. The questionnaire items (scales) were adapted from existing quantitative studies, which were published in peer-reviewed journals, including *Computers in Human Behaviour* and *Interacting with Computers*. Operationalisation of the research variables is discussed in section 5.5.1.3.

#### ***Step 4: Determine the appropriate format for responding to each question***

There are many types of questions that can be used in developing a questionnaire. However, the main two types are closed-ended questions and open-ended questions. While the closed-ended question forces respondents to select a specific answer, the open-ended question allows respondents to formulate their answers based on their knowledge and experience. Questions in the present are closed-ended questions for the purpose of being easy to administer and analyse (Iacobucci & Churchill, 2010). All questionnaire items except demographic and descriptive variables are scored using a seven-point Likert scale to ensure consistency in the response form. Respondents choose from seven alternative answers: strongly disagree, disagree, slightly disagree, uncertain (neutral), slightly agree, agree and strongly agree.

The use of the Likert Scale technique in this study is attributed to a variety of factors. Firstly, it is an easy and reliable way to conduct and administer questionnaires. This contributes to performing the data analysis with relative ease in handling quantifiable responses (Peterson, 1994). Secondly, unlike other types of closed-ended questions, Likert Scales questions do not use a simple yes/no answer; instead, it allows the respondent to degrees of opinions (Brace, 2018). Finally, the use of Likert Scale questions is more common in the existing information systems and e-commerce research in particular, in the e-banking contexts. (Jansen & van Schaik, 2018; Sharma & Sharma, 2019; Yousafzai et al., 2009; Zhou, 2012b). Therefore, using Likert Scale can be easily understood by practitioners and researchers.

#### ***Step 5: Determine the wording of each question***

The wording of questions is a key step to avoid the negative effects of using misleading questions, ambiguous words and inappropriate abbreviations, and vocabulary problems (Iacobucci & Churchill, 2010). These issues can cause rejection of the questionnaire by potential respondents or misunderstanding of the questions. Therefore, in order to overcome these issues during the development of the questionnaire, pre-testing of the questionnaire is

necessarily required before the distribution of the final version of the questionnaire (Iacobucci & Churchill, 2010). In this research, a pilot study was conducted before performing the main data collection procedure to test the understanding of the questionnaire items by the respondents.

***Step 6: Determine the sequence of questions***

After determining the response form and the proper wording for questions, questions should be placed in an appropriate sequence in the questionnaire. This step is crucial in the development of the questionnaire as it contributes to the achievement of a good response rate (Iacobucci & Churchill, 2010). According to Iacobucci and Churchill (2010), the questionnaire should start with simple, interesting questions and the most important questions. This can motivate the respondents to complete the questionnaire and to answer the questions regarding the essential information of the research. The authors also suggest that demographic questions should be laid at the end of the questionnaire as they may be considered as sensitive questions. This is because, by the last section of the questionnaire, the respondents should have formed a rapport with the research that can encourage them to provide honest answers to the personal information questions (Iacobucci & Churchill, 2010).

The questionnaire for this research is structured into four parts. The first part measures the respondents' beliefs about the factors that influence trust and satisfaction in the MB services. The second part investigates the respondents' beliefs regarding trust in MB. The third part deals with gathering opinions on customer satisfaction in MB services. The demographic and personal questions are asked in the last part. In addition to the demographic questions, two filter questions regarding the use of MB are placed in the last part to exclude the non-users of MB since the objectives of this research require investigating customers who are current users of MB (see section 5.5.1.3 regarding the operationalisation of the research variables and appendix A p 270 which shows the research questionnaire)

### ***Step 7: Determine the physical characteristics of the questionnaire***

The layout of a self-completion questionnaire is essential and should be attractive and easy to complete. It can influence the participants' cooperation to take part in the research and the accuracy of the data (Iacobucci & Churchill, 2010). For example, if the questionnaire is not well organised, the respondents can feel that this research is unimportant, resulting in ignoring the questionnaire or providing inaccurate answers to the questions. Therefore, based on such rationale, a pilot study was conducted in this research (see section 5.5.1.5) to test the layout, questionnaire size, wording and sequencing of the questions.

As mentioned, the current research employs an online survey to collect the data. The survey uses a mix of closed-ended questions and multiple-choice questions. In most questions, seven-point Likert scales are used to provide a series of statements to which respondents could indicate degrees of agreement or disagreement. The questionnaire is displayed in categories without question numbers because long surveys can discourage respondents from completing the survey (Pitkow & Recker, 1994). Every frame in the questionnaire consists of a few clear questions. Respondents are required to select the appropriate answers and then click on the buttons next to the questions. Standard web terms and buttons such as back, next, submit and reset are used on the survey pages on every frame.

### ***Step 8: Re-assess and revise steps 1-7 if necessary***

It is highly recommended to revise the first draft of the questionnaire by reviewing the clarity of questions from any ambiguity or confusion (Iacobucci & Churchill, 2010). Also, the layout of the questionnaire should be revised to enhance attractiveness and to ensure presenting the right sequence of questions. In the present research, the survey's revision step is carried out throughout all the survey design steps, and alongside all other steps in the research design.

### ***Step 9: Pre-test the survey, revise if necessary***

Piloting the questionnaire is a crucial step before the data collection procedure. In this step, the researchers can examine the understanding of each question and the sequence of questions by assessing the questionnaire on a small number of participants (Iacobucci & Churchill, 2010). The participants in the pilot study should have similar characteristics to the target population of the study (Iacobucci & Churchill, 2018). The pilot study of this research was conducted with 21 Libyan students in the UK who have good experience with MB in Libya. The details and results of the pilot study are discussed in section 5.5.1.5.

#### **5.5.1.3 Operationalisation of the Research Variables**

The term operationalisation in quantitative research refers to the process by which researchers can clarify precisely how a concept of a specific variable can be empirically measured (Francis et al., 2010). The conceptual model of the present research is operationalised using measures that are validated in previous MB literature and published in peer-reviewed journals. As mentioned in section 5.5.1.2, all items in the questionnaire are measured on a seven-point scale starting with 1 = strongly disagree and ending with 7 = strongly agree. The following subsections illustrate the operationalisation of the items for each variable in the questionnaire:

##### **5.5.1.3.1 OPERATIONALISATION OF SYSTEM QUALITY (SYS)**

System quality is operationalised using four items, including accessibility, ease of use, navigation capability and attractiveness. These items were adapted from the studies of (K. C. Lee & Chung, 2009) and (Zhou, 2011). The authors of these studies derived these items from (Bharati & Chaudhury, 2004; DeLone & McLean, 1992, 2003; H.-W. Kim et al., 2004; C. Liu & Arnett, 2000; Schacklett, 2000) and modified them to fit the MB context. Table 5.4 shows the items of system quality.

**Table 5. 4 The operationalisation of system quality**

Source	Item
(K. C. Lee & Chung, 2009)	SYS1: Mobile banking provides convenient access.
(K. C. Lee & Chung, 2009)	SYS2: Mobile banking is easy to use.
(Zhou, 2011)	SYS3: Mobile banking is easy to navigate.
(Zhou, 2011)	SYS4: Mobile banking is visually attractive.

**5.5.1.3.2 OPERATIONALISATION OF INFORMATION QUALITY (INF)**

To operationalise information quality, four items are used. These items were adopted from (K. C. Lee & Chung, 2009) and (Zhou, 2011, 2013). The items were originally derived from (Bharati & Chaudhury, 2004; D. J. Kim et al., 2008; H.-W. Kim et al., 2004). These items measure the information obtained by customers from the MB services regarding accuracy, sufficiency, relevance and recency. The items of information quality are shown in table 5.5.

**Table 5. 5 The operationalisation of information quality**

Source	Item
(Zhou, 2011); (K. C. Lee & Chung, 2009)	INF1: Mobile banking provides me with accurate information.
(Zhou, 2011); (K. C. Lee & Chung, 2009)	INF2: Mobile banking provides me with sufficient information.
(Zhou, 2011); (K. C. Lee & Chung, 2009)	INF3: Mobile banking provides me with information relevant to my needs.
(Zhou, 2011); (K. C. Lee & Chung, 2009)	INF4: Mobile banking provides me with up-to-date information.

**5.5.1.3.3 OPERATIONALISATION OF SERVICE QUALITY (SEV)**

Service quality is operationalised using measures of dependability, prompting, proficiency and personalisation of the MB services. All items for measuring service quality are adapted from (Zhou, 2012b). The author derived these items from (H.-W. Kim et al., 2004) and modified them to fit the MB context. Table 5.6 depicts the items of service quality.



**Table 5. 6 The operationalisation of service quality**

Source	Item
(Zhou, 2012b)	SEV1: Mobile banking provides dependable services.
(Zhou, 2012b)	SEV2: Mobile banking provides prompt services.
(Zhou, 2012b)	SEV3: Mobile banking provides professional services.
(Zhou, 2012b)	SEV4: Mobile banking provides personalized services.

#### **5.5.1.3.4 OPERATIONALISATION OF TASK CHARACTERISTICS (TSK)**

Task characteristics measures the extent to which banks support customers through MB in doing their tasks and do not take advantage of them. It is operationalised using three items which were adapted from the study of (Malaquias & Hwang, 2016). These items were initially derived from (Zhou et al., 2010) and (Oliveira et al., 2014). Table 5.7 shows the items of task characteristics.

**Table 5. 7 The operationalisation of task characteristic**

Source	Item
(Malaquias & Hwang, 2016)	TSK1: I need to transfer money anytime anywhere.
(Malaquias & Hwang, 2016)	TSK2: I need to manage my account anytime anywhere.
(Malaquias & Hwang, 2016)	TSK3: I need to acquire account information in real time.

#### **5.5.1.3.5 OPERATIONALISATION OF STRUCTURAL ASSURANCE (SA)**

The operationalisation of structural assurance is based on three items adapted from (Zhou, 2012b) which were originally derived from (McKnight et al., 2002a, 2002b). These items measure MB customers' beliefs regarding the security and privacy concerns in the mobile environment. The items of structural assurance are depicted in table 5.8.

**Table 5. 8 The operationalisation of structural assurance**

Source	Item
(Zhou, 2012b)	SA1: I feel confident that encryption and other technological advances on the mobile Internet make it safe for me to use mobile banking.
(Zhou, 2012b)	SA2: I feel assured that legal and technological structures adequately protect me from payment problems on the mobile Internet.
(Zhou, 2012b)	SA3: Mobile Internet is a robust and safe environment in which to use mobile banking.

**5.5.1.3.6 OPERATIONALISATION OF TRUST (TRU)**

Trust in the current research measures the three trusting beliefs of the MB system, which are ability, integrity and benevolence. In addition, it assesses MB customers' perception regarding the security and privacy guarantees provided by banks for MB customers. Trust is operationalised using five items adapted from the study of (K. C. Lee & Chung, 2009), which were derived from (Stewart, 2003) and (Pennington, Wilcox, & Grover, 2003) and modified to fit the MB context. Table 5.9 depicts the items that measure trust in MB.

**Table 5. 9 The operationalisation of trust**

Source	Item
(K. C. Lee & Chung, 2009)	TRU1: Mobile banking keeps its promises
(K. C. Lee & Chung, 2009)	TRU2: Mobile banking services meet my needs
(K. C. Lee & Chung, 2009)	TRU3: Mobile banking is trustworthy
(K. C. Lee & Chung, 2009)	TRU4: I think mobile banking is concerned with the present and future interests of users
(K. C. Lee & Chung, 2009)	TRU5: Overall, I trust mobile banking

**5.5.1.3.7 OPERATIONALISATION OF CUSTOMER SATISFACTION (SAT)**

The construct of customer satisfaction measures MB customers' perception regarding satisfaction with MB services. The operationalisation of this construct is based on five items, which were adopted from (K. C. Lee & Chung, 2009). These items were initially adapted from (Anderson & Sullivan, 1993) and (Kohli, Devaraj, & Mahmood, 2004) and modified to fit the MB context. The items of customer satisfaction are shown in table 5.10

**Table 5. 10 The operationalisation of customer satisfaction**

Source	Item
(K. C. Lee & Chung, 2009)	SAT1: I strongly recommend mobile banking to others.
(K. C. Lee & Chung, 2009)	SAT2: I think that I made the correct decision to use mobile banking.
(K. C. Lee & Chung, 2009)	SAT3: I am satisfied with the way that mobile banking has carried out transactions.
(K. C. Lee & Chung, 2009)	SAT4: I am satisfied with the service I have received from mobile banking
(K. C. Lee & Chung, 2009)	SAT5: Overall, I was satisfied with mobile banking

#### **5.5.1.3.8 DESCRIPTIVE AND DEMOGRAPHIC VARIABLES**

This section consists of two parts; the first part reports questions regarding the use and experience of customers with MB, and the second part shows the demographic variables that characterise the participants in the survey.

##### ***Experience with MB***

Customer experience with MB is a qualifying question as it identifies whether the participant uses MB or not, and the length of use. Four categories were used for this variable, ordered as follows: not use, less than 1 year, 1–2 years, more than 2 years.

##### ***Frequency of Use***

This question gathers information about how often customers use the MB services. It contains five categories ordered as follows: every day, several times a week, once a week, several times a month, once a month.

##### ***Most Used Services through MB***

This question measures the banking services that customers usually use through MB. It consists of the following choices: basic account information, making online payments, checking account balance, making bank transfer, others.

### ***Demographic Information***

The demographic variables in the research questionnaire include age, gender, education and occupation. They are measured using categorical questions as shown in table 5.11

**Table 5. 11 Demographic questions used in the research questionnaire**

Demographic variable	Categories
Age	less than 18, between 18-24, between 25-34, between 35-50, above 50
Gender	male/female
Education	less than high school, high school, diploma, undergraduate degree and post-graduate or above
Occupation	unemployed, student, private sector, government employee, retired

#### **5.5.1.4 Translate the Questionnaire into the Arabic Language**

Since this research is targeting in the Libyan context, where the native language is Arabic, it is essential to translate the questionnaire into Arabic before conducting the pilot study and the developing online survey (McGorry, 2000). The purpose of this procedure is to develop a version of the research instrument in the language of the target population that is conceptually equivalent to the English version (Douglas & Craig, 2007). Thus, the questionnaire in its translated form will function identically to the original one (Cha, Kim, & Erlen, 2007). The present research employs the back translation technique, which is a well-known method that can be applied when a questionnaire is originally written in one language and performed in another language (Bulmer & Warwick, 1993). It enables the researcher to ascertain any discrepancies between the original and translated questionnaires.

The translation procedure of the present research was performed as follows: Firstly, the research questionnaire was translated from English to Arabic by a staff member at the Business Administration department at the University of Tobruk in Libya, who is skilled in English and

Arabic and has broad experience in the banking sector. Secondly, a member of staff from the University of Tobruk's Economics Faculty, who is fluent in English, independently translated the questionnaire back from Arabic to English. Finally, a comparison was made between the original English version and the back-translated version by a translation expert competent in both English and Arabic and has good knowledge of the banking vocabulary to validate the translation procedure.

#### **5.5.1.5 Pilot Study**

Prior to the main data collection procedure, the initial version of the questionnaire was evaluated using a pilot study. Conducting a pilot study is essential in conducting empirical research. It enables the researcher to examine the feasibility of the data collection instrument regarding its validity and reliability (Straub, 1989). In addition, it enables the researcher to ensure the quality of the questionnaire by determining the extent of clarity of the wording and sequence of the questions and the questionnaire instructions (Lancaster, Dodd, & Williamson, 2004). Besides, pre-testing the questionnaire contributes to ensuring that all questions are understandable, and there is no confusion or ambiguity in the questions (Lipu, Williamson, & Lloyd, 2007). Furthermore, it deals with estimating the time required to complete the questionnaire by participants (Iacobucci & Churchill, 2010). Moreover, the researcher can obtain valuable feedback and suggestions from experienced respondents to improve the final version of the questionnaire (Lipu et al., 2007).

The pilot study for the current research, which used hardcopy versions of the questionnaire, took place for a week in September 2018. Libyan students studying in the UK who have prior experience with the use of MB in Libya were chosen at random for the pilot study. 22 students agreed to take part in the procedure, which is a sufficient number to perform an effective pilot study (Isaac & Michael, 1995). After collecting the completed questionnaires, the researcher received 21 valid responses (15 male and 6 female). The majority of the respondents are aged

between 25-34 years (67%). This is rational as most Libyan students in the UK are postgraduate students. In terms of MB use, most respondents used MB for more than two years (86%). In addition, the majority of the respondents use MB several times a week (57%). Furthermore, the most used services are checking account balance (100%). Table 5.12 exhibits the descriptive variables for the Pilot study.

**Table 5. 12 Descriptive variables for the pilot study** (Geebren et al., 2021)

variables	Frequency (n=21)	Percentage %
<b>MB experience:</b>		
Less than one year	0	0%
1-2 years	3	14%
More than 2 years	18	86%
<b>Frequency of Use:</b>		
Every day	7	33%
Several time a week	12	57%
Once a week	1	5%
Several time a month	1	5%
Once a month	0	0%
<b>Products:</b>		
Basic account information	11	52%
Making online payments	11	52%
Checking account balance	21	100%
Making bank transfer	9	43%
Other	0	0%
<b>Age:</b>		
Less than 18 Years	0	0%
18-24Years	4	19%
25-34 Years	14	67%
35- 50	3	14%
Above 50 Years	0	0%
<b>Gender:</b>		
Male	15	71%
Female	6	29%
<b>Education:</b>		

Less than high school	0	0%
High school	0	0%
Diploma	0	0%
Undergraduate degree	2	10%
Post-graduate or above	19	90%
Occupation:		
Unemployed	0	0%
Student	21	100%
Private sector	0	0%
Government employee	0	0%
Retired	0	0%
Other	0	0%

In the first step of the questionnaire estimation, the respondents were asked to give their feedback on the last page of the questionnaire regarding the quality considerations, such as the question wording and the length of the questionnaire. When checking the respondents' feedback, the questionnaire took an average of 5-7 minutes to complete. Besides, all respondents agreed that they could understand all items in the survey and the wording and sequence of the questions were well written and organised. This might be because all these items were adopted from previously published studies in peer-reviewed journals, and they were translated effectively into Arabic.

After assessing the quality of the questionnaire, the data was prepared for the data analysis phase. The Cronbach's Alpha criterion was then used to evaluate the internal consistency of the measurement model using IBM SPSS version 26 software. This method allows the researcher to assess the constructs' reliability in the conceptual framework based on the inter-correlations between their indicators (Bland & Altman, 1997). Table 5.13 shows the results of the internal consistency test of all constructs in the research model.

**Table 5. 13 Results of the pilot study**

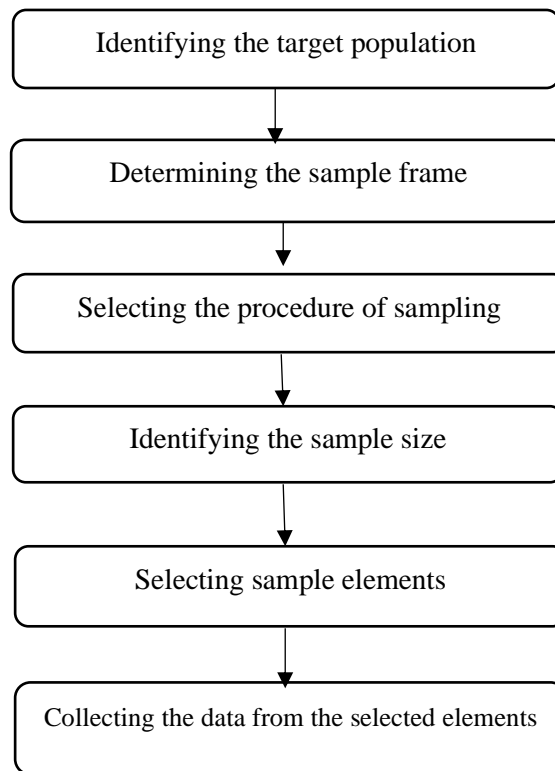
Constructs	Number of indicators	Cronbach's alpha scores
System quality	4	0.76
Information quality	4	0.83
Services quality	4	0.87
Task characteristics	3	0.87
Structural assurance	3	0.71
Trust	5	0.89
Satisfaction	5	0.89
Total	28	

As depicted in table 5.13, all scores for all variables are greater than the Cronbach's alpha test threshold of 0.70. This implies that all indicators in the measurement model are reliable in measuring the constructs they are supposed to measure (Nunally & Bernstein, 1978).

### **5.5.2 Population and Sampling**

Following the selection and validation of the appropriate research instrument for the current study, the next stage is to specify the target population and draw a sample from which the information needed to evaluate the conceptual framework is collected. According to Gay et al. (2012), sampling is termed as the process of drawing a representative number of individuals or objects from a larger population. The sampling technique has clear advantages in research, such as saving time and money and assuring data accuracy (Gay et al., 2012). However, the researcher should be careful when determining the sample due to the potential influences on the ability to generalise the research findings from the sample to the entire population (Bryman & Bell, 2007). Iacobucci and Churchill (2010) proposed a systematic guideline for the sampling process which is used in the present research to guide the researcher throughout the sampling process (see figure 5.5).





**Figure 5. 5 Guideline of the sampling process used in present research**

(Iacobucci & Churchill, 2010)

### **5.5.2.1 Target Population**

To achieve the proposed objectives in the current research, information regarding phenomenon under investigating should be collected from the target research population (Creswell, 2018). Therefore, it is crucial to precisely identify the population from which the study sample will be drawn (De Vaus, 2001). The target population refers to the total units that comply with some certain specifications (Iacobucci & Churchill, 2010). As mentioned in chapter 1, the aim of this research is to determine the factors that influence customer trust and satisfaction in MB in Libya. Thus, this study's target population includes all Libyan MB users.

### **5.5.2.2 Sampling Frame**

The sampling frame refers to a database or list of all potential respondents within a target population from which a researcher can draw a sample (Iacobucci & Churchill, 2010). Given that there are no reliable statistics of the number of MB users in Libya, and it is not possible to reach all units in such a large-sized population, the size of the research population is unknown. In such situations, it is not possible to list the entire population. Thus, deriving a sample from the relevant population, i.e. MB users in Libya, is essential (Gay et al., 2012).

### **5.5.2.3 Sampling Procedure**

The sampling procedure can be carried out using two methods, namely probability sampling and non-probability sampling. *For the probability sampling technique*, each unit in the target population has a nonzero chance of being selected in the sample. Employing this method enables researchers to gain a representative sample since it can minimise sampling errors. Researchers can choose one of three types of probability sampling procedures depending on the nature of the study population: cluster sampling, random sampling, or stratified sampling.

*The Non-probability sampling technique*, on the other hand, refers to the case that the units of the target population do not have equal chances of being represented in the sample. For the nature and the aim of the current research, the non-probability technique is used to draw the research sample from the research population since the researcher cannot obtain a list of all MB users in Libya. There are four methods in which the non-probability technique can be carried out, namely convenience sampling, judgment sampling, quota sampling and snowball sampling.

#### **Convenience Sampling**

The convenience sampling is a procedure of sampling based on the availability of participants without additional requirements (Dillon, Madden, & Firtle, 1993). In other words, in this

technique, participants can be obtained wherever the researcher can reach them. Therefore, it is unknown how representative the sample is of the target population (Deming, 1990).

### **Judgment Sampling**

In this sampling technique, the researcher has the chance to select certain participants for the research sample (Levy & Lemeshow, 2013). In other words, the selection of respondents is based on matching specific requirements of the research (Soloff, Lawrence, & Johnstone, 2005). The downside of this method is that the findings are subject to bias due to the difficulties associated with proving identical characteristics for both the sample and population (Deming, 1990).

### **Quota Sampling**

Quota sampling is a non-probability sampling technique in which the tailored sample is selected from certain respondents who have desired features such as gender or education level (Levy & Lemeshow, 2013). The observer then takes a quota from each group to meet similar proportions of respondents as the entire population (Deming, 1990). Although this technique is easy and fast to use, it can result in some bias because it relies on the researcher's preferences in selecting the sample, such as easy to reach cases (Soloff et al., 2005).

### **Snowball Sampling**

The snowball sampling refers to a recruitment technique that is helpful when the target population is small and unavailable, and cannot be compiled by the researcher (Henry, 1990). It involves recruiting other potential subjects by existing subjects who have the required qualifications to be included in the sample (Soloff et al., 2005). Thus, the sample grows as a rolling snowball. This process is repeated until the needed sample size is achieved. The main drawback of using the snowball technique is that it is hard to identify the sampling errors or draw inferences regarding the population based on the acquired sample (Henry, 1990).

After reviewing all the non-probability sampling techniques, convenience sampling is employed in this research. The main reason for using this technique is to obtain an adequate number of responses to examine the research hypotheses as it is not possible to secure a full list of MB users in Libya. Other non-probability techniques are not suitable to conduct the sampling procedure in this research. Quota sampling may appear as an appropriate method for drawing the research sample. However, the aim of data collection in the present research is to collect as many responses as possible from Libyan MB users regardless of their demographic characteristics such as age and gender. Therefore, the quota sampling technique is not the appropriate method for this research (Dillon et al., 1993). Judgment sampling is also not appropriate since the desired characteristics of the sampling units are comprehensively specified in the target population (Deming, 1990). Finally, since the MB users are a large population, snowball sampling is not appropriate in the current research as it is a useful technique when the target population is small and unavailable (Soloff et al., 2005).

#### **5.5.2.4 Determine the Sample Size**

After identifying the sampling frame and the sampling procedure, the next step is to determine the sample size. Defining an appropriate sample size is a crucial and complicated task in research “because it depends on the type of sample, the statistic in question, the homogeneity of the population, and the time, money, and personnel available for the study” (Iacobucci & Churchill, 2010, p. 312). Inadequate sample size can have a negative impact on the validity and outcome of research. For example, if the data is not representative, it may result in an inability to generalise the findings from the sample to the entire population (Levy & Lemeshow, 2013). On the contrary, drawing a large sample size can result in many issues, such as wasting time and incurring unnecessary costs (Hair et al., 2018).

Researchers have considered several thoughts to determine the appropriate sample size for conducting valid research. For example, some researchers point out that the appropriate sample

size reflects the representativeness of the entire population in the sample (Salkind, 2010). Other researchers suggest that it is worth to considering the sample size utilised in other related studies (Chen 2004). However, the most important technique to determine the sample size is based on data analysis techniques used in the study (Salkind, 2010). The data in the current research is analysed using the structural equation modelling technique (SEM) (see section 5.5.4). Due to the flexibility of SEM, which enables researchers to examine complex theoretical models and data simultaneously, it is difficult to establish general guidelines regarding sample size requirements (MacCallum, Widaman, Zhang, & Hong, 1999). However, the SEM literature provides a set of rules of thumb for establishing a sample size. The following paragraph illustrates the most common rules of thumb that have been applied in quantitative research:

According to Hair et al. (2018), in general, the sample size must be larger than 50 units in order to be accepted. Boomsma (1982) states that a minimum sample size of 100 or 200 is generally accepted and 400 observations is the minimum satisfactory sample size when applying SEM. Kline (2011), points out that a sample size of 200 observations may be too small when analysing a complex model. Some researchers agreed that 5 or 10 observations per estimated parameter are adequate if the data is normally distributed and there is no missing data or outliers cases (Bentler, Chou, & Research, 1987). Comrey and Lee (1992) proposed a guideline for determining sample size, indicating that 100 = poor, 200 = fair, 300 = good, 500 = very good, 1,000 or more = excellent.

It has been argued that the previous discussed rules of thumb are not model-specific. Therefore, they can cause the sample size to be inflated or decreased (Wolf, Harrington, Clark, Miller, & measurement, 2013). Thus, the sample size required is determined by the research model's characteristics.

*“including the level of communality of the variables and the level of overdetermination of the factors” (MacCallum et al., 1999, p. 84).*

This research, therefore, adopts the guideline of (Hair et al., 2018) for the minimum sample size, which takes into account model-specification and theoretical considerations. According to Hair et al. (2018), the sample size of higher than 300 is generally required to provide more stable solutions when using SEM. In addition, the authors offer four suggestions for the appropriate number of observations based on the complexity of the SEM model and characteristics of the measurement model. These four suggestions are illustrated as follows:

-100 observations may be used to test models with five or fewer constructs, each with more than three items and high item communalities.

-150 observations may be used to estimate models with seven or fewer constructs, modest communalities, and no under-identified constructs.

-A minimum sample size of 300 is needed for models with seven or fewer constructs, lower communalities, and/or multiple under-identified constructs.

-Models with a large number of constructs, some with lower communalities, and some with fewer than three items, require a minimum sample size of 500.

Based on the nature of the population in the current research and the previous discussion and recommendations, a sample size of higher than 500 observations is appropriate for this research. The minimum sample size depends on the size of the target population. The target population of the current research is Libyan MB users, which is a large population size. Furthermore, prior research regarding sampling argues that non-probability sampling methods, such as the convenience sampling technique, lack representativeness of the entire population (Bryman, 2012; Zikmund et al., 2013). However, non-representativeness in convenience sampling can be reduced using a large sample size (Fricker & Schonlau, 2002; Hair et al., 2018).

Moreover, many MB studies have pointed out in their limitations that the sample size is modest and not adequate to generalise the findings from the sample to the entire population (Afshan & Sharif, 2016; Alalwan et al., 2017; Arcand et al., 2017; Berraies et al., 2017; Sharma & Sharma, 2019). Therefore, the current research attempts to bridge this gap by examining 659 respondents. Finally, the conceptual model of this research is considered as complex because it seeks to identify the factors that influence trust and satisfaction within MB, and to understand the effect of trust as a mediator factor on user satisfaction with MB. Therefore, using a large sample size advocates the researcher to achieve these research objectives by gathering information from a large number of diverse MB customers (Hair et al., 2018).

### **5.5.3 Data Collection Procedure**

The data collection process includes gathering opinions and information from the target respondents regarding the research questions and objectives (Iacobucci & Churchill, 2010). As discussed in (section 5.4.1), the data of the present research is collected using the online survey technique. This research uses the Bristol Online Survey (BOS) to design and control the research questionnaire during the data collection stage. Online surveys can be administered efficiently and simply via a variety of methods, including SMS, email and social media networks (SmartSurvey, 2016). Distributing the online survey by email, however, requires a full list of all of the target population's email addresses. In addition, using SMS requires collecting the mobile phone numbers of all potential respondents. Thus, due to the size of the study population, and data restrictions imposed by banks because of privacy and data security legislation, using email or SMS to distribute the online survey for this research is not possible. Alternatively, social media networks can be effective channels to extend the reach of online surveys because they allow social media users to share the survey link with their contacts on social networks (SmartSurvey, 2016). The current research used Facebook as a distribution

channel to collect the data in this research by posting the URL link of the online survey in selected banking online communities. The main reason for selecting Facebook as a data collection tool is that Facebook is the most prominent social media site in Libya. According to Statcounter (2019), with 67.4 percent of people having access to Facebook, it ranks first among the most prominent social media sites in Libya, followed by YouTube with 25.24%. This popularity of Facebook motivates participants to establish online communities on the platform to discuss and share information on shared interests.

To facilitate the data collection process and to reach as many participants as possible, the researcher joined the 18 most influential banking communities on Facebook in Libya. These online communities were particularly useful since they comprised users from all of Libya's regions, and the country's seven largest commercial banks. Table 5.14 depicts the banking online communities, and the related banks used to collect the data and the number of respondents from each online community on Facebook.

**Table 5. 14 Online communities and related banks used to collect the research data**

Banks	Number of online communities	Number of respondents
Jumhouria Bank	4	131
National Commercial Bank	3	83
Wahda Bank	3	147
Sahara Bank	2	62
North Africa Bank	2	53
Bank of Commerce & Development	2	65
Aman Bank for Commerce and Investment	2	142
Total	18	683

For the purpose of obtaining a proximate classification of the data collected from the banking online communities, the researcher posted the URL link of the online survey in the 18 online



communities in order based on the related online communities for each bank. Every two weeks, the survey was posted in online communities belonging to one bank, and the number of respondents from each online community was counted. For example, the online survey was posted in three online communities belonging to Jumhouria Bank from 30 September 2018 to 13 October 2018.

The first invitation to participate in the online survey was posted on 30 September 2018. In each invitation, the potential respondents were briefed about the research aim and given a link to the online survey. 361 responses were obtained within six weeks after posting the survey in 10 online communities belonging to three banks (Jumhouria Bank, National Commercial Bank and Wahda Bank). To increase the response rate, the researcher posted the online survey in other 8 online communities representing 4 banks (Sahara Bank, North Africa Bank, Bank of Commerce & Development and Aman Bank for Commerce and Investment). After 8 weeks, another 322 responses were collected. Thus, after 14 weeks, the survey received 683 responses from participants who completed the entire online survey.

As mentioned, this research uses the BOS online survey to distribute the online survey. This software provides information about the distribution process of the survey. The respondent progress table in the software shows the last page of the survey that respondents visited before they left the survey. The online survey of this research consists of 6 pages. There were 4418 instances of respondents who accessed the first page, which is the cover letter of the survey, and then they left the survey. In addition, 169 respondents advanced to the second page before abandoning the survey, while 18 advanced to the third page, 5 advanced to the fourth page, and 11 advanced to the fifth page before abandoning the survey. Finally, there were 683 instances of respondents who completed the entire survey and submitted their responses. This number represents the completed responses because all questions were highlighted as (required) in the online survey, so a respondent cannot submit the survey without answering all questions. The

final responses number is 659 after excluding 24 responses for several reasons in the data screening step (this is explained in detail in chapter 6, section 6.2.2).

Hence, the researcher divided the number of completed and submitted responses by the total number of respondents who accessed the online survey to determine the response rate. As a result,  $683/4801 = 14.22\%$ . The response rate of this study survey is acceptable since online surveys usually have a lower response rate than paper-based surveys (Kaplowitz, Hadlock, & Levine, 2004).

#### **5.5.4 Data Analysis Procedure**

In quantitative research, there are different approaches a researcher can use to examine relationships between variables in a conceptual framework. These approaches include factor analysis, multiple regression analysis and structural equation modelling (SEM) (Hair et al., 2018) The present research employs the structural equation modelling (SEM), which is a multivariate statistical technique for estimating the direct and indirect relationships between constructs in a conceptual model. This technique combines data and the underlying model in order to assess both the measurement and structural model simultaneously (Gefen, Straub, & Boudreau, 2000).

##### **5.5.4.1 Justification for Selecting SEM**

The adoption of the SEM technique in the present research is attributed to its advantages over other quantitative data analysis techniques. Firstly, the SEM is a second-generation data analysis technique that can examine and explain the relationships between multiple dependent and independent variables in a conceptual model simultaneously instead of examining each relationship separately (Chin, 1998a). Thus, it is unlike the first-generation techniques such as multiple regression and factor analysis, which evaluate only single relationships between an independent variable and a dependent variable in a model.

Secondly, SEM enables researchers to build complex path models that include both direct and indirect effects (Tabachnick & Fidell, 2014). This is a valuable feature for the SEM technique, in particular, in this study as it aims to examine the direct and indirect relationships between a set of independent variables and customer satisfaction through trust. Thirdly, using SEM allows researchers to validate the indicators of constructs in measurement models and assess the causal relationships between the constructs in the structural models simultaneously (Gefen et al., 2000). Hence, researchers can incorporate that measurement model directly into SEM, which implies that the phenomenon under investigation can be modelled accurately (Chin, 1998a). Finally, SEM can be used for explanatory purposes in addition to the confirmatory analysis as it combines hypotheses examination and factor analysis in the same process (Gefen et al., 2000).

#### **5.5.4.2 Covariance-Based SEM (CB-SEM) vs Partial Least Square (PLS-SEM)**

To perform SEM analysis, there are two main statistical approaches. These approaches are the covariance-based structural equation modelling CB-SEM with software programmes such as AMOS (Analysis of a Moment Structures) and the component-based structural equation modelling such as partial least square PLS analysis with software programmes such as Smartpls or Graph. These two approaches are distinguished regarding their statistical assumptions and outputs (Gefen et al., 2000). In other words, the two approaches are different in terms of their estimation method (Chin, 1998a).

The CB-SEM utilises the maximum likelihood technique (ML) to estimate the overall fit of an observed covariance matrix with the hypothesised model (Sarstedt, Ringle, Smith, Reams, & Hair, 2014). Therefore, the primary use of this technique is to test theories in order to confirm or reject them. It can also be used to perform comparisons between alternative theories (Chin, 1998a). The component-based structural equation modelling PLS-SEM, on the other hand, applies least square estimation to minimise the errors and maximise the total variance between

latent variables and their indicators (Gefen et al., 2000). Therefore, PLS-SEM is the most appropriate technique for predicting target constructs or identifying driver constructs. Besides, PLS-SEM is useful in conducting explanatory research that aim to extend or modify existing theories (Hair, Sarstedt, Hopkins & Kuppelwieser, 2014).

Regarding sample size requirement, despite the popularity of CB-SEM, it lacks the ability to deal with small sample sizes, unlike PLS-SEM, which deals with both large and small sample size. Concerning normality in the data distribution, while the CB-SEM requires that the data must be normally distributed, the PLS-SEM deals with both normal and non-normal distributed data. Furthermore, there are more technical features that distinguish between CB-SEM and PLS-SEM. For example, PLS-SEM is the most appropriate method for dealing with complex models. On the other hand, CB-SEM is suitable when the study requires a global goodness-of-fit criterion as PLS-SEM does not offer a measure to assess global goodness-of-fit. Instead, PLS-SEM employs other tests to assess the structural model, such as coefficient of determination ( $R^2$ ), predictive relevance ( $Q^2$ ), effect size ( $F^2$ ), and the modern test, PLS predict, for assessing the structural model's out-of-sample predictive power.

#### **5.5.4.3 The rationale for using SEM with PLS**

The present research applies the structural equation modelling technique with partial least squares (PLS-SEM) to analyse the collected data for the following reasons: *First*, the conceptual model of this research consists of six hypothesised direct relationships and five hypothesised indirect relationships between seven constructs which have to be tested using observable measurement indicators. Therefore, the SEM-PLS technique is more appropriate for large and complex models because it incorporates empirical data with the structural model. Applying other techniques in this context would not be suitable; for example, multiple regression can only deal with testing single relationships between independent and dependent variables.

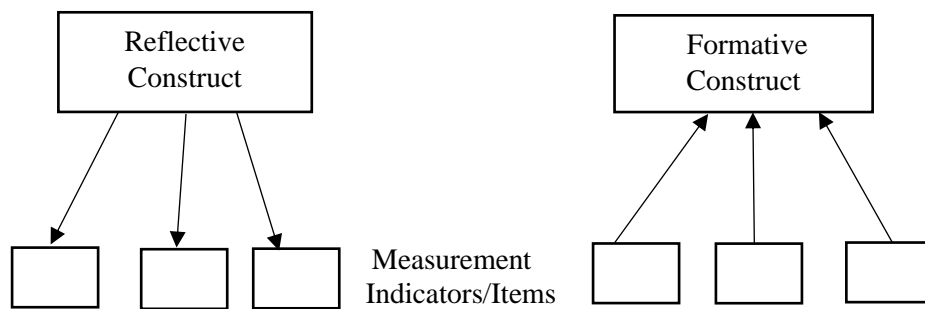
**Second**, one of the main objectives of this research is to assess the mediating role that trust plays in explaining customer satisfaction in MB. This aim is pursued by formulating five hypotheses regarding the influence of trust as a mediator on the relationship between the five independent variables in the research model and user satisfaction. While CB-SEM is the most effective method in testing theories, PLS-SEM is considered as the most appropriate technique in predicting and exploring structural relationships (Chin, 1998a). This is because PLS-SEM is based on causal-predictive analysis.

**Third**, the findings of the data normality test in this research (see section 6.2.2.4) found that there are non-normal cases in the collected data, which supports the application of PLS-SEM as it is flexible in dealing with the non-normal data distribution (Sarstedt et al., 2014). The use of CB-SEM, on the other hand, requires normal distribution of the data (Chin, 2010). **Fourth**, the constructs in the conceptual model in the present research are linked to a mediator variable (trust). Analysing of the mediating effects is a critical technique in developing theories because it enables researchers to explain the relationships between exogenous and endogenous constructs (Hair, et al., 2014). PLS offers an effective technique for analysing the mediation effect and determining its type (full or partial mediation). **Finally**, the PLS technique has been widely applied in various business disciplines such as information systems and e-commerce such as e-banking services, and proved a strong ability in predicting and explaining causal relationships (K. C. Lee & Chung, 2009; Liébana-Cabanillas et al., 2017; Susanto et al., 2016; Tam & Oliveira, 2017b; Thakur, 2014).

#### **5.5.4.4 Construct Specification**

The examination of the conceptual relationships between a construct and its indicators is essential in the use of the SEM technique. It enables the researcher to analyse the measurement and structural models simultaneously (Petter, Straub, & Rai, 2007). The main goal here is to determine whether the latent variables should be modelled using reflective or formative

indicators (MacCallum & Browne, 1993). In the reflective construct, indicators are considered as effects of a particular construct, and the causality flows from the construct to its indicators (Chin, 1998b). This implies that any change in the indicators reflects changes in the construct (Coltman, Devinney, Midgley, & Venaik, 2008). Another feature of the reflective construct is that indicators are interchangeable and share common themes. Therefore, dropping one of the parallel indicators from a specific construct in the measurement model does not alter the content validity of the construct (Chin, Marcolin, & Newsted, 2003). In the informative construct, on the other hand, causality is directed from the indicators to the construct (Coltman et al., 2008). The indicators here are independent components which are combined to conceptualise the construct. Therefore, dropping one indicator from a specific construct in the measurement model causes changes in the concept of the construct (Petter et al., 2007). Figure 5.6 illustrates the diagram of reflective and formative constructs.



**Figure 5. 6 Illustration of reflective and formative constructs in structural equation modelling (SEM)**

Determining whether a construct is reflective or formative is a challenging decision; it has been debated in a variety of disciplines (Sarstedt et al., 2014). In the current research, all the indicators (items) of the constructs in the measurement model are reflective. The rationale behind considering all indicators in the measurement model as reflective is related to the sources of these indicators. As mentioned in the conceptual framework development (chapter 4) and the operationalisation of the research variables (section 5.5.1.3), the conceptual model

of this research consists of seven constructs: system quality, information quality, service quality, task characteristics, structural assurance, trust and customer satisfaction. These constructs were conceptualised based on well-established theoretical frameworks. In addition, the indicators of the constructs were derived from the existing MB and e-commerce literature, which have been prevalently measured as first-order reflective constructs. Adopting previous literature to determine the causality flow is essential for researchers to avoid misspecification in the measurement model (Jarvis, MacKenzie, & Podsakoff, 2003). However, researchers must ensure that using prior validated constructs and indicators fits well in the proposed model and does not cause validity issues in the measurement model (Hair, et al., 2017). Therefore, it has been recommended that researchers should measure the internal consistency of the reflective constructs based on the correlation between one or a set of indicators that measure the same construct (Coltman et al., 2008). (This procedure is discussed in section 5.5.4.5.1.1 regarding the assessment of internal consistency in the measurement model).

#### **5.5.4.5 Model Evaluation**

The present research performs two procedures to assess the conceptual framework that was developed in chapter 4. Firstly, the assessment of the measurement (outer) model which aims to evaluate the validity and reliability of the measurement model before proceeding to the structural model assessment (Hair, et al., 2014). Secondly, the assessment of the structural (inner) model to test the relationships between latent variables in the model (Sarstedt et al., 2014). In addition, analysing the mediating effect of trust between the independent variables in the research model and customer satisfaction.

##### **5.5.4.5.1 ASSESSMENT OF THE MEASUREMENT MODEL**

Prior to the examination of the structural model, it is crucial to ensure that the measurement (outer) model is reliable and valid for further analysis (Manheim, 2008). To ensure the quality criteria of the measurement model, researchers must ensure that the relationships between the

latent variables and their indicators are valid (Chin, 1998b). Besides, each measure assigned to a specific construct effectively reflects the meaning of the concept of the construct (Hair, et al., 2017). The measurement model assessment involves the following tests:

1-Evaluating the internal consistency reliability using the composite reliability (CR) and Cronbach's alpha.

2-Evaluating the individual item reliability by testing the indicator (item) loadings.

3-Assessing the convergent validity of the indicators linked to the individual constructs using the average variance extracted (AVE).

4-Evaluating discriminant validity by testing cross loadings criterion, Fornell-Larcker criterion and heterotrait-monotrait ratio (HTMT).

The following subsections discuss the criteria used to assess the measurement model.

#### **5.5.4.5.1.1 INTERNAL CONSISTENCY RELIABILITY**

The internal consistency reliability refers to a metric that quantifies the correlations between various measures that evaluate the same construct (Hair et al., 2018). It estimates the extent to which a measure of a particular construct yields the same score repeatedly (Chin, 1998b). This test is essential for researchers to ensure that the number of indicators that are assigned to a specific construct is adequate to capture the concept of the construct (Hair et al., 2017). There are two main tests that are typically used to evaluate the internal consistency of the measurement model, namely composite reliability and Cronbach's alpha. Although both tests examine the same thing, composite reliability is regarded as more advanced and superior to Cronbach's alpha (Hair et al., 2017).

Cronbach's alpha is a traditional criterion which estimates the reliability based on indicator inter-correlations (Hair et al., 2018). Items within a construct that has high Cronbach's alpha



value are assumed to measure a similar meaning (Peterson, 1994). Nunnally and Bernstein (1978) propose that a Cronbach's alpha value of 0.7 is acceptable. However, Cronbach's alpha underestimates the internal consistency reliability because it assumes that all items have equal reliability (Hair et al., 2017).

Composite reliability (CR), on the other hand, assumes that indicators of a specific construct have different loadings (Chin, 1998b). Thus, it evaluates the measurement model's internal consistency using factor loadings generated by the measurement model. A composite reliability value above 0.7 is acceptable and values less than 0.6 is considered as an indicator of lack of internal consistency reliability (Segars, 1997). Both measures are used in the present study to assess the internal consistency reliability of the measurement model.

#### **5.5.4.5.1.2 INDIVIDUAL ITEM RELIABILITY**

Individual item reliability refers to the extent to which indicators of a scale significantly load on their corresponding construct (Hair et al., 2017). This correlation between items and a specific construct is called factor (outer) loading (Sarstedt et al., 2014). The factor loading of all items must be significant. The threshold of the factor loadings test is above 0.7, which determines an item absolute contribution to its assigned construct (Hair et al., 2019). According to Nunnally, Bernstein, and Berge (1967), researchers should eliminate the indicators that have low loading from the scale to increase internal reliability.

#### **5.5.4.5.1.3 CONVERGENT VALIDITY**

Convergent validity deals with evaluating the degree of correlation between the items that measure a certain construct (Urbach & Ahlemann, 2010). The test of the convergent validity enables researchers to ensure that the items of a particular construct are correlated and reflect the concept of the construct they propose to measure, and they do not measure other constructs (Hair et al., 2017). In PLS-SEM, the convergent validity can be measured using the value of

average variance extracted (AVE) (Fornell & Larcker, 1981). AVE estimates the magnitude of average variance that a variable yield from its indicators compared to the magnitude that is generated from measurement error (Hair et al., 2017). Concerning the acceptable values of the AVE test, according to Fornell and Larcker (1981), adequate convergent validity is established when each construct's AVE value is at least 0.5. This means that the construct interprets more than 50% of its indicators' variance.

#### **5.5.4.5.1.4 DISCRIMINANT VALIDITY**

Discriminant validity refers to the amount of correlation between indicators of one construct with indicators of other different constructs in a conceptual framework (Chin, 1998b). The discriminant validity can be established when measures of constructs in the model are unique and not highly related (Hair et al., 2017). Assessing discriminant validity is essential because it is theoretically assumed that every construct examines a different concept from the other constructs' concepts in a conceptual model (Hair et al., 2014). Regarding the assessment of discriminant validity, two traditional criteria have been commonly used, namely the cross-loadings criterion and the Fornell and Larcker criterion. The Fornell and Larcker criterion is concerned with the construct level, while the Cross-loadings criterion is concerned with the item (indicator) level (Hair et al., 2017). The following two subsections discuss these criteria.

##### ***Analysis of Cross-loadings***

Cross-loading Analysis is often used as an initial step in assessing the discriminant validity of indicators in a measurement model. To establish adequate discriminant validity using the cross-loadings criterion, an indicator's outer loadings on its associated construct must be greater than its outer loadings on all other constructs (Chin, 1998b). This implies that the indicators for a specific construct examine only that construct and not any other (Chin et al., 2003). In contrast, the presence of cross-loadings that surpass the cross-loadings of the indicators would indicate that there are issues in the discriminant validity (Hair et al., 2017).

### ***Fornell and Larcker Criterion (Variable correlation)***

The second traditional technique of the discriminant validity assessment is the Fornell and Larcker criterion. This test compares the square root of the average variance extracted values (AVE) to the correlations of latent variables (AVE) (Hair et al., 2017). The square root of the average variance extracted AVE of each construct must overtake the squared correlations between the construct and all other constructs in the model to establish discriminant validity using the Fornell and Larcker criterion (Hair et al., 2014). The square root of the AVE value of each construct must be greater than the squared correlations between the construct and all other constructs (Fornell & Larcker, 1981).

Although Fornell-Larcker and cross-loadings criteria have been widely used in assessing discriminant validity, recent research indicates that both are not effective detectors for issues with discriminant validity (Henseler, Ringle, & Sarstedt, 2015). To address the issue of inadequate discriminant validity detection, Henseler et al. (2015) proposed a novel technique for evaluating discriminant validity, namely the heterotrait–monotrait ratio (HTMT) of the correlations.

### ***Heterotrait-Monotrait Ratio (HTMT)***

The heterotrait–monotrait ratio (HTMT) refers to the mean of all correlations between indicators measuring different constructs in comparison to the mean of all correlations between indicators measuring the same construct (Hair et al., 2017). The mechanism of this criterion functions as follows: “A high ratio of correlations across constructs (heterotrait) relative to those within constructs (monotrait) indicates a lack of discriminant validity” (Franke & Sarstedt, 2019, p. 434). The appropriate HTMT test threshold is arguable as some researchers argue that the HTMT ratio of 0.85 is sufficient to detect any discriminant validity issues (Franke & Sarstedt, 2019) and others accept the 0.90 value threshold (Henseler et al., 2015). However, correlation scores close to one suggest a lack of discriminant validity in genera

(Franke & Sarstedt, 2019). The current study uses the 0.90 threshold suggested by (Henseler et al., 2015). Thus, any HTMT ratio for each pair of constructs in the measurement model higher than 0.90 is considered as an indicator of discriminant validity issues.

Table 5.15 exhibits a summary of all the criteria used to assess the measurement model in the present research.

**Table 5. 15 A summary of the criteria used to evaluate the measurement model**

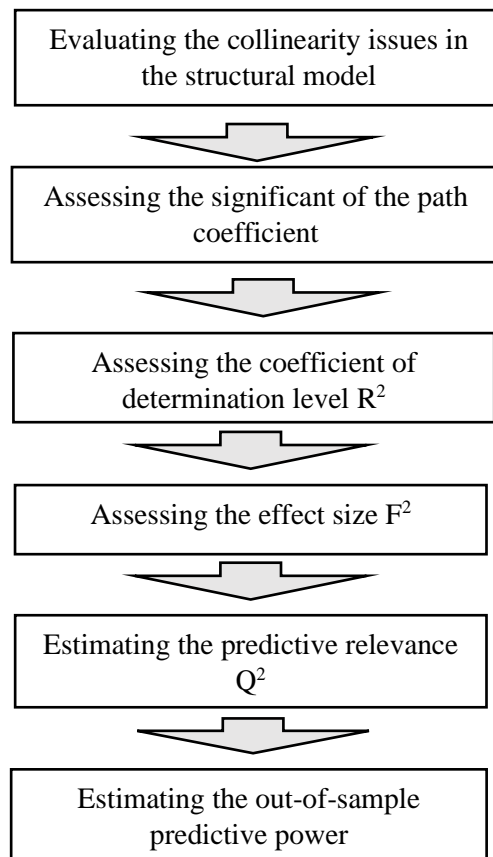
Assessments and Criteria	Guideline
Internal consistency reliability: Cronbach’s alpha	The minimum acceptable value is 0.7 (Nunally & Bernstein, 1978).
Composite reliability (CR)	For exploratory study, values between 0.60 and 0.70 are adequate. Between 0.70 and 0.90, the values vary from acceptable to good. 0.95 and higher values are problematic (Segars, 1997).
Individual item reliability	The factor (outer) loadings of indicators must be greater than 0.7 and significant at least at the 0.05 level (Hair et al., 2019).
Convergent validity	The average variance extracted (AVE) values must be 0.5 or higher (Fornell & Larcker, 1981).
Discriminant validity: Cross-loadings	The outer loadings of an item should be the highest on its associated construct (Chin, 1998b).
Fornell and Larcker criterion	The AVE of each construct should be higher than the squared correlations between the construct and all other constructs in the model (Fornell & Larcker, 1981).
Heterotrait-monotrait ratio (HTMT)	The (HTMT) ratio for each pair of constructs in the model must be less than 0.90 (Henseler et al., 2015).

#### **5.5.4.5.2 ASSESSMENT OF THE STRUCTURAL MODEL**

Following establishing the validity and reliability of the reflective measurement model, the next step is to test the linear relationships between the structural model's exogenous and endogenous latent variables. Further, examining the role of trust as a moderator in enhancing

user satisfaction with MB. Analysing the structural model allows the researcher to ascertain if the empirical data endorse the conceptual model's hypotheses (Urbach & Ahlemann, 2010). In other words, the amount of variance in the dependent variables that the independent variables can explain (Chin, 2010).

As mentioned, the current research uses the PLS-SEM technique, which is unlike the CB-SEM, does not have a specific measure for estimating the overall goodness of fit (GoF) in the structural model (Hair et al., 2019). Therefore, PLS uses non-parametric statistical analysis to estimate the overall fit of the structural model by assessing its ability to predict the endogenous variables (Sarstedt et al., 2014). The present research uses the systematic approach proposed by Hair et al. (2017) to evaluate the structural model. This approach consists of five tests that can be applied systematically to evaluate the explanatory and predictive powers of the structural model. Besides, this research uses the PLS predict technique, which was proposed by Shmueli et al. (2016) to estimate out-of-sample predictive power called PLS predict. Figure 5.7 illustrates the tests used in assessing the structural model in this research.



**Figure 5. 7 Structural Model Assessment Procedure**

(Hair et al., 2017)

#### **5.5.4.5.2.1 COLLINEARITY ASSESSMENT**

The assessment of the structural model begins with conducting a collinearity analysis. The purpose of this procedure is to ensure that no substantial amounts of collinearity exist between the predictor constructs. The collinearity issues can lead to redundancy when analysing the structural model (Hair et al., 2019). If the predictor constructs are highly collinear, the path coefficients can be biased (Hair et al., 2017). The investigation of collinearity is performed in PLS-SEM using the algorithm procedure to test the Variance inflation factor (VIF) values. The threshold for this test is 5. Thus, VIF values higher than 5 indicate that there is multicollinearity among the predictor constructs (Hair et al., 2019).

#### **5.5.4.5.2.2 STRUCTURAL MODEL PATH COEFFICIENT**

The path coefficient  $\beta$  examines the significance of the hypothesised relationships between each path linking two latent variables within the structural model (Chin et al., 2003). The path coefficient for a relationship can be produced based on the t-value, which can be calculated in the PLS-SEM using the Bootstrapping procedure (Hair et al., 2018). The Bootstrapping routine is a resampling method for drawing a large number of samples from the original sample. It calculates the t-statistics of each path in the structural model. The t-values indicate the strength of the relationships between each pair of model constructs (Hair et al., 2014).

The path coefficient values are standardised between -1 and +1, with values close to +1 indicating significant positive relationships and values close to -1 indicating significant negative relationships (Hair et al., 2019). The path coefficient procedure allows researchers to confirm or reject the research hypotheses and to explain the strength of the relationships between independent and dependent variables in the structural model. Researchers typically use the p-value to examine the significant level of relationships. For example, the p-value must be smaller than 0.05 when assuming that the significant level is 5% (Hair et al., 2018). In the present research, there are six relationships that need to be tested. The five hypothesised paths between the five independent variables in the model and trust, and the relationship between trust and customer satisfaction.

#### **5.5.4.5.2.3 COEFFICIENT OF DETERMINATION ( $R^2$ )**

The coefficient of determination  $R^2$  refers to the proportion of variation in each endogenous variable that can be explained by the exogenous variables (Henseler, Ringle, & Sinkovics, 2009). This implies that  $R^2$  measures the predictive capability of the structural model (Hair et al., 2018). The value of  $R^2$  ranges from 0 to 1, which reflects the level of the predictive accuracy depending on the complexity of the model and the number of the exogenous variables (Chin, 1998b). According to Falk and Miller (1992), the minimum acceptable level of  $R^2$  value is

0.10. However, (Chin, 1998b) indicates that when using PLS-ESM,  $R^2$  values of 0.67, 0.33, and 0.19, respectively, are considered substantial, moderate, and weak. In the present research, the variables that need to measure  $R^2$  values are trust and customer satisfaction as they are endogenous variables in the structural model.

#### **5.5.4.5.2.4 EFFECT SIZE ( $F^2$ )**

Along with determining the  $R^2$  of endogenous variables in the structural model, researchers can also evaluate the  $F^2$  (Chin et al., 2003). The effect size  $F^2$  indicates the change in the  $R^2$  value that can happen when excluding a particular exogenous construct from the structural model (Hair et al., 2017). This criterion can be used to evaluate whether excluding an exogenous variable will substantially influence the endogenous variables in the structural model (Henseler et al., 2009). In general,  $F^2$  values of 0.35, 0.15, and 0.02 represent large, medium, and small effect sizes respectively (Cohen, 1988). However, a low  $F^2$  value does not always imply that the effect is trivial in all contexts (Chin et al., 2003).

#### **5.5.4.5.2.5 PREDICTIVE RELEVANCE ( $Q^2$ )**

Further to the assessment of  $R^2$  as an indicator of the predictive power, predictive relevance  $Q^2$  should be tested to identify the predictive capabilities level of the structural model (Henseler et al., 2009).  $Q^2$  can be measured by assessing the predictive ability of the latent endogenous variables, which are trust and customer satisfaction in this research. It can be measured in PLS-SEM using the blindfolding technique, which is an integration of bootstrapping and PLS algorithms (Hair et al., 2017). This procedure evaluates how properly the structural model can reproduce observed values and estimating parameters.  $Q^2$  value must be above zero to ensure that the structural model has predictive relevance (Geisser, 1974). The  $Q^2$  values of the endogenous variables that are greater than zero, 0.25 and 0.50 represent small, medium and large predictive relevance of the PLS-path model (Hair et al., 2019).



#### **5.5.4.5.2.6 OUT-OF-SAMPLE PREDICTIVE POWER (PLS PREDICT)**

Researchers routinely used the coefficient of determination  $R^2$  statistic and predictive relevance  $Q^2$  to assess the predictive power of a structural model. However,  $R^2$  is not entirely appropriate to evaluate predictive power (Shmueli et al., 2019). This is because  $R^2$  is only evidence of the explanatory power of the in-sample model. It cannot be used to measure the out-of-sample predictive power, viz the ability to predict new observations not included in the assessment procedure (Hair et al., 2019). In addition, the predictive relevance  $Q^2$  cannot be employed to evaluate the out-of-sample predictive power of a structural model because it combines in-sample and out-of-sample prediction (Hair et al., 2019). Hence, assessing out-of-sample predictive power is essential for simulating how the PLS model will be used to predict new observations (Shmueli et al., 2019).

To estimate the out-of-sample predictive power, Shmueli et al. (2016) proposed a new and straightforward procedure called PLS predict. This technique comprises assessing models on a training sample and estimating how they perform to predict other data indicated as a holdout sample. To employ this procedure, there are two steps that should be performed (Shmueli et al., 2019). First, establishing that all endogenous variable predictions surpass the means of indicators in the training sample. This is accomplished by calculating the values of the  $Q^2$  predict, which must be greater than zero for all endogenous variable indicators in order to outperform the naive benchmark (Hair et al., 2019).

Second, the prediction errors should be analysed using prediction statistics such as the mean absolute error MAE and the root mean squared error RMSE (Shmueli et al., 2019). These prediction metrics can calculate the amount of prediction errors (Hair et al., 2019). The prediction statistics values (RMSE and MAE) for the indicators of the endogenous variables from the PLS path model should be then compared with their counterparts of the linear

regression model (LM) as a naïve benchmark. To interpret the results of the comparison, the following guidelines should be applied (Shmueli et al., 2019):

PLS-SEM analysis < LM benchmark for none of the indicators: the model lacks predictive power.

PLS-SEM analysis < LM benchmark for the minority of the indicators: the model has low predictive power.

PLS-SEM analysis < LM benchmark for the majority of the indicators: the model has a medium predictive power.

PLS-SEM analysis < LM benchmark for all indicators: the model has high predictive power.

Table 5.16 depicts a summary of the criteria used to validate the structural model in this research.

**Table 5. 16 A summary of the criteria used to validate the structural model**

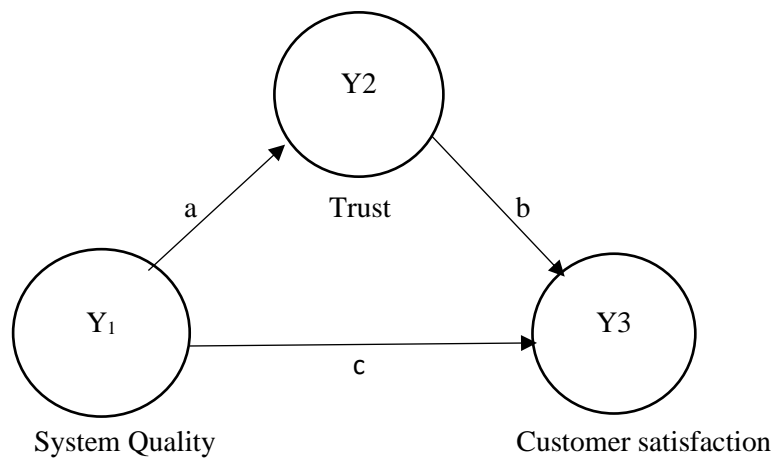
Criterion	Description	Guideline
Collinearity Level	Ensuring that there are no significant levels of collinearity issues which can result in biased path coefficients.	Collinearity issues occur when VIF values are higher than 5. Possible collinearity issues when VIF between 3-5. Ideal collinearity level when VIF less than 3. (Hair et al., 2017)
Path coefficients	Examining the path coefficients $\beta$ between the exogenous and endogenous latent variables regarding their significance.	The standardised value of path coefficient is between -1 and + 1. The closer the estimated coefficients are to 1, the stronger the relationships are (Hair et al., 2017).
Coefficient of determination ( $R^2$ )	Measuring the degrees of variability in endogenous latent variables that are explained by the exogenous variables.	$R^2$ value of 0.67 is substantial. $R^2$ value of 0.33 is moderate. $R^2$ value of 0.19 is weak (Chin, 1998b).
Effect size ( $F^2$ )	Measuring whether an exogenous latent variable has impact on endogenous latent variable.	$F^2$ value of 0.35 is large. $F^2$ value of 0.15 is medium. $F^2$ value of 0.02 is small (Cohen, 1988).
Prediction relevance ( $Q^2$ )	Evaluating the predictive relevance of the structural	$Q^2$ value must be higher than zero.

	model in measuring the latent dependent variables.	Q <sup>2</sup> values greater than zero, 0.25 and 0.50 represent small, medium and large predictive relevance of the endogenous variables in the PLS-path model (Geisser, 1974)
PLS predict	Assessing the out-of-sample predictive power of the conceptual model.	<p>1- Q<sup>2</sup> predict values of the endogenous variables must be above zero.</p> <p>2- The prediction statistics values (RMSE and MAE) for the PLS path model and the linear regression model (LM) are compared.</p> <ul style="list-style-type: none"> <li>- All (RMSE and MAE) values for PLS-SEM are higher than the (RMSE and MAE) values of LM: lacks predictive power.</li> <li>- The minority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: low predictive power.</li> <li>- The majority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: medium predictive power.</li> <li>- All (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: high predictive power (Shmueli et al., 2019).</li> </ul>

#### 5.5.4.5.3 MEDIATION EFFECT ANALYSIS

The mediator is a third factor that, within a conceptual model, explains the relationships between the independent and dependent variables (Baron & Kenny, 1986). Hence, it represents the mechanism that explains the indirect effect of a predictor variable on an endogenous variable (Preacher & Hayes, 2008). To explain the mediation effect mechanism, figure 5.8 depicts the mediation effect in a simple model from the research model, illustrating the mediating effect of trust between system quality and customer satisfaction. Y2 in the model is called a mediator variable. There are two ways through which the independent variable Y1 can affect the dependent variable Y3 (Hayes, 2018). The first way is the pathway (c), which represents the effect from the predictor variable Y1 to the outcome Y3 without the influence of Y2, which is termed as the direct effect of Y1 on Y3. The second pathway (ab) is the indirect effect from the independent variable Y1 to the dependent variable Y3 through the mediator Y2. For example, trust is conceptualised in the current research as a potential mediator between system quality and customer satisfaction. It illustrates a suggested mechanism by which system

quality influences trust, which in turn affects user satisfaction causally (Preacher & Hayes, 2008).



**Figure 5. 8 The mediation effect mechanism**

(Zhao et al., 2010)

Scholars have used the bootstrapping technique to test the mediating effect using the PLS-SEM, which relies on a free sampling distribution assumption (Hair et al., 2017). It is essential before conducting the mediation analysis that the researcher ensures that all criteria used to evaluate the measurement and structural model are met. The lack of reliability and validity in the model substantially impacts the indirect relationships between independent and dependent variables, especially with constructs that are modelled using reflective indicators (Hair et al., 2017).

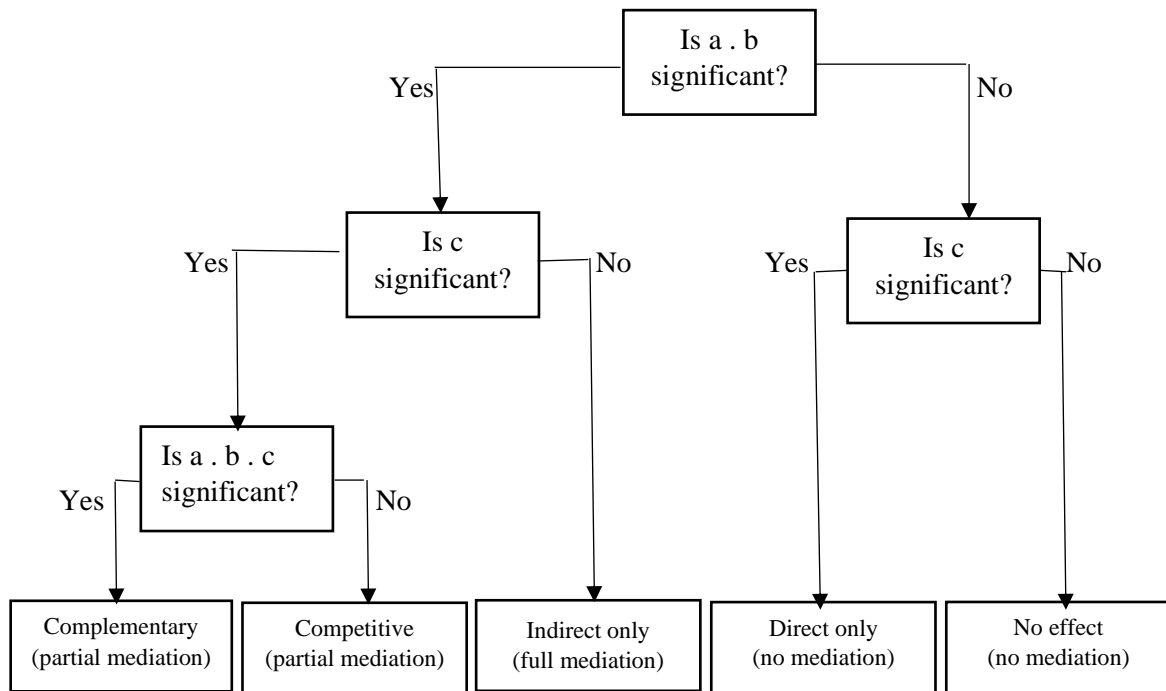
The mediation effect has been tested using a variety of approaches (Baron & Kenny, 1986; Preacher & Hayes, 2008; Sobel, 1982; Zhao et al., 2010). However, the most common method was presented by Baron and Kenny (1986), who suggested criteria that must be achieved in order to establish the mediation effect. According to Baron and Kenny (1986), three requirements must be met in order to establish a mediation effect. First, the independent variable must significantly influence the dependent variable. Second, the independent variable

must significantly influence the hypothesized mediating variable. Third, the mediator must significantly influence the dependent variable. Full mediation occurs if the independent variable no longer affects the dependent variable and the mediator is controlled, and all the other requirements are fulfilled. Partial mediation happens when the independent variable's effect on the dependent variable is decreased when the control of the mediator.

However, Zhao et al. (2010) dispute this approach regarding three points: First, it is not necessary to establish a significant impact of the independent variable on the dependent variable in order to establish a mediator. The only criterion for establishing a mediator is that the indirect effect must be significant. Second, although Baron and Kenny (1986) advocate full mediation, most studies indicate partial mediation with a significant direct relationship seldom predicted or explained. An excluded mediator could clarify the unexplained direct path. Third, using the Sobel test to evaluate the significance of an indirect effect is low in power compared to the bootstrapping test, which is more rigorous and robust. Besides, the sign of the indirect effect should be considered. Positive significant correlations between an independent variable and mediator, independent and dependent variables, and mediator and dependent variables are all possible while also having a significant negative indirect effect.

In addition to this approach, other researchers have relied on the Sobel test to evaluate the mediation effect (Sobel, 1982). The Sobel test computes the proportion of the direct path from the independent variable to the dependent variable via the mediator variable using the standard errors. Furthermore, others have adopted the approach proposed by (Preacher & Hayes, 2008), which suggests two steps to test the mediating effect; computing the total indirect effect and identifying the bootstrapped confidence interval.

The current study employs the systematic approach recently suggested by Zhao et al. (2010) to address the limitations of the previous approaches. The approach distinguishes three distinct forms of mediation and two instances of non-mediation (see figure 5.9).



**Figure 5. 9 Guideline for mediation effect analysis**

adapted from (Zhao et al., 2010) and (Hair et al., 2017)

According to (Zhao et al., 2010), there are two cases where the mediation effect cannot exist. The first case is when there is no significant indirect effect (a.b) from the independent variable to the dependent variable via the mediator. Whereas the second case, when there is only a direct effect between the independent variable and the dependent variable (c). On the other hand, the authors characterise three types of mediation effect. The full mediation, which describes a situation in which the independent variable has a significant influence on the dependent variable but only indirect effect (a. b) through the mediator. This means that there is no direct relationship between the independent and dependent variables. In addition, there are two cases of partial mediation when the indirect and direct effects (a. b. c) between the independent and dependent variables are significant. These partial mediations are partial complementary and partial competitive mediation. The complementary mediation effect represents a situation in which both the direct and indirect effects point in the same direction (positive). Competitive

mediation, on the other hand, applies to the opposite signs of the direct effect (c) and one of the indirect effects (a or b) (negative).

In the present research, trust is tested to evaluate the mediation effect levels between each independent variable in the conceptual model (system quality, information quality, service quality, task characteristics and structural assurance) and customer satisfaction.

Table 5.17 shows the links between the adopted methods for all data analysis stages and how they contribute to one other.

**Table 5. 17 The link between the adopted the data analysis methods**

Methods	Aims	Techniques and tools	Tests	Criteria
Data collection method	To gather opinions from current MB users on factors that influence their perceptions regarding the characteristics of MB and their effects on trust and satisfaction.	Online survey using the Jisc online survey, formerly known as the BOS survey.	N/A	N/A
Model validation (measurement model)	To evaluate the validity and reliability of the measurement (outer) model before proceeding to the structural model assessment. This enabled the researcher to empirically examine the relationships between the constructs in the conceptual model and their indicators (items).	<p>All tests were performed using the algorithm procedure in the SmartPLS 3 software.</p> <p>Internal consistency reliability</p> <p>Individual item reliability</p> <p>Convergent validity</p> <p>Discriminant validity</p>	<p>1- Cronbach's alpha</p> <p>2- Composite reliability (CR)</p> <p>Factor (outer) loadings</p> <p>Average variance extracted (AVE)</p> <p>1-Cross-loadings</p>	<p>0.7 (Nunally &amp; Bernstein, 1978)</p> <p>0.70 (Segars, 1997)</p> <p>The factor loadings must be greater than 0.7 (Hair et al., 2019)</p> <p>AVE values must be 0.5 or higher (Fornell &amp; Larcker, 1981).</p> <p>The outer loadings of an item should be the highest on its associated construct (Chin, 1998b).</p>



			2- Fornell and Larcker criterion	The AVE of each construct must be higher than the squared correlations between the construct and all other constructs in the model (Fornell & Larcker, 1981).
			Heterotrait-monotrait ratio (HTMT)	The (HTMT) ratio for each pair of constructs in the model must be less than 0.90 (Henseler et al., 2015)
Model evaluation and hypotheses testing (structural model)	Following establishing the validity and reliability of the reflective measurement model, the next step is to evaluate the structural model of the current research and to test the linear relationships between the structural model's exogenous and endogenous latent variables.	The hypothesized structural model was assessed using the algorithm and bootstrapping procedures with 5000 subsamples in SmartPls 3.		
		Collinearity Level	Variance inflation factor (VIF)	The VIF values must be lower than 5 (Hair et al., 2017)
		Path coefficients	t-value, p-value	p-value must be smaller than 0.05 at the significant level 5% (Hair et al., 2017).
		Explanatory power	Coefficient of determination ( $R^2$ )	$R^2$ value of 0.67 is substantial. $R^2$ value of 0.33 is moderate. $R^2$ value of 0.19 is weak (Chin, 1998b)
		Effect size	( $F^2$ )	$F^2$ value of 0.35 is large. $F^2$ value of 0.15 is medium. $F^2$ value of 0.02 is small (Cohen, 1988)
		Predictive power		Q2 value must be higher than zero. Q2 values greater than zero, 0.25 and 0.50 represent

		Out-of-sample predictive power assessment	<p>Prediction relevance (Q2)</p> <p>PLS predict</p>	<p>small, medium and large predictive relevance of the endogenous variables in the PLS-path model (Geisser, 1974)</p> <p>1- Q2 predict values of the endogenous variables must be above zero.</p> <p>2- The prediction statistics values (RMSE and MAE) for the PLS path model and the linear regression model (LM) are compared.</p> <ul style="list-style-type: none"> <li>- All (RMSE and MAE) values for PLS-SEM are higher than the (RMSE and MAE) values of LM: lacks predictive power.</li> <li>- The minority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: low predictive power.</li> <li>- The majority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: medium predictive power.</li> <li>- All (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: high predictive power (Shmueli et al., 2019).</li> </ul>
Mediation effect analysis	To test the hypotheses related the mediation effect of trust between the independent variables in the research model and customer satisfaction.	The mediation effect analysis approach proposed by (Zhao et al., 2010).	The bootstrapping technique with 5000 subsamples in smartPLS 3 to generate the direct and indirect effects between latent variables in the structural model.	the only requirement for establishing a mediation effect is that the indirect effect between the independent variables and the dependent variable (satisfaction) through the mediator (trust) must be significant (Zhao et al., 2010). Full mediation happens only when the independent variable has a significant effect on satisfaction via trust. Partial mediation happens when the independent variables have significant indirect and direct effects on satisfaction.

## **5.6 Ethics Considerations**

Ethics in research refers to the appropriate behaviour of the researcher regarding the rights of the research subjects or who are affected by the research (Saunders et al., 2016). In the present research, ethical issues were considered throughout the research process, including data collection, data analysis and data storage. Prior to conducting the online survey, ethical approval was obtained from the Business School Research Ethics Committee at the University of Huddersfield. The ethical approval for the questionnaire was issued on 26/09/2018.

In addition, on the cover page of the online survey, all participants were entirely informed about the purpose of the research. Also, participants were informed that the participation in the survey is entirely voluntary, and they can ignore the URL link or withdraw from participation at any time while completing the responses and before the submission of the final responses. Furthermore, the researcher assured that if the participants find difficulties or issues regarding the understanding of the survey items, they can inquire directly with the researcher by a phone call or email.

Regarding confidentiality, the researcher assured that all the information that the potential participants of this research provide are anonymised and confidential according to ethical research guidelines and principles of the University of Huddersfield and the Data Protection Act 1998. Concerning the privacy considerations, the participants were informed that the data collected will be securely stored at the University and accessible only to the relevant researcher and supervisors for academic purposes. They also informed that the data collected may be published in proceedings of national/international conferences and/or academic journals.

## **Chapter Summary**

In summary, this chapter highlighted the philosophical assumptions of the current research, including the ontological and epistemological positions. Besides, it presented the research

methodology and the research design used in this research, including the research design approach, research type, research strategy. In addition, this chapter discussed in detail the research methods applied in the empirical study, including developing the research instrument, the population and sampling procedure, the data collection procedure and the data analysis techniques used in the research. Furthermore, it discussed the ethical considerations of the current research. Chapter 6 reports the data analysis procedure and the empirical findings.

## **Chapter 6 Data Analysis and Empirical Findings**

### **6.1 Introduction**

After discussing the development of the research model in Chapter 4 and the research methodology in Chapter 5, this chapter discusses the empirical results of the current study. It begins with data preparation in section 6.2, which includes editing and coding of the data, data screening including missing data, outliers, normality and common method bias. Chapter 6 then continues with preliminary data analysis in section 6.3, including the descriptive statistics and sample characteristics. Section 6.4 summarizes the results of the measurement model assessment followed by the assessment of the structural model in section 6.5. Since one of the objectives of this research is to assess the mediating effect of trust on customer satisfaction, a mediation effect analysis is conducted and presented in section 6.6. Finally, this chapter ends with a summary of the chapter.

### **6.2 Data Preparation**

The first procedure of the data analysis is the preparing and describing of the research data. This stage involves coding and editing data and data screening (Aguinis, Gottfredson, & Joo, 2013). Using the BOS online survey, the data were entered automatically into the system. After that, the data were coded and edited to ensure that data are accurate, as elaborated in the next section. Once the data coding and editing step was completed, the data were subjected to further screening investigations regarding missing data and suspicious and other issues that could affect the validity of data before conducting the SEM analysis. The following subsections report and discuss the steps of data preparation.

#### **6.2.1 Data Editing and Coding**

Before the data analysis procedure, it is essential to edit and code the raw data to ensure that data are rigorous and consistent with the purpose of the questions in the survey (Cooper,

Schindler, & Sun, 2006). In addition, editing data guarantees that data are completed and organised to classifying the data, simplifying coding and detecting missing data (Hair, et al., 2017). In the current research, all the online survey responses were stored in the BOS survey server. This helps to review and download the responses at any time. Also, the data can be exported to other software to conduct further analysis, such as Microsoft Excel or SPSS. When the required number of responses were achieved, the data were exported from the server in the form of an Excel sheet for further analysis. The default format of the source data offered by the BOS survey is .xlsx which must be converted into csv format (comma delimited), which is the format required by SmartPLS software (the software used in this research to analyse the data).

The aim of the coding procedure is to assign numbers to the answers into the survey questions. This process enables grouping the answers into numbers of categories. In the current research, each question (item) in the questionnaire was assigned to its latent variable. The answers of the questions in the excel file were coded into numbers from 1 to 7 according to the answers in the questionnaire (from strongly disagree to strongly agree) to simplify the data analysis process. After coding the data file, it was imported to the SmartPLS software to perform the data analysis procedure.

### **6.2.2 Data Screening**

After coding and editing the data, the next stage is screening the data. This section discusses the tests that were conducted to verify the collected data regarding its completion and validation (Hair et al., 2018). This procedure is essential to justify the selection of the structural equation modelling SEM as the data analysis technique in this research (Hair et al., 2017). This stage includes investigating the existence of missing data, inspecting potential suspicious responses, evaluating outliers, assessing normality and examining common method bias.

### 6.2.2.1 Assessment of Missing Data

Investigating missing data is crucial in survey-based research because missing data threatens the validity and raises potential bias in the collected data (Hair et al., 2018). Missing data describes the values that have not been completed or have been omitted by the participants (Hair et al., 2018). In the current research, there was no necessity to conduct missing data analysis as the data were collected using the BOS online survey technique. This software enables the researcher to design all questions as required questions in the system. Therefore, the respondents must answer all questions before moving to the next page or submitting the survey. As shown in table 6.1, out of 659 responses, there were no missing values among all the questionnaire items.

**Table 6. 1 Missing data and normality assessments for the research variables**

Indicators	N	Missing Values	Kurtosis	Skewness
SYS1	659	0.000	8.320	-2.249
SYS2	659	0.000	5.336	-1.751
SYS3	659	0.000	3.947	-1.601
SYS4	659	0.000	2.810	-1.500
INF1	659	0.000	2.378	-1.292
INF2	659	0.000	1.098	-1.104
INF3	659	0.000	2.801	-1.202
INF4	659	0.000	1.889	-1.253
SEV1	659	0.000	1.933	-1.239
SEV2	659	0.000	4.448	-1.827
SEV3	659	0.000	0.695	-0.885
SEV4	659	0.000	2.002	-1.251
TSK1	659	0.000	4.474	-1.856
TSK2	659	0.000	6.927	-2.109
TSK3	659	0.000	9.386	-2.387
SA1	659	0.000	0.713	-0.983
SA2	659	0.000	0.147	-0.822
SA3	659	0.000	0.685	-0.892
TRU1	659	0.000	0.841	-0.932
TRU2	659	0.000	2.240	-1.247
TRU3	659	0.000	1.692	-1.213
TRU4	659	0.000	1.906	-1.197
TRU5	659	0.000	2.558	-1.381
SAT1	659	0.000	3.529	-1.494
SAT2	659	0.000	4.255	-1.700
SAT3	659	0.000	1.954	-1.254

SAT4	659	0.000	2.541	-1.346
SAT5	659	0.000	3.522	-1.558

### 6.2.2.2 Suspicious Response Patterns

It is important to investigate the response patterns of all questions in the survey before conducting the main data analysis (Hair et al., 2017) After coding the answers of the questionnaire, a total of 683 responses were scrutinised for invalid data. Although all questions in the questionnaire were highlighted as (required) to be answered before submitting the survey, 24 responses were found to be invalid for the following reasons:

1-(6 responses) have straight lining patterns as respondents selected the same answers for all questions (e.g., the respondent answered (1) for all asked questions).

2-(2 responses) have diagonal lining patterns.

3-(16 responses) answered that they do not use MB for question number 29, which asks the respondents about their experience with MB. Therefore, these responses had to be removed from the data file. The researcher included the choice (I do not use mobile banking) in this question to target only MB customers and ensure that every respondent has experience with MB.

After performing the data screening, a total of 659 responses were valid to perform the data analysis process.

### 6.2.2.3 Assessment of Outliers

Examining outliers is an essential step in the data analysis procedure. Outliers can be problematic because ignoring the initial investigation of outliers can distort the statistical analysis of the data if the data set contains outliers (Hair et al., 2018). An outlier refers to an extreme data point different from the other values in the data set (Aguinis et al., 2013). There is a range of causes that can lead to outliers in the data. For example, outliers can occur due to



variation in the measurement, data entry errors or sampling errors. It can also occur as a result of experimental errors, which should be excluded from the data set (Iacobucci & Churchill, 2010). Outliers can be univariate or multivariate, depending on the focus of the detection. Univariate outliers have extreme scores on a single variable, while multivariate outliers have extreme scores on multiple variables (Tabachnick & Fidell, 2014).

To detect outliers issues, there are some common methods such as minimum covariance determinant (MCD), Mahalanobis Distance and invariant coordinate selection (ICS) (Bollen & Jackman, 1985). The current research followed the Mahalanobis distance values method, which was recommended by Tabachnick and Fidell (2014) to handle outliers issues. Mahalanobis distance refers to a multivariate distance metric, which measures the distance between a specific point and a distribution in multivariate space (Tabachnick & Fidell, 2014). In the present research, The Mahalanobis distance method was performed using the Mahalanobis D2 analysis in the IBM SPSS version 26. Mahalanobis D2 values were calculated through the linear regression technique. Any observation with Mahalanobis D2 value significant at 0.001 was considered an outlier (Tabachnick & Fidell, 2014). After conducting the outliers detection assessment, it can be concluded that there are no outliers problems in the data distribution in this research.

#### **6.2.2.4 Assessment of Normality**

Normality assumption evaluation is one of the key aspects when using multivariate data analysis techniques, including structural equation modelling SEM (Henseler et al., 2009). Normality refers to the form of a data distribution for a single variable in comparison to the normal distribution used as a benchmark for statistical techniques (Hair et al., 2018). In this research, Normality was tested using the skewness and kurtosis benchmark. According to Hair et al. (2018), skewness and kurtosis values that are close to zero, are considered to be normally

distributed. In addition, if the skewness of the data is between -2 and +2, and the kurtosis is between -7 and +7, the data is considered normal.

As displayed in table 6.1, there are some measures of the latent variables in this research have non-normality issues. These items are SYS1, TSK2 and TSK3. This deviation from the normality assumption provides further support for the use of PLS-SEM as it is a non-parametric statistical mean that does not require normal distribution of the data contrary to the covariance-based structural equation modelling CB-SEM (Henseler et al., 2009).

#### **6.2.2.5 Assessment of Common Method Bias**

The data was examined for potential common method bias as the final step in the data screening stage. Common method variance bias refers to “variance that is attributable to the measurement method rather than to the constructs the measures are assumed to represent” (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, p. 879). Common method bias can be problematic for validating the research model as it can cause inflation or deflation of the relationships between constructs in the research model (Chang, Van Witteloostuijn, & Eden, 2010). Besides, it is one of the critical issues that needs to be considered in quantitative research, particularly the self-reported questionnaire with Likert scales (Podsakoff & Organ, 1986).

Several approaches have been suggested to detect and remedy any possible common method bias. According to (Podsakoff et al., 2003), there are three techniques that can be applied to control method biases as follows:

1-the use of multiple sources to collect measures for the predictors and dependent variables that can be used to examine the research model.

2-The use of several procedural remedies to design and administrate the research instrument in terms of wording and formatting the questions.

3-The use of several statistical remedies such as Harman's single-factor test to control the potential impacts of common method variance on the research results.

In the current research, the first two remedies of common method bias were implemented before the data collection stage. First, as discussed in chapter 5 section 5.5.1.3, all the measures of the latent variables were adopted from multiple sources that were validated in peer-reviewed journals and had a high level of reliability. Second, as discussed in chapter 5 section 5.5.1.2, the design and development of the research questionnaire were conducted by following the systematic approach suggested by (Iacobucci & Churchill, 2010). Using this guideline helps in handling every step in the questionnaire design, from defining the information that will be pursued to Pre-testing the survey, revising if necessary.

The statistical remedies, on the other hand, were used after measuring the variables in the study. The present research used Harman's single-factor test, which requires entering all the study indicators into a factor analysis (Jarvis et al., 2003). Then, investigate the results to determine the potential method bias by checking the unrotated first factor, which should be less than 50%. This indicates that no common method variance bias issues exist.

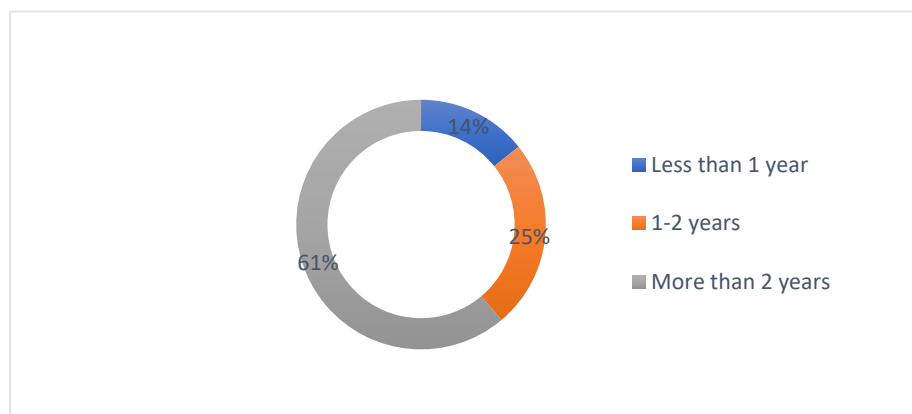
Podsakoff and Organ (1986) argue that common method bias is problematic when a single factor accounts for the majority of the explained variance. In this research, all the data related items (measures) were imported into IBM SPSS version 26 to conduct an exploratory factor analysis (EFA) by employing principal axis factoring. The test of the unrotated factor analysis of the 28 measures (items) in the questionnaire revealed that one factor explained approximately 42% of the total variance, and all other factors accounted for less than 7%. This indicates that common method bias is not problematic in this research for applying structural equation modelling SEM.

### 6.3 Descriptive Statistics

This section reports and discusses the results of the experience and demographic variables in the research. Also, it summarises the descriptive statistics analysis of the data.

#### 6.3.1 Descriptive Analysis of the Experience and Demographic Variables

The objective of this research is to investigate trust and satisfaction of the current MB customers in Libya. Therefore, the patterns of customer experience, frequency of use and the most used services through MB were observed. The main aim of these inquiries is to omit observations that do not have any experience with MB. Besides, investigating customer experience can provide an insight into the adoption and usage of MB services in the research context. In the study survey, MB customers were asked about their MB use history in years, their frequency of use of MB, and the most used MB services. According to the usage history, figure 6.1 and table 6.2 show that the largest group of participants have more than 2 years of MB experience (61%, n=403) followed by 1-2 years (25%, n=162). The MB customers with the lowest experience were less than one year (14%, n=94). As discussed in section 6.2.2.2, the respondents who do not have any experience with MB (16 respondents) were omitted from the collected data in the data screening stage.

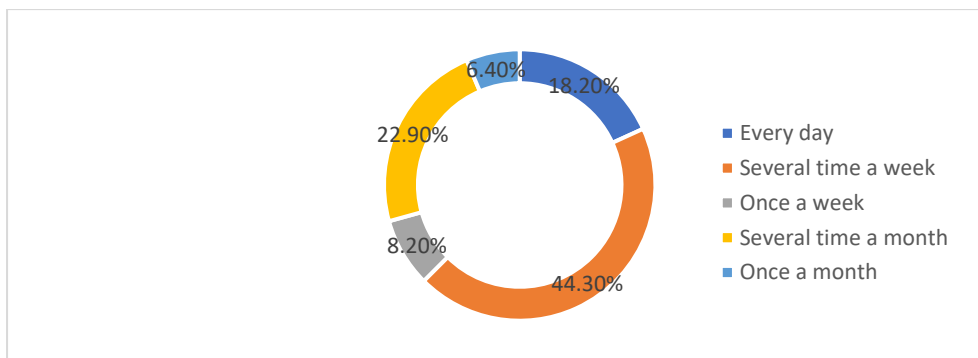


**Figure 6. 1 MB experience of the respondents**

**Table 6. 2 MB Experience of the respondents**

Experience	Frequency
Less than one year	94
1-2 years	162
More than 2 years	403
Total	659

Concerning the frequency of MB usage, figure 6.2 and table 6.3 display that respondents who use MB services several times a week had the highest representation in the data (44.3%, n=292) followed by several times a month (22.9%, n=151), every day (18.2%, n=120), once a week (8.2%, n=54) and once a month (6.4%, n=42).



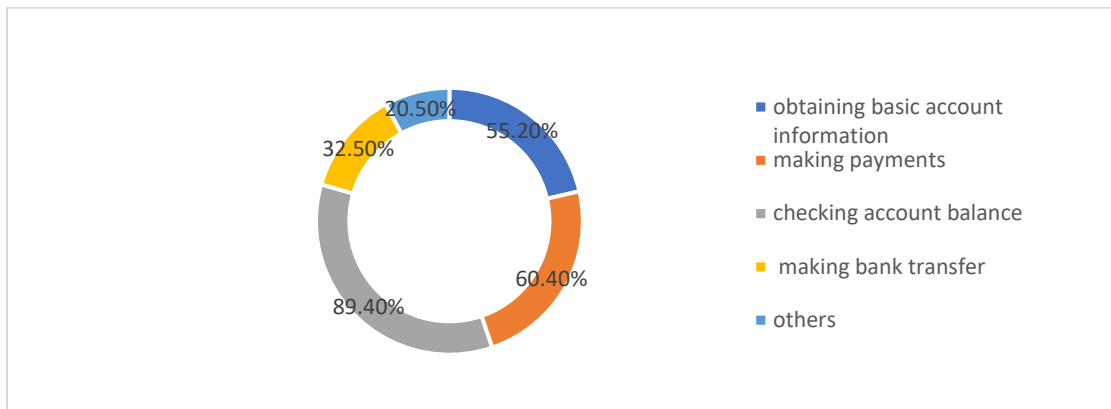
**Figure 6. 2 Frequency use of MB**

**Table 6. 3 Frequency of MB use**

Frequency of Use	Frequency
Every day	120
Several times a week	292
Once a week	54
Several times a month	151
Once a month	42
Total	659

Regarding the most used banking services through MB, as presented in figure 6.3 and table 6.4, checking account balance was the most used service (89.4%, n=589). The second most used service was making online payments (60.4%, n=398) followed by obtaining basic account information (55.2%, n=364). Only (32.5%, n=214) of respondents said that they use MB to

make bank transfers. In addition, (20.5%, n=135) of respondents indicated that they use other services through MB.

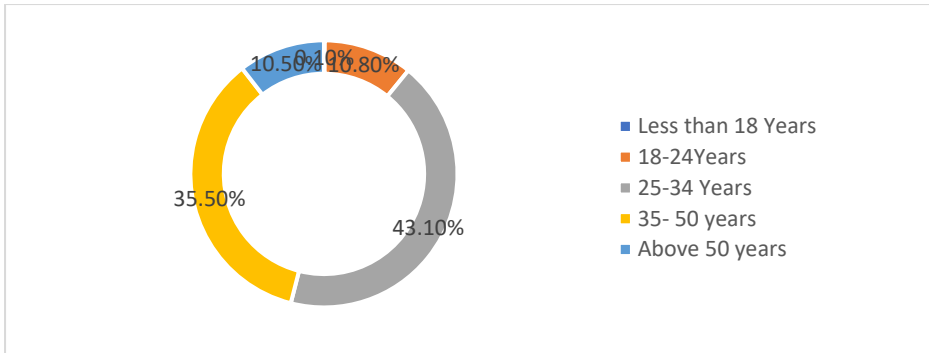


**Figure 6. 3 Most used MB services**

**Table 6. 4 Most used services through MB**

Most used services through MB	Frequency
Basic account information	364
Making online payments	398
Checking account balance	589
Making bank transfer	214
Other	135

**The demographic variables** considered in the current research are age, gender, education and occupation. Firstly, the age distribution is depicted in figure 6.4 and table 6.5. Out of 659 participants in the research sample, the age group (25-34 years) was the most represented (43.1%, n=284) followed by 35-50 years (35.5%, n= 234), 18-24Years (10.8%, n=71) and above 50 years (10.5%, n=69). The age group less than 18 years had only (0.1%, n=1) represented the least age group in the sample.

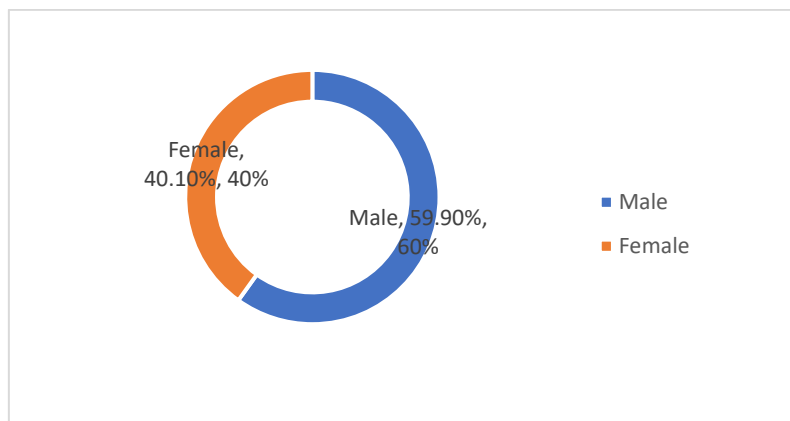


**Figure 6. 4 Age of the respondents**

**Table 6. 5 Respondents' ages**

Age	Frequency
Less than 18 Years	1
18-24Years	71
25-34 Years	284
35- 50 years	234
Above 50 Years	69
Total	659

Secondly, concerning gender distribution in the research sample, figure 6.5 and table 6.6 exhibit that there were (59.9%, n=395) male respondents and (40.1%, n=264) female respondents in the research sample.

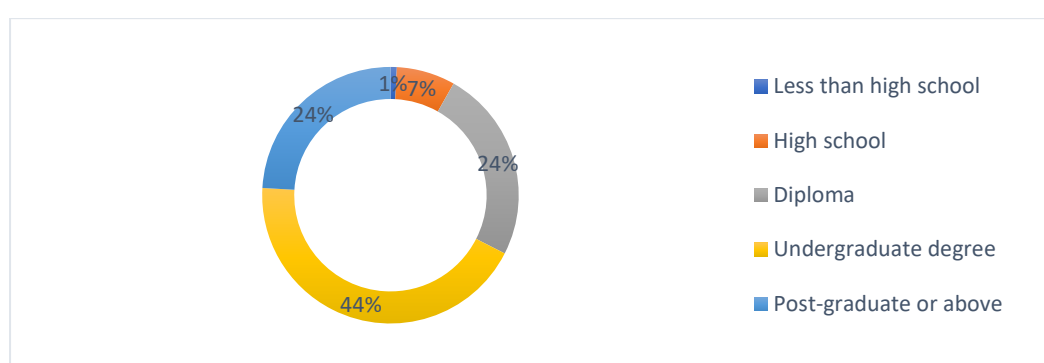


**Figure 6. 5 Gender of the respondents**

**Table 6. 6 Respondents' gender**

Gender	Frequency
Male	395
Female	264
Total	659

Thirdly, regarding the level of education of the respondents, figure 6.6 and table 6.7 show that respondents who with undergraduate degrees had the highest representation in the sample (44%, n=286). This group is followed by diploma group and post-graduate or above which had almost the same representation with (24.3%, n=160) and (24.1%, n=159) respectively. There were (7.4%, n=49) respondents with high school and the lowest representation was the education group less than high school (0.8%, n=5).



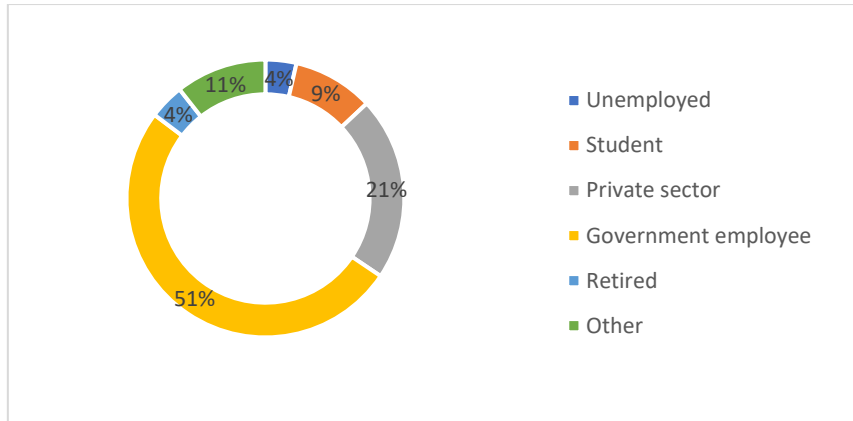
**Figure 6. 6 Education level of the respondents**

**Table 6. 7 Education level of the respondents**

Education	Frequency
Less than high school	5
High school	49
Diploma	160
Undergraduate degree	286
Post-graduate or above	159
Total	659

Finally, the occupation distribution of the respondents is shown in figure 6.7 and table 6.8. The largest group of respondents was government employees (50.8%, n=335) followed by the private sector (21.4%, n=141), others (10.6% n=70), students (9.4%, n=62), retired (4.1%, n=27) and unemployed (3.6%, n=24). It is worth noting that 77 per cent of Libyans are employed in the public sector because of the structure of the Libyan economy and are thus regarded as public employees (The World Bank, 2016).





**Figure 6. 7 Occupation of the respondents**

**Table 6. 8 Occupation of the respondents**

Education	Frequency
Unemployed	24
Student	62
Private sector	141
Government employee	335
Retired	27
Other	70
Total	659

### 6.3.2 Descriptive Statistics Analysis of the Latent Variables

Before conducting the measurement and structural model assessments, producing descriptive statistics is important for research as it enables researchers to present the raw data in a more meaningful way (Lancaster et al., 2004). This allows summarising a large amount of data and simplifying the interpretation of the data (Bell et al., 2018). The descriptive statistics of the latent variables in this research were analysed by calculating means and standard deviation on a 7-point Likert scale of each latent variable. This analysis was conducted by running the algorithm procedure in SmartPLS 3. Table 6.9 shows the descriptive statistics of the research sample.

**Table 6. 9 Results of descriptive statistics analysis of the research sample**

Construct	Indicators	N	Minimum	Maximum	Mean	Standard Deviation
System Quality	SYS1	659	1	7	6.266	0.937
	SYS2	659	1	7	5.973	0.962
	SYS3	659	1	7	5.889	1.037
	SYS4	659	1	7	5.637	1.208
Information Quality	INF1	659	1	7	5.643	1.193
	INF2	659	1	7	5.372	1.297
	INF3	659	1	7	5.616	1.071
	INF4	659	1	7	5.728	1.175
Service quality	SEV1	659	1	7	5.584	1.169
	SEV2	659	1	7	5.983	1.139
	SEV3	659	1	7	5.168	1.330
	SEV4	659	1	7	5.604	1.155
Task Characteristics	TSK1	659	1	7	5.976	1.212
	TSK2	659	1	7	6.206	0.993
	TSK3	659	1	7	6.351	0.871
Structural Assurance	SA1	659	1	7	5.266	1.345
	SA2	659	1	7	4.965	1.473
	SA3	659	1	7	5.129	1.360
Trust	TRU1	659	1	7	5.263	1.310
	TRU2	659	1	7	5.555	1.134
	TRU3	659	1	7	5.527	1.202
	TRU4	659	1	7	5.448	1.187
	TRU5	659	1	7	5.601	1.179
Customer Satisfaction	SAT1	659	1	7	5.985	1.036
	SAT2	659	1	7	5.992	1.062
	SAT3	659	1	7	5.507	1.259
	SAT4	659	1	7	5.530	1.225
	SAT5	659	1	7	5.747	1.153

#### 6.4 Assessment of the Reflective Measurement Model

Having discussed the methods used to prepare and specify the measurement model in chapter 5 (section 5.5.4.5.1), this section illustrates the evaluation of the reflective measurement model and reports the assessment results. The estimation of the measurement model presents empirical examinations of the relationships between the constructs in the conceptual model and their indicators (items) (Hair et al., 2019). As mentioned, the proposed conceptual model for the present research is assessed using structural equation modelling with partial least squares PLS-SEM. In order to perform the data analysis, this research used the SmartPLS 3.0 software,

a professional statistical software with a graphical user interface. This software enables users to assess the psychometric properties of the measurement model and test the PLS path model with latent variables (Hair et al., 2017).

As discussed in chapter 5, the assessment of the reflective measurement model in this research includes the following tests:

1-Internal consistency reliability.

2-Individual item reliability (indicator reliability).

3-Convergent validity.

4-Discriminant validity.

These analyses can be performed in the SmartPLS software using the algorithm procedure. The software enables the researcher to import the data and to draw the research model (see figure 6.8), and then link each construct with its items in order to conduct the measurement model assessment. The following subsections discuss the results of each criterion used to assess the reliability and validity of the reflective measurement model of the present research based on the procedures discussed in Chapter 5 (see Section 5.5.4.5.1).



**Table 6. 10 Results of composite reliability (CR), Cronbach's alpha and average variance extracted (AVE)**

Constructs	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
System Quality	0.787	0.859	0.605
Information Quality	0.852	0.900	0.692
Service Quality	0.813	0.877	0.641
Task Characteristics	0.802	0.884	0.717
Structural Assurance	0.882	0.927	0.809
Trust	0.868	0.905	0.656
Customer Satisfaction	0.914	0.936	0.746

#### **6.4.2 Individual Item Reliability**

In PLS-SEM, the evaluation of the indicator reliability of the reflective measurement model is performed using the outer (indicator) loadings criterion. According to the results in Table 6. 11, the loadings of all indicators on their allocated constructs are greater than the recommended threshold of (0.7), ranging from 0. 703 (SYS1) to 0. 906 (SA3) (Sarstedt et al., 2014). These results reveal that all indicators utilised in the research model demonstrate acceptable indicator reliability (Hair et al., 2019).

**Table 6. 11 Results of Individual Item Reliability (indicator loadings criterion)**

Items	System Quality	Information Quality	Service Quality	Task Characteristics	Structural Assurance	Trust	Customer Satisfaction
SYS1	0.703						
SYS2	0.768						
SYS3	0.819						
SYS4	0.815						
INF1		0.827					
INF2		0.834					
INF3		0.820					
INF4		0.848					
SEV1			0.792				
SEV2			0.821				
SEV3			0.850				
SEV4			0.735				
TSK1				0.856			
TSK2				0.891			
TSK3				0.790			
SA1					0.887		
SA2					0.905		
SA3					0.906		
TRU1						0.825	
TRU2						0.747	
TRU3						0.859	
TRU4						0.768	
TRU5						0.845	
SAT1							0.811
SAT2							0.841
SAT3							0.878
SAT4							0.891
SAT5							0.894

**6.4.3 Convergent Validity**

The convergent validity of the reflective measurement model can be examined in PLS-SEM using the average variance extracted (AVE) criterion. The AVE values of the constructs were generated through the algorithm routine in SmartPLS. In order to establish an adequate convergent validity, the average variance extracted (AVE) values for all the constructs must be 0.5 or higher (Fornell & Larcker, 1981). As presented in table 6.10, all AVE values ranged from 0.605 to 0.809, exceeding the acceptable threshold (0.5). This indicates that each

construct in the measurement model accounts for more than 50% of the variance in its indicators (Hair et al., 2019).

#### **6.4.4 Discriminant validity**

For the purpose of estimating the discriminant validity of the reflective measurement model in this research, there are two traditional criteria dominantly used in PLS-SEM, namely: The Cross-loadings and the Fornell and Larcker (Hair et al., 2017). However, as discussed in chapter 5, these two criteria are insufficient for detecting discriminant validity issues. (Henseler et al., 2015). Therefore, in addition to these two criteria, this research employed the heterotrait–monotrait ratio (HTMT) criterion, which was proposed by Henseler et al. (2015). This criterion has demonstrated strong ability in assessing the discriminant validity (Hair et al., 2019).

For the cross-loading criterion, the measurement model can show a satisfactory discriminant validity if the loadings of indicators are more significant against their assigned construct than the other constructs in the model (Chin, 1998b). Table 6.12 depicts the results of cross loading between constructs and indicators. The results indicate that the indicators' loadings on each allocated construct are substantially larger than their loadings on all other constructs. This means that each construct's indicators test only that construct and not any others. (Hair et al., 2019).

**Table 6. 12 Results of the Cross Loading criterion Criterion**

indicators	Information Quality	Structural Assurance	Satisfaction	Services Quality	System Quality	Trust	Task Characteristics
INF1	<b>0.836</b>	0.344	0.510	0.533	0.421	0.499	0.261
INF2	<b>0.829</b>	0.409	0.488	0.569	0.461	0.479	0.271
INF3	<b>0.819</b>	0.361	0.529	0.581	0.482	0.509	0.249
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	0.546	0.517	0.615	0.564	0.507	<b>0.752</b>	0.425
TRU3	0.512	0.663	0.599	0.573	0.417	<b>0.868</b>	0.361
TRU4	0.427	0.503	0.564	0.531	0.458	<b>0.778</b>	0.401
TRU5	0.493	0.631	0.682	0.522	0.503	<b>0.861</b>	0.462
TSK1	0.241	0.404	0.415	0.382	0.334	0.445	<b>0.861</b>
TSK2	0.317	0.368	0.458	0.383	0.411	0.446	<b>0.894</b>
TSK3	0.311	0.273	0.381	0.292	0.322	0.374	<b>0.801</b>

The second criterion of the discriminant validity assessment is examining the Fornell and Larcker criterion. According to this criterion, the reflective measurement model can establish an acceptable discriminant validity when the square root of the average variance extracted AVE of each construct overtakes the squared correlations between the construct and all other constructs in the model (Hair et al., 2014). The bolded values in table 6.13 represent the square roots of the average variance extracted AVE, and the other values represent the intercorrelation among constructs. As shown in table 6.13, the square root of (AVE) of each construct has a greater value than all off-diagonal values, which reflect correlations with other constructs in



the model. These results indicate that every construct adequately explains the variance of its indicators better than that of the other structures (Hair et al., 2017).

**Table 6. 13 Results of the Fornell and Larcker criterion**

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

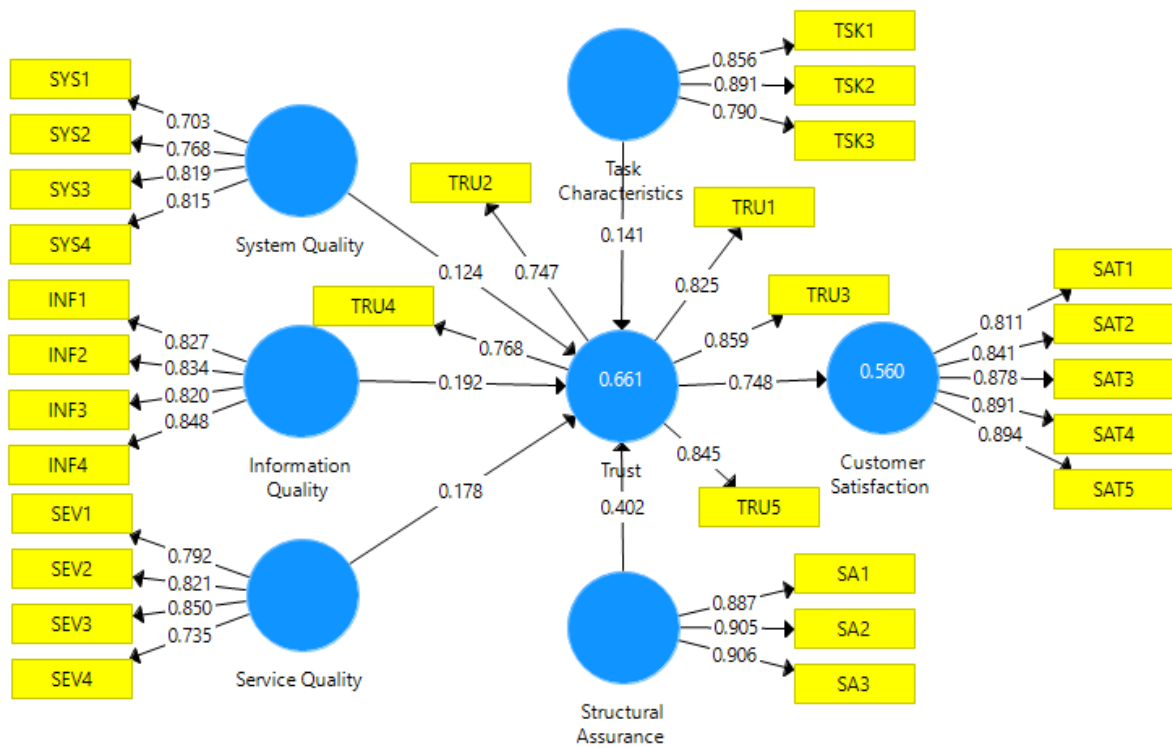
The third criterion used in this research to assess the discriminant validity of the reflective measurement model is the heterotrait–monotrait ratio (HTMT). In general, in order to establish discriminant validity using this criterion, the average correlations of the indicators across constructs should not be close to one (Franke & Sarstedt, 2019). The threshold used in this study is 0.90, as suggested by Henseler et al. (2015). According to Table 6.14, the HTMT ratios for each pair of constructs ranged between 0.398 (task characteristics, information quality) and 0.829 (trust, satisfaction). Therefore, all HTMT ratios are less than 0.90, indicating that there are no issues with discriminant validity (Henseler et al., 2015).

**Table 6. 14 Results of the heterotrait–monotrait ratio (HTMT) criterion.**

Construct	Customer Satisfaction	Information Quality	Service Quality	Structural Assurance	System Quality	Task Characteristics	Trust
Customer Satisfaction							
Information Quality	0.700						
Service Quality	0.704	0.836					
Structural Assurance	0.634	0.523	0.691				
System Quality	0.702	0.672	0.711	0.499			
Task Characteristics	0.568	0.398	0.514	0.481	0.501		
Trust	0.829	0.714	0.812	0.805	0.663	0.592	

#### **6.4.5 Final Reflective Measurement Model**

Based on the findings reported in sections 6.4.1 to 6.4.4, the reflective measurement model of the present research demonstrates satisfying reliability and validity. Figure 6.9 illustrates the measurement model with loadings of indicators on its assigned constructs. All the recommended reliability and validity assessments are established, which indicates that the measurement model for this research is valid and robust to be utilised to assess the structural model, test hypotheses and evaluate the mediation effect.



**Figure 6. 9 The final reflective measurement model**

## 6.5 Assessment of the Structural Model

Following the assessment of the reflective measurement model's reliability and validity, this section summarizes the results of the data analysis, with a focus on the evaluation of the structural model using the guidelines suggested by (Hair et al., 2017) (as discussed in the section 5.5.4.5.2). The assessment of the structural model includes the following tests: collinearity assessment, path coefficient, coefficient of determination ( $R^2$ ), effect size ( $F^2$ ), predictive relevance ( $Q^2$ ) and out-of-sample predictive power. The assessment then ends with testing the hypotheses regarding the mediation effect of trust between the independent variables in the research model and customer satisfaction using the guidelines proposed by (Zhao et al., 2010).

### 6.5.1 Assessment of Collinearity Level

The first step in evaluating the structural model is to ensure that all the predictor constructs in the model do not include significant levels of collinearity. As discussed in section (5.5.4.5.2.1),

the threshold of this test is 5 (Hair et al., 2017). Therefore, the Variance inflation factor (VIF) values must be less than 5, and the ideal collinearity level is when the VIF value is less than 3. When performing the PLS algorithm procedure in SmartPLS, table 6.15 and table 6.16 show that all the VIF values are between 1.525 and 2.647 for the indicator (outer) level and between 1 and 2.551 for the construct (inner) level. Thus, all the (VIF) values are below the recommended threshold. This established that no evidence of multicollinearity exists and that the model's path coefficients are not biased (Hair et al., 2017).

**Table 6. 15 Results of collinearity assessment (indicator level)**

Indicators	VIF
SYS1	1.527
SYS2	1.643
SYS3	1.671
SYS4	1.525
INF1	1.998
INF2	2.072
INF3	1.874
INF4	2.020
SEV1	1.618
SEV2	1.783
SEV3	1.928
SEV4	1.516
TSK1	1.804
TSK2	2.100
TSK3	1.561
SA1	2.312
SA2	2.530
SA3	2.586
TRU1	2.079
TRU2	1.609
TRU3	2.647
TRU4	1.728
TRU5	2.455

**Table 6. 16 Results of collinearity assessment (construct level)**

Constructs	VIF
System Quality	1.741
Information Quality	2.137
Service Quality	2.551
Task Characteristics	1.332
Structural Assurance	1.622
Trust	1.000

### **6.5.2 Assessment of Path Coefficients**

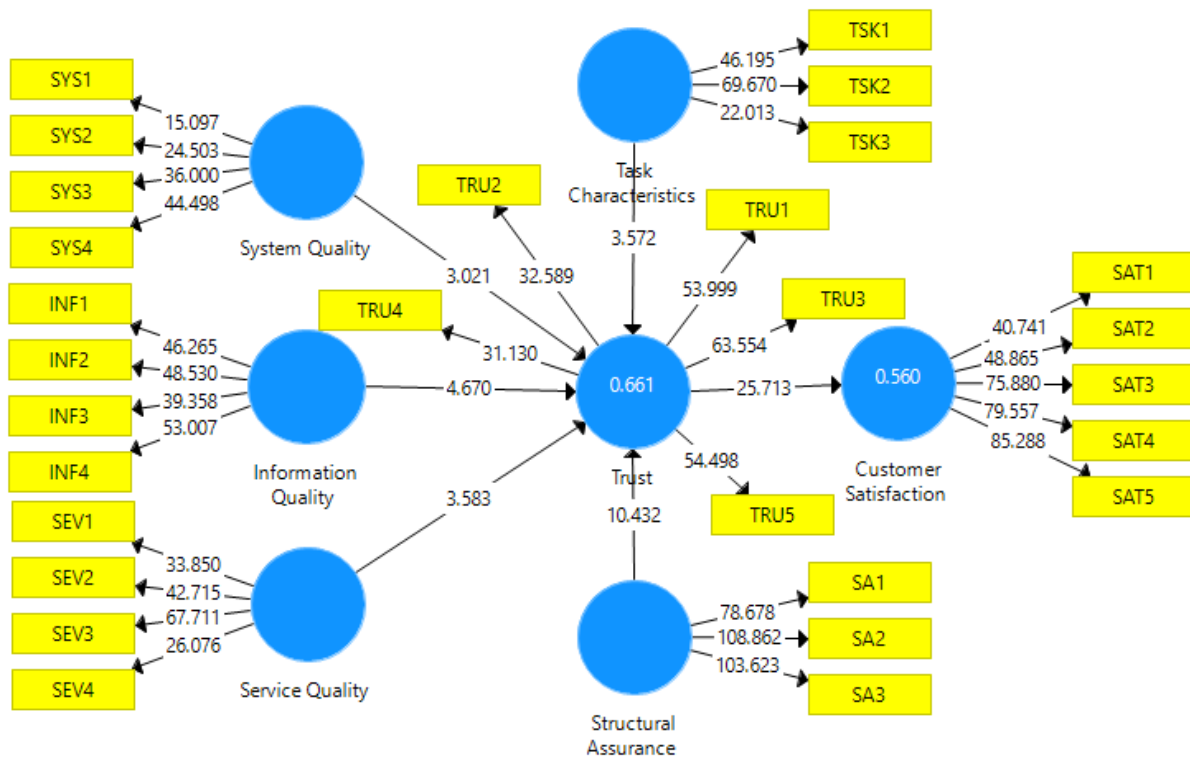
In the structural model, a hypothesised relationship is represented by each path connecting two latent variables. The path coefficient values are standardised between -1 and 1, and the values that are close to 1 are considered an indicator of significant positive relationships and vice versa for significant negative relationships (Hair et al., 2019). Path coefficient examines the significance of the t-value associated with each path among the latent variables in the model (Hair et al., 2017). It enables researchers to confirm or reject the research hypotheses and to understand the strength of the relationships between constructs in the structural model (Chin et al., 2003).

In this study, the path coefficient test was performed in SmartPLS 3 with 5000 subsamples using the Bootstrapping technique. As depicted in table 6.17 and figure 6.10, all the t-values that represent the relationships between the independent and dependent variables are significant at a level of 0.05. According to the evaluation of the path coefficient, the results of testing the hypotheses H1, H2a, H3a, H4a, H5a and H6a were determined. Table 6.18 shows the outcomes of these hypotheses. The other hypotheses (H2b, H3b, H4b, H5b and H6b, which are related to investigating the mediation effect of trust between the independent variables and user satisfaction are illustrated in section 6.6 regarding the mediation effect analysis.

**Table 6. 17 Results of path coefficient, T-statistics and significant level for all paths in the structural model**

Path	Standard Deviation	Path Coefficient ( $\beta$ )	T Statistics	P Values
SYS $\longrightarrow$ TRU	0.043	0.124	3.021	0.003
INF $\longrightarrow$ TRU	0.041	0.192	4.670	0.000
SEV $\longrightarrow$ TRU	0.050	0.178	3.583	0.000
TSK $\longrightarrow$ TRU	0.039	0.141	3.572	0.000
SA $\longrightarrow$ TRU	0.039	0.402	10.432	0.000
TRU $\longrightarrow$ SAT	0.029	0.748	25.713	0.000

\*Significant at 0.05 level; \*\* Significant at 0.01 level; \*\*\* Significant at 0.001 level  
 SYS: system quality, INF: information quality, SEV: service quality, TSK: task characteristics, SA: structural assurance, TRU: trust, SAT: customer satisfaction.



**Figure 6. 10 The structural model assessment**

As exhibited in table 6.17 and table 6.18, all proposed hypotheses regarding the relationships between the paths in the structural model are supported. Trust is significantly influenced by system quality ( $\beta=0.124$ ,  $t=3.021$ ,  $p < 0.01$ ), information quality ( $\beta=0.192$ ,  $t=4.670$ ,  $p < 0.001$ ), service quality ( $\beta=0.178$ ,  $t=3.583$ ,  $p < 0.001$ ), task characteristics ( $\beta=0.141$ ,  $t=3.572$ ,  $p < 0.001$ )

and structural assurance ( $\beta=0.402$ ,  $t=10.432$ ,  $p < 0.001$ ). In addition, customer satisfaction is significantly influenced by trust ( $\beta=0.748$ ,  $t=25.713$ ,  $p < 0.001$ ). As a result, hypotheses H1, H2a, H3a, H4a, H5a and H6a are supported.

**Table 6. 18 The results of testing H1, H2a, H3a, H4a, H5a and H6a**

Hypothesis statements		Results
<b>H1</b>	<i>Trust positively influences customer satisfaction within MB.</i>	Supported ***
<b>H2 a</b>	<i>System quality has a positive influence on trust within MB.</i>	Supported **
<b>H3a</b>	<i>Information quality has a positive influence on trust within MB.</i>	Supported ***
<b>H4a</b>	<i>Service Quality has a positive influence on trust within MB.</i>	Supported ***
<b>H5a</b>	<i>Task characteristics has a positive influence on trust within MB.</i>	Supported ***
<b>H6a</b>	<i>Structural assurance has a positive influence on trust within MB.</i>	Supported ***
*Significant at 0.05 level, ** Significant at 0.01 level, *** Significant at 0.001 level		

### 6.5.3 Assessment of Coefficient of Determination ( $R^2$ )

The coefficient of determination ( $R^2$ ) denotes the degree of variability in the endogenous variables that is explained by the exogenous variables (Henseler et al., 2009). As mentioned in section (5.5.4.5.2.3), in general, a larger value of  $R^2$  reflects a strong predictive ability of the structural model. The rule of thumb is that the  $R^2$  value of 0.67 is substantial, the  $R^2$  value of 0.33 is moderate, and the  $R^2$  value of 0.19 is weak (Chin, 1998b). In the structural model of this research, as depicted in figure 6.10, the five independent variables explain 66% of the variance in trust. Meanwhile, trust explains 56% of the variance in user satisfaction. This implies that the structural model of this research has a strong predictive ability.

#### 6.5.4 Assessment of Effect Size ( $F^2$ )

As discussed in section (5.5.4.5.2.4), the effect size  $F^2$  refers to the change in the  $R^2$  value, which can occur as a result of excluding a specific exogenous variable from the structural model (Henseler et al., 2009). The results of the significance of  $F^2$ , as depicted in table 6.19, reveal that of the five predictors of trust, structural assurance is the largest effect size. In addition, the effect size of trust to predict customer satisfaction is high and significant. Although some of the independent variables have a relatively small effect on predicting trust, the results of  $R^2$  indicate that the research model has a strong ability to predict the dependent variables (Chin et al., 2003).

**Table 6. 19 Results of effective size ( $F^2$ )**

Construct	Customer Satisfaction	Information Quality	Service Quality	Structural Assurance	System Quality	Task Characteristics	Trust
Customer Satisfaction							
Information Quality							0.051
Service Quality							0.037
Structural Assurance							0.296
System Quality							0.026
Task Characteristics							0.044
Trust	1.274						

#### 6.5.5 Assessment of Predictive Relevance ( $Q^2$ )

As discussed in section (5.5.4.5.2.5),  $Q^2$  values must be above zero to demonstrate that the model has predictive ability (Geisser, 1974). In addition, the rule of thumb is  $Q^2$  values greater than zero, 0.25 and 0.50 represent small, medium and large predictive relevance respectively of the PLS-path model (Hair et al., 2019). Calculating  $Q^2$  values can be performed in SmartPLS 3 using the sample reuse technique, namely the blindfolding procedure (Hair et al., 2017). Table 6.20 shows that all of the  $Q^2$  values are above zero. They are 0.43 for trust and 0.41 for



customer satisfaction, which implies that the structural model of the current research has a high predictive ability (Hair et al., 2019).

**Table 6. 20 Results of predictive relevance test (Q<sup>2</sup>)**

Construct	SSO	SSE	Q <sup>2</sup> (=1-SSE/SSO)
Customer Satisfaction	3295.000	1932.256	0.414
Information Quality	2636.000	2636.000	
Service Quality	2636.000	2636.000	
Structural Assurance	1977.000	1977.000	
System Quality	2636.000	2636.000	
Task Characteristics	1977.000	1977.000	
Trust	3295.000	1889.950	0.426

The structural model in this study proved a high level of explanatory power and in-sample predictive ability. However, it is important to evaluate the out of sample predictive power of the structural model to assess the predictive ability when using the PLS model to predict a new research sample (Shmueli et al., 2019). Thus, the next section discusses the results of the out-of-sample predictive power test.

### 6.5.6 Assessment of Out-of-Sample Predictive Power

As mentioned in section (5.5.4.5.2.6) on estimating PLS predict, it is important to measure how well the PLS structural model predicts out-of-sample observations in addition to examining R<sup>2</sup> and Q<sup>2</sup> (Shmueli et al., 2019). Assessing the out-of-sample predictive power can be conducted in SmartPLS 3 using the PLS predict technique. This study utilised PLS predict with 10 folds to generate prediction statistics (RSME and MAE) for all indicators of the endogenous variables in the PLS path model and the linear model (LM).

By testing the Q<sup>2</sup> predict statistic in SmartPLS 3, the first step (condition) in using the PLS Predict technique is ensuring that all endogenous predictions outperform indicator means of the training sample (Shmueli et al., 2019). As illustrated in table 6.21, all Q<sup>2</sup> predict values are greater than zero, indicating that all indicators of endogenous variables exceed the naive

benchmark. After achieving this condition, the next step (condition) is to compare the PLS path model statistics values (RMSE and MAE) with their opposing linear regression model by examining prediction errors.

The following is the suggested guideline for evaluating a model's predictive power (Shmueli et al., 2019):

1-All (RMSE and MAE) values for PLS-SEM are higher than the (RMSE and MAE) values of LM: lacks predictive power.

2-The minority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: low predictive power.

3-The majority of (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: medium predictive power.

4-All (RMSE and MAE) values for PLS-SEM are lower than the (RMSE and MAE) values of LM: high predictive power.

Table 6.2 illustrates that the majority of indicators generated less prediction errors in the PLS-SEM path model. Shmueli et al. (2019), However, suggest that rather than focusing on all endogenous construct indicators, the emphasis should be on the main endogenous construct in the model. The main endogenous construct of the structural model in the current research is customer satisfaction. Thus, based on the results of the PLS Predict test, the structural model of this study demonstrated high predictive power.

**Table 6. 21 PLS Predict test results**

Indicators	PLS Predict			LM Predict		LM-PLS	
	Q <sup>2</sup> Predict	RMSE	MAE	RMSE	MAE	RMSE	MAE
TRU1	0.435	0.984	0.729	0.987	0.732	0.003	0.003
TRU2	0.413	0.859	0.631	0.874	0.644	0.015	0.013
TRU3	0.461	0.865	0.647	0.882	0.645	0.017	-0.002
TRU4	0.346	0.961	0.692	0.959	0.705	-0.002	0.013
TRU5	0.464	0.864	0.618	0.862	0.617	-0.002	-0.001
SAT1	0.371	0.813	0.587	0.824	0.604	0.011	0.017
SAT2	0.366	0.825	0.577	0.844	0.599	0.019	0.022
SAT3	0.410	0.964	0.684	0.972	0.703	0.008	0.019
SAT4	0.389	0.936	0.681	0.957	0.704	0.021	0.023
SAT5	0.412	0.884	0.618	0.886	0.626	0.002	0.008

### 6.6 Mediation Effects Analysis

Evaluating the indirect relationships among independent and dependent latent variables is another key assessment of the structural model (Preacher & Hayes, 2008). In this research, the mediation effect analysis is considered in order to achieve the fourth objective regarding the explanation of the mediating effect of trust on MB user satisfaction. This represents a proposed mechanism by which system quality, information quality, service quality, task characteristics and structural assurance influence trust and then causally influence customer satisfaction (Preacher & Hayes, 2008).

In order to assess the mediation effect, this research adopts the approach recently developed by (Zhao et al., 2010). As discussed in chapter 5 section (5.5.4.5.3), the only requirement for establishing a mediation effect is that the indirect effect between the independent variables and the dependent variable through the mediator must be significant (Zhao et al., 2010). In addition, there are three types of mediation (Zhao et al., 2010). Full mediation happens only when the independent variable has a significant effect on the dependent variable only via the mediator. Besides, if the independent variable has significant indirect and direct effects on the dependent variable, the mediation effect can be partial complementary or partial competitive, depending on the sign of the effects. Complementary mediation is used to describe the situation in which both direct and indirect effects point in the same direction (positive). By comparison,

competitive mediation refers to the situation in which the direct effect and one of the indirect effects have opposite signs (negative).

The bootstrapping technique in the SmartPLS 3, a resampling technique that draws a large number of samples from the original sample, was used to test the mediating effect of trust (Hair, et al., 2017). This procedure can automatically generate the direct and indirect effects between latent variables in the structural model. To establish the mediation effect, the first step is to examine the indirect effects of the independent variables in the structural model on user satisfaction via trust. As shown in Table 6.22, all the indirect effects in the model are significant, indicating that trust functions as a mediator between the independent variables and user satisfaction in the structural model. (SYS  $t=2.259$ ,  $p < 0.05$ ), (INF  $t= 3.377$ ,  $p < 0.001$ ), (SEV  $t=2.876$ ,  $p < 0.01$ ), (TSK  $t=3.907$ ,  $p < 0.001$ ) and (SA  $t=5.792$ ,  $p < 0.001$ ).

**Table 6. 22 Results the mediation effect (indirect effect)**

Relationships	T-Value	P-value
SYS → TRU → SAT	2.249	0.024
INF → TRU → SAT	3.377	0.001
SEV → TRU → SAT	2.876	0.002
TSK → TRU → SAT	3.907	0.000
SA → TRU → SAT	5.792	0.000

\*Significant at 0.05 level; \*\* Significant at 0.01 level; \*\*\* Significant at 0.001 level  
 SYS: system quality, INF: information quality, SEV: service quality, TSK: task characteristics, SA: structural assurance, TRU: trust, SAT: customer satisfaction.

To identify the mediation type, the second step in the mediation effect test is to assess the direct effects of the independent variables on user satisfaction. As indicated in table 6.23, three exogenous variables have significant direct effects on customer satisfaction. These variables are: (SYS  $t=3.536$ ,  $p < 0.01$ ), (INF  $t=3.964$ ,  $p < 0.001$ ) and (TSK  $t=3.076$ ,  $p < 0.01$ ). The other

two independent variables in the study model, on the other hand, have no significant direct effects on consumer satisfaction: (SEV  $t= 0.084$ ,  $p > 0.05$ ) and (SA  $t=1.055$ ,  $p > 0.05$ ).

**Table 6. 23 Results the mediation effect (direct effect)**

Direct Relationships		T-values	P-values
SYS	—————▶ SAT	3.536	0.0003
INF	—————▶ SAT	3.964	0.0001
SEV	—————▶ SAT	0.084	0.9319
TSK	—————▶ SAT	3.076	0.0021
SA	—————▶ SAT	1.055	0.2914

\*Significant at 0.05 level; \*\* Significant at 0.01 level; \*\*\* Significant at 0.001 level  
 SYS: system quality, INF: information quality, SEV: service quality, TSK: task characteristics, SA: structural assurance, TRU: trust, SAT: customer satisfaction.

Thus, according to the findings of the mediation effect assessment and the criteria developed by Zhao et al. (2010), trust fully mediates the relationships between (service quality, structural assurance) and customer satisfaction. Furthermore, trust mediates the relationships between (System Quality, Information Quality, and Task Characteristics) and customer satisfaction in a complementary partial mediation.

In section 6.5.2, the hypotheses related to the path relationships in the structural model were tested, which are H1, H2a, H3a, H4a, H5a and H6a. After assessing the mediation effect analysis, the results of testing the other 5 hypotheses related to the mediation effect of trust between the independent variables and customer satisfaction (H2b, H3b, H4b, H5b and H6b) were supported. These results are illustrated in table 6.24.

**Table 6. 24 Results of testing H2b, H3b, H4b, H5b and H6b**

Hypothesis statements		Results
<b>H2b</b>	<i>Trust acts as a mediator between system quality and customer satisfaction within MB.</i>	Supported Partial Mediation (Complementary)
<b>H3b</b>	<i>Trust acts as a mediator between information quality and customer satisfaction within MB.</i>	Supported Partial Mediation (Complementary)
<b>H4b</b>	<i>Trust acts as a mediator between service quality and customer satisfaction within MB.</i>	Supported Full Mediation
<b>H5b</b>	<i>Trust acts as a mediator between task characteristics and customer satisfaction within MB.</i>	Supported Partial Mediation (Complementary)
<b>H6b</b>	<i>Trust acts as a mediator between structural assurance and customer satisfaction within MB.</i>	Supported Full Mediation

### Chapter Summary

The data analysis of this research consisted of two stages. The first stage was the data preparation prior to conducting the structural equation modelling analysis. Preparing the data included editing and coding of the raw data to ensure that the data are rigorous and consistent with the purpose of the questions in the questionnaire. In addition, screening of the data was performed to verify the collected data concerning its completion and validation. This procedure considered investigating missing data, inspecting potential suspicious response, evaluating outliers, assessing normality and examining common method bias. Once these steps were completed, the descriptive analysis of the demographic and experience variables was conducted to observe the patterns of customer experience, frequency of use and the most used services through MB. The analysis also included age, gender, education and occupation of the respondents who participated in the research questionnaire. The first stage of the data analysis ended with an analysis of the descriptive statistics for the latent variables by calculating means and standard deviation on a 7-point Likert scale of each latent variable.

The second stage of the data analysis was the use of PLS-SEM. For the purpose of validation the measurement and structural models, and testing the research hypotheses, the SmartPLS 3 software was used in this research. These procedures were performed in two stages. The reliability and validity of the constructs and their indicators were examined in the first stage of the reflective measurement model assessment. It started with assessing the internal consistency reliability by testing the composite reliability (CR) and Cronbach's alpha values. The findings indicated that the research model has sufficient internal consistency reliability. In addition, the indicator reliability was examined by performing the outer loading analysis, which revealed that all indicators used in the research model demonstrate acceptable indicator reliability.

Furthermore, the convergent validity of the reflective measurement model was examined using the average variance extracted (AVE) criterion. The results showed that each construct in the model interpreted more than 50% of its items' variance and met the threshold of this test. Finally, the discriminant validity was assessed by using three criteria; the Cross-loadings, the Fornell and Larcker and the heterotrait–monotrait ratio (HTMT). The findings indicated that there are no discriminant validity issues. All the constructs were proved to be valid.

The second step was to test the hypothesized structural model using the Bootstrapping procedure in SmartPls 3. All the hypotheses representing the path relationships in the structural model were supported (H1, H2a, H3a, H4a, H5a and H6a). Besides, all the hypotheses representing the mediation effect of trust were supported (H2b, H3b, H4b, H5b and H6b). Moreover, the criteria of R<sup>2</sup>, F<sup>2</sup>, Q<sup>2</sup> were tested to assess the structural model. All these tests demonstrated that the structural model of this research has high explanatory and predictive abilities. Finally, the out-of-sample predictive power of the structural model was assessed by using the PLS Predict technique, which revealed that the model has a high out-of-sample predictive power. The next chapter discusses the findings reported in this chapter to answer the research questions.

## **Chapter 7 Discussion**

### **7.1 Introduction**

The primary goals of this research were to develop a comprehensive conceptual model of the factors that affect trust in MB and to explain the mediating effect of trust in enhancing customer satisfaction with MB. These goals were set against the backdrop of gaps in the current MB literature, specifically the lack of studies that examine trust in the post-adoption stage of MB. In addition, the lack of an explanation of the mediating effect of trust in forming user satisfaction based on a systematic conceptualisation of trust in MB. In achieving these aims, first, this research has conceptualised trust in the post-adoption stage of MB based on the trust concept in e-commerce. Second, this study has identified the key factors that influence customer trust in MB, and in turn, customer satisfaction. Third, this research has also investigated the most used theories in the fields of information systems and e-commerce. This investigation has led the researcher to adopt the information system success model (DeLone & McLean, 2003) as a theoretical underpinning of the conceptual framework of this study.

An online survey questionnaire was developed to gather MB customers' perceptions regarding the characteristics of MB, and privacy and security issues that affect customer trust and satisfaction. To examine the proposed research model and address the research questions, the data was then analysed using structural equation modelling with partial least square PLS-SEM technique. The data analysis has led to testing the eleven research hypotheses concerning the factors affecting trust in the post-adoption stage of MB and the analysis of trust as a mediating factor affecting user satisfaction. In alignment with the findings of this research reported in chapter 6, this chapter aims to discuss the research findings and compare them with the findings in the existing MB literature, and to interpret and explain the differences.



## 7.2 Overview of the research problem, Aim, Objectives, Questions and Hypotheses

Prior to discussing and analysing the research findings, it is important to revisit and link the research problem, aim, objectives, research questions, and hypotheses. Table 7.1 depicts a summary of these elements.

**Table 7. 1 Overview of the research problem, aim, objectives, questions and hypotheses**

<p><b>Research Problem</b></p> <p>The statistics and existing MB literature indicate that the use of MB may be considered unsatisfactory. The reasons behind this can be related to customers’ perceptions concerning the MB characteristics, such as the quality aspects of the MB and the support they can gain from their bank through MB. In addition, customers’ concerns regarding privacy and security issues in the MB system.</p>	
<p><b>Research Aim and Objectives</b></p> <p>The present study mainly aims to expand the body of knowledge in the fields of information systems and e-commerce by reviewing the current literature and draws on the information systems success model (DeLone &amp; McLean, 2003) to sheds light on the factors influencing trust and satisfaction of the current users of MB. To fulfil this aim, these specific objectives are pursued:</p> <p><b>Objective 1.</b> To extend the understanding of trust concept in MB by systematically reviewing the literature that has investigated trust in the e-commerce context in order to conceptualise trust in the MB context.</p> <p><b>Objective 2.</b> To examine the influence of trust on customer satisfaction with MB.</p> <p><b>Objective 3.</b> To identify the factors which influence user trust in MB.</p> <p><b>Objective 4.</b> To explain the mediating effect of trust on customer satisfaction with MB.</p> <p><b>Objective 5.</b> To empirically validate the proposed model in an economically developing country, i.e., Libya.</p>	
Research question	Hypotheses
RQ1. How can trust in MB be conceptualised based on the typology of trust in e-commerce?	N/A
RQ2. What is the relationship between trust and user satisfaction within MB?	<i><b>H1:</b> Trust positively influences customer satisfaction within MB.</i>

<p>RQ3. What are the key factors which affect customer trust in MB based on the conceptualisation of trust in e-commerce?</p>	<p><b>H2a:</b> <i>System quality has a positive influence on trust within MB.</i></p> <p><b>H3a:</b> <i>Information quality has a positive influence on trust within MB.</i></p> <p><b>H4a:</b> <i>Service Quality has a positive influence on trust within MB.</i></p> <p><b>H5a:</b> <i>Task characteristics has a positive influence on trust within MB.</i></p> <p><b>H6a:</b> <i>Structural assurance has a positive influence on trust within MB.</i></p>
<p>RQ4. What is the mediating role that trust plays in enhancing customer satisfaction within MB?</p>	<p><b>H2b:</b> <i>Trust acts as a mediator between system quality and customer satisfaction within MB.</i></p> <p><b>H3b:</b> <i>Trust acts as a mediator between information quality and customer satisfaction within MB.</i></p> <p><b>H4b:</b> <i>Trust acts as a mediator between service quality and customer satisfaction within MB.</i></p> <p><b>H5b:</b> <i>Trust acts as a mediator between task characteristics and customer satisfaction within MB.</i></p> <p><b>H6b:</b> <i>Trust acts as a mediator between structural assurance and customer satisfaction within MB.</i></p>

### 7.3 Explanatory and Predictive Powers of the Research Model

This research is mainly aimed at investigating the antecedents of trust in the post-adoption stage of MB. In addition, the influence of trust as a mediator between user satisfaction and the five independent variables in the research model. The five independent variables in the research model explain 66% of the variance in trust and trust explains 56% of the variance in

satisfaction. According to Chin (1998b),  $R^2$  values of 0.67, 0.33 and 0.19 are considered substantial, moderate and weak. Thus, in comparison to other current MB models investigating trust or satisfaction, the study model proved a strong explanatory power.

For example, regarding the explanatory power of satisfaction models, the model in the study of Abdullah M. Baabdullah et al. (2019) explains only 29% of the variance in MB satisfaction. Also, 55% of the variance in MB customer satisfaction was explained by the model of Thakur (2014). Concerning the explanatory power of trust, the model of Malaquias and Hwang (2016) explains 38% of the variance in trust. This implies that the current research has succeeded in identifying the key factors affecting trust and customer satisfaction in MB.

The research model also has high predictive relevance ( $Q^2$ ) with 0.43 for trust and 0.41 for customer satisfaction, which means that the research model of the current research has an in-sample high predictive ability. Furthermore, although the findings of this research are limited to MB users in Libya, the research model proved a high out-of-sample predictive power (section 6.5.6). Therefore, it can be applied in other contexts and countries.

## **7.4 Discussion of Research Findings**

The structure of this section is based on the four research questions. It discusses the importance and relevance of the research findings, explanation and evaluation of what the research has found to show how it relates to the literature review and research questions.

### **7.4.1 Research Question 1: Conceptualisation of Trust in MB**

*RQ1: How can trust in MB be conceptualised based on the typology of trust in e-commerce?*

The systematic literature review and analysis of the trust literature in MB that was conducted in this research have made a clear gap as there is no definitive and finalised consensus regarding the trust concept in MB. This lack of clarity provides the researcher with a significant amount of freedom to investigate this area through the conceptualisation of trust in the e-commerce

context, focusing on trust in the post-adoption stage of MB. Thus, based on this, the present research proposes an understanding of the trust concept in MB by investigating the definitions and dimensions of trust in e-commerce. This is crucial for a variety of reasons, including the necessity for a consistent conceptualisation of trust in e-commerce settings such as MB (McKnight & Chervany, 2001). This can enable scholars to communicate effectively with practitioners to offer them a practical solution to trust issues. Therefore, this research aimed to conceptualise trust in MB based on the concept of trust in e-commerce and to identify the factors that influence trust and, in turn, user satisfaction with MB.

In meeting the requirements of RQ1, this research analysed the concept of trust in e-commerce to conceptualise trust in MB. Taking into consideration the features and functions of MB, and after analysis of trust types in e-commerce, this research identified two types of trust that can explain trust in MB, namely institutional-based trust and interpersonal-based trust. Structural assurance is the key dimension in assessing the institutional-based trust in MB. In addition, interpersonal-based trust was assessed by three dimensions (ability, integrity and benevolence). These dimensions are used to evaluate customers' perceptions of the characteristics of MB and how these perceptions can influence trust. These four dimensions enabled the researcher to determine the factors that affect trust in the MB context. This is discussed in detail in the answer to the research question 3 (section 7.4.3).

The current research offers a systematic conceptualisation of trust in the post-adoption stage of MB. This comprehensive conceptualisation considered all the characteristics of a functional MB scenario. This is important as the majority of studies that have investigated trust in MB in the post-adoption stage have focused on very limited aspects of MB and only one type of trust; the interpersonal-based trust (Arcand et al., 2017; Berraies et al., 2017; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2017; Thakur, 2014). In addition, other researchers such as Susanto et al. (2016) focused only on privacy and security factors, which represent the institutional-

based trust, while neglecting the other characteristics of the MB system that explain the interpersonal-based trust.

While some researchers have attempted to investigate both interpersonal-based trust and institutional-based trust, they have failed to consider all aspects of trust. In their MB research, Malaquias and Hwang (2017), for example, used a variety of factors, including Task Characteristics, Social Influence, and Risk, while ignoring other important aspects of MB, such as quality factors such as system quality and information quality. In addition, Trabelsi-Zoghalmi et al. (2018) found that three factors influence trust in the post-adoption stage of MB, which are security, reliability, ease of use. However, the study neglected the role of other factors, such as task characteristics. Thus, this research argues that the conceptualisation of trust conducted in this research is the first to take a holistic view of the role of trust in customer behaviour within MB.

#### **7.4.2 Research Question 2: The Relationship between Trust and User Satisfaction with MB**

*RQ2. What is the relationship between trust and user satisfaction with MB?*

In this study, user satisfaction was found to be strongly influenced by trust ( $\beta=0.748$ ,  $t=25.713$ ,  $p < 0.001$ ). This finding is in line with previous research that has found that customer satisfaction with MB is influenced by trust (Berraies et al., 2017; K. C. Lee & Chung, 2009; Sharma & Sharma, 2019; Susanto et al., 2016; Trabelsi-Zoghalmi et al., 2018). However, this study contributes to the body of knowledge concerning the conceptualisation and investigation of the influence of trust and satisfaction in the MB context. Based on the systematic review of the MB literature conducted in this study, no studies have examined the mediating effect of trust on customer satisfaction. In addition, some of the previous studies have not identified the antecedents that determine how trust in MB can be formed (Poromatikul et al., 2019; Sharma & Sharma, 2019).

Besides, the other studies that have investigated the relationship between trust and satisfaction focused only on limited antecedents of trust in MB. K. C. Lee and Chung (2009), for example, investigated only the impacts of system quality and information quality on trust and satisfaction. In addition, Berraies et al. (2017) in their study, which aimed to identify the effects of perceived values of MB on customer trust, satisfaction and loyalty, used only quality, price and emotional perceived values as antecedents of trust. Also, Arcand et al. (2017) examined the influence of trust on commitment and satisfaction with MB to investigate the multidimensional concept of MB service quality and its impact on the relationship with customers. The study considered only the impacts of Security/ Privacy and Practice as antecedents of trust. The current research, therefore, has attempted to comprehensively identify the antecedents that form trust in MB based on the holistic conceptualisation of trust in e-commerce.

#### **7.4.3 Research Question 3: The factors affecting customer trust in MB**

*RQ3. What are the key factors which affect customer trust in MB based on the conceptualisation of trust in e-commerce?*

For RQ3, this research has identified five key factors that influence trust in MB based on the conceptualisation of trust in e-commerce. Firstly, this research argues that system quality, information quality, service quality and task characteristics are the critical factors in assessing interpersonal-based trust. They are used to evaluate the characteristics of MB. While system quality, information quality and service quality reflect customers' perceptions of the ability and integrity of MB to provide banking services properly and conveniently, task characteristics reflects the benevolence of the bank to support customers in performing their banking tasks through the use of MB. In addition, structural assurance explains the institutional-based trust in MB. It evaluates customer's perceptions regarding the privacy and security of MB, which

can affect customer trust. The following three subsections discuss the importance of the findings of the factors that influence trust in MB.

#### **7.4.3.1 Findings on MB Quality Factors**

In the current research within the hypotheses H2a, H3a and H4a, all three MB quality factors have proven to affect trust significantly. System quality ( $\beta=0.124$ ,  $t=3.021$ ,  $p < 0.01$ ), information quality ( $\beta=0.192$ ,  $t=4.670$ ,  $p < 0.001$ ) and service quality ( $\beta=0.178$ ,  $t=3.583$ ,  $p < 0.001$ ). These results support the findings of other studies in this field that have linked the three quality factors of MB to trust (Gao & Waechter, 2017; K. C. Lee & Chung, 2009; Zhou, 2011, 2012b). However, most studies that have considered the quality factors focused only on the impacts of these factors on initial trust in MB, which leads to acceptance and adoption of MB. Gao and Waechter (2017) For example, investigated the influences of the three quality factors with other factors on initial trust in MB, which led to usage intention. (Zhou, 2011, 2012b) also prove that the three quality factors have significant positive effects on initial trust and, in turn, adoption of MB.

The investigation of the role of the quality factors of MB can be important in forming initial trust. However, the existing MB literature suggests that there are other factors, which are considered more important to study trust in the pre-adoption stage, such as propensity to trust, structural assurances and relative benefits (Afshan & Sharif, 2016; G. Kim et al., 2009; Oliveira et al., 2014). It has been argued that the impact of the quality factors in MB can provide a better understanding of the post-adoption customer behaviour (Tam & Oliveira, 2016b). Thus, this research argues that quality factors in MB play a critical role in understanding customers' trust regarding the characteristics of MB.

To the best of the researcher's knowledge, only one study examined the effect of the quality factors of MB on trust in the post-adoption stage (K. C. Lee & Chung, 2009). However, the

study considered only system quality and information quality and neglected the important influence of service quality on trust. The current research argues that it is essential to include all the three quality factors in order to assess customer behaviour in MB. Although information quality and system quality are the key variables for measuring an individual system's success, service quality is considered as the key criterion for assessing the overall success of information systems (DeLone & McLean, 2003). Thus, the present research added a significant contribution to the MB research by demonstrating that the three quality factors in MB have significant influences on trust in the post-adoption stage of the MB services.

#### **7.4.3.2 Findings on Task Characteristics**

This research used task characteristics to test the hypothesis H5a, which measured the benevolence of MB as it deals with the support customers receive from their bank to meet their banking needs and interests through MB. Task characteristics has been proven as an incentive for MB adoption (Abdullah M. Baabdullah et al., 2019; Oliveira et al., 2014; Zhou et al., 2010). However, the previous studies have not investigated the impact of task characteristics on trust in MB. From the systematic literature review conducted in this research regarding trust in the post-adoption stage of MB, this research found that there is only one study that has considered task characteristics as a determinant of trust in MB (Malaquias & Hwang, 2016). Malaquias and Hwang (2016) used task characteristics to identify the determinants of trust in MB. The authors found that age, social influence, gender, task characteristics and risk are the determinants of trust in MB. Although Malaquias and Hwang (2016) explained some antecedents of trust, they relied on only limited aspects of the MB characteristics and did not explain the influence of trust on customer behaviour.

In the current research, task characteristics is acting as an antecedent of trust in MB with other antecedents to cover all dimensions of the interpersonal-based trust. This is due to task characteristics encapsulating the bank's commitment to always acting in the best interests of



its customers. This can enhance the understanding of the role of task characteristics in the post-adoption consumer behaviour within MB. This research has provided evidence that task characteristics plays a key role in building trust in MB in the post-adoption stage ( $\beta=0.141$ ,  $t=3.572$ ,  $p < 0.001$ ).

#### **7.4.3.3 Findings on Structural Assurance**

Based on the discussion in conceptualising trust in MB, structural assurance is used in this study as the key dimension to investigate institutional-based trust. It evaluates customers' perceptions regarding the privacy and security of MB, which can affect customer trust (Baptista & Oliveira, 2016). The test of the hypothesis H6a revealed that structural assurance is the strongest factor influencing trust in MB ( $\beta=0.402$ ,  $t=10.432$ ,  $p < 0.001$ ). This finding is consistent with prior research emphasising the critical role of structural assurance in establishing trust in MB (Baptista & Oliveira, 2016; Gu et al., 2009; Oliveira et al., 2014; Zhou, 2011, 2012b). However, all the previous research examined the function of structural assurance in establishing initial trust in the MB pre-adoption stage. Thus, the present research bridged this gap in the literature by examining the role of structural assurance in building trust in the post-adoption stage of MB.

In e-banking settings, structural assurance is a vital component which means the implementation of required conditions, such as security and privacy, to protect users (Oliveira et al., 2014). However, this study contends that structural assurance is more relevant in the MB context because the infrastructure is based on wireless networks and cellular data points, which can be perceived by customers as vulnerable to hacker attacks or information interception. Strong structural assurances, such as the transport layer security protocol TLS and government regulations, are therefore critical in ensuring security and serving as the basis for users to develop their trust in the MB services (Oliveira et al., 2014).

In addition, this finding confirms the vital role that structural assurance plays in the online business environment. This agrees with prior studies that have proved that structural assurance is a critical contributor in building users' overall trust in the online business setting, where there are uncertain situations (McCole et al., 2019a; Pavlou & Gefen, 2004; Sarkar, Chauhan, & Khare, 2020).

#### **7.4.4 Research Question 4: The Mediation Effect of Trust in Enhancing Customer Satisfaction within MB**

*RQ4. What is the mediating role that trust plays in enhancing customer satisfaction within MB?*

In order to answer the fourth research question, a mediation effect analysis was conducted. The goal of the mediation effect analysis was to identify how significant trust is as a mediator between customer satisfaction and the specified five independent variables in the research model (information quality, system quality, service quality, structural assurance and task characteristics). This adds a clear contribution to knowledge as the exhaustive literature review conducted in this research revealed that no studies have considered the mediating effect of trust on user satisfaction (K. C. Lee & Chung, 2009; Sharma & Sharma, 2019; Susanto et al., 2016; Trabelsi-Zoghalmi et al., 2018).

The mediation effect analysis enabled the researcher to test the hypotheses H2b, H3b, H4b, H5b, H6b through the application of the approach recommended by Zhao et al. (2010). As discussed in section 5.5.4.5.3 and section 6.6, two conditions must be met in order to evaluate the mediation effect analysis. The first condition is that the indirect effects of the independent variables in the structural model on customer satisfaction (the dependent variable) through trust must be significant to establish a mediation effect. The findings demonstrated that all the indirect effects are significant, indicating that trust functions as a mediator in the research model (SYS  $t=2.259$ ,  $p < 0.05$ ), (INF  $t= 3.377$ ,  $p < 0.001$ ), (SEV  $t=2.876$ ,  $p < 0.01$ ), (TSK  $t=3.907$ ,  $p < 0.001$ ) and (SA  $t=5.792$ ,  $p < 0.001$ ).

The second condition is to examine the direct relationships between the independent variables and consumer satisfaction in order to determine the mediation type (full mediation or partial mediation). The research findings confirmed that trust has a partial mediation effect between three independent variables and user satisfaction (SYS  $t=3.536$ ,  $p < 0.01$ ), (INF  $t=3.964$ ,  $p < 0.001$ ) and (TSK  $t=3.076$ ,  $p < 0.01$ ). In addition, trust has a full mediation effect between the other two independent variables in the model and user satisfaction (SEV  $t= 0.084$ ,  $p > 0.05$ ) and (SA  $t=1.055$ ,  $p > 0.05$ ). The following two subsections discuss the findings of the mediation effect analysis:

#### **7.4.4.1 The Mediation Effect of Trust between the Three Quality Factors and Customer Satisfaction**

The test of the hypotheses H2b, H3b and H4b has revealed that the three quality factors of MB have significant indirect influences on user satisfaction via trust. These results are in accordance with other prior studies that have proved that system quality, information quality and service quality have significant influences on trust in MB (Gao & Waechter, 2017; K. C. Lee & Chung, 2009; Zhou, 2011, 2012b). In addition, Motiwalla et al. (2019) revealed that the three MB quality variables have substantial effects on user satisfaction, while Sharma and Sharma (2019) proved the effects of information quality and service quality on MB user satisfaction. The work in the present research has built on prior research that has studied trust and satisfaction in MB.

In developing the fourth contribution in this research, the influence of the quality factors on customer satisfaction was examined via trust as a mediator. When examining the mediating effect of trust on the relationships between the three quality factors and customer satisfaction, it is worth noting that trust has the greatest mediating effect on service quality. Trust acts as a full mediator in the relationship between service quality and customer satisfaction. Trust has a

partial mediation effect (Complementary) on the two other quality variables. These results contradict those of (Sharma & Sharma, 2019), who revealed that information and service quality have direct effects on customer satisfaction, while system quality has no impact.

#### **7.4.4.2 The Mediation Effect of Trust between Task Characteristics and Customer Satisfaction**

The test of hypothesis H5b showed that task characteristics directly and indirectly via trust affects user satisfaction within MB. This implies that trust partially mediates the relationship between task characteristics and customer satisfaction. Regarding the effect of task characteristics on trust in the post-adoption stage, this finding is consistent with the findings of the only one study that has investigated this phenomenon (Malaquias & Hwang, 2016). The current research, however, has attempted to expand on this body of knowledge by examining the effect of task characteristics on customer behaviour via the mediating impact of trust.

Several studies have examined the effect that task characteristics has on customer behaviour. For example, Tam and Oliveira (2016b) studied the influence of task characteristics on individual performance. However, to the best of the researcher's knowledge, the current study is the first study to examine how task characteristics affects customer satisfaction. Examining this effect demonstrates the critical role of MB in supporting customers accomplish their tasks and is also consistent with other research on the effect of task characteristics on the adoption and use of MB (Tam & Oliveira, 2016b; Zhou et al., 2010).

#### **7.4.4.3 The Mediation Effect of Trust between Structural Assurance and Customer Satisfaction**

Finally, for the hypothesis H6b, the findings of the current research indicate that structural assurance has only an indirect effect on user satisfaction through trust. This means that customers' perceptions of privacy and security considerations in MB lead to enhancing trust, which leads to high customer satisfaction.

The current study demonstrates that structural assurance is the most important element in determining trust. Prior research has demonstrated the critical impact of structural assurance in establishing trust in MB (Baptista & Oliveira, 2016; Gu et al., 2009; Oliveira et al., 2014; Zhou, 2011, 2012b). However, as discussed, structural assurance has been mainly investigated in building initial trust in the pre-adoption stage of MB. The current study, therefore, examined the influence of structural assurance on post-adoption MB trust and, consequently, customer satisfaction. Thus, this research has demonstrated that structural assurance can also have a significant impact on post-adoption consumer behaviours.

### **Chapter Summary**

This chapter discussed the findings reported in Chapter 6. It discussed the answers of the four research questions and explained the result of the eleven hypotheses test. In addition, the chapter presented the importance of the research findings and their relations with the previous literature in the research area. Based on the results of the hypotheses H1, H2a, H3a, H4a, H5a, H6a, H2b, H3b, H4b, H5b and H6b, customer satisfaction is influenced by trust. Also, system quality, information quality, service quality, task characteristics and structural assurance influence trust, and in the meantime, customer satisfaction through the mediation effect of trust. The next chapter provides an overall summary of the research and its contributions, managerial implications and recommendations for future research.

## **Chapter 8 Conclusion**

### **8.1 Introduction**

This concluding chapter begins with a summary of the aim, objectives and findings of the current research. Then it is followed by a discussion of the theoretical and methodological contributions of the research. Then the implications for practice of the research are summarised. Then, the research limitations are highlighted to suggest some recommendations for future work.

### **8.2 The importance of trust in MB**

Trust has long been regarded as a critical factor influencing consumer behaviour in the online environment due to the risk and uncertainty situations associated with such environments (Fang et al., 2014; McCole et al., 2019b). In the MB context, trust has been widely investigated, with studies confirming the critical role of initial trust in the acceptance, adoption, and usage of MB services (Alalwan et al., 2017; K. C. Lee & Chung, 2009; Malaquias & Hwang, 2016; Sun et al., 2017; Susanto et al., 2016; Zhou, 2014). However, the trust literature in MB demonstrates that there is no consensus regarding the concept, antecedents, and outcomes of trust. In addition, the majority of studies focus on one particular angle when developing the concept of trust in MB, such as institutional-based trust, personality-based trust, or interpersonal-based trust. The current research builds on previous work on MB trust, emphasising the development of a comprehensive conceptualisation of the overall trust in MB. To accomplish this, the current research proposes a systematic framework based on two distinct types of trust: interpersonal-based trust and institutional-based trust.

The testing of this framework revealed the crucial mediating role of trust in the MB setting, influencing user behaviour in a variety of ways. The main outcome of trust in MB is an increase in customer satisfaction. The importance of trust was demonstrated by the significant positive

influences of its antecedents. These antecedents are system quality, information quality, service quality, task characteristics, and structural insurance. Trust plays an essential mediation role between these antecedents and customer satisfaction. This means that, without trust, banks will find it difficult to shape customer satisfaction. Therefore, banks need to establish marketing strategies that emphasise the characteristics of MB that can improve MB users' perceptions of MB services, which can lead to enhance trust level in such services.

### **8.3 Revisiting the Research aim, Objectives and Findings**

The overall goal of the present study was to extend the knowledge in the area of information systems and MB by reviewing the existing literature and drawing on the information systems success model (DeLone & McLean, 2003) to identify the factors affecting trust and satisfaction of the current users of MB. In order to fulfil this aim, this research pursued to achieve the five formulated research objectives: Thus, this research has:

1. Extended the understanding of the trust concept in MB by reviewing the literature regarding trust in e-commerce in order to conceptualise trust in the MB context.
2. Examined the relationship between trust and customer satisfaction within MB.
3. Identified the factors which influence customer trust in MB.
4. Explained the role of trust as a mediator influencing the formation of MB user satisfaction.
5. Empirically validated the proposed model in an economically developing country, i.e., Libya.

In addition, to bridge the research gaps that have been identified and discussed in chapter 2 and chapter 3, this research has extended the information system success model by including trust as a mediator between the three quality factors and user satisfaction. In addition, two more independent variables (task characteristics and structural assurance) were added to the model.

This research intended to answer the following research questions:

RQ1. How can trust in MB be conceptualised based on the typology of trust in e-commerce?

RQ2. What is the relationship between trust and user satisfaction within MB?

RQ3. What are the key factors which affect customer trust in MB based on the conceptualisation of trust in e-commerce?

RQ4. What is the mediating role that trust plays in enhancing customer satisfaction within MB?

To answer the first question, Chapter 2 reviewed the concept of trust in e-commerce to conceptualise trust in MB and identify the key factors that influence trust in MB. The chapter proposed a conceptual model of trust and satisfaction in the MB context based on the conceptualisation of trust in e-commerce. The literature review, discussed in Chapters 2 and 3, and the conceptual framework suggested in Chapter 4 resulted in the formulation of 11 research hypotheses. Chapter 5 provided a discussion of the philosophical assumptions of the current research and provided an overview of the methodology used in the research to collect and analyse the data.

Chapter 6 reported the findings of the data analysis through the use of structural equation modelling with partial least square (PLS-SEM) performed using SmartPLS software version 3. It validated the measurement model and assessed the structural model according to the guidelines presented in the methodology chapter (Hair et al., 2017). In addition, chapter 6 presented the findings of the mediation effect analysis according to the approach developed by (Zhao et al., 2010). Chapter 7 discussed the findings and indicated the importance of the research findings in relation to previous MB literature. Overall, all the research hypotheses were supported. A summary of the key findings of the research is presented below:

*RQ 1. How can trust in MB be conceptualised based on the typology of trust in e-commerce?*



The research findings showed that trust in MB is conceptualised based on the trust concept in e-commerce through two types of trust, namely institutional-based trust and interpersonal-based trust. The findings revealed that structural assurance is the main dimension of institutional-based trust in MB. In addition, ability, integrity and benevolence are the three dimensions of the interpersonal-based trust in MB.

*2. What is the relationship between trust and user satisfaction within MB?*

The research findings demonstrated that trust is a key predictor of user satisfaction within MB. This result confirmed the research hypothesis H1.

*3. What are the key factors which affect customer trust in MB based on the conceptualisation of trust in e-commerce?*

Based on the conceptualisation of trust in MB, this research revealed that system quality, information quality, service quality, task characteristics and structural assurance are the factors influencing trust in MB. While system quality, information quality, service quality, task characteristics reflect customers' perceptions regarding the characteristics of MB, structural assurance reflects customers' perceptions regarding privacy and security concerns associated with MB. These results supported the research hypotheses H2a, H3a, H4a, H5a and H6a.

*4. What is the mediating role that trust plays in enhancing customer satisfaction within MB?*

The research findings indicated that trust has a full mediation effect on the relationship between two of the independent variables in the research model (services quality, structural assurance), and the dependent variable (user satisfaction). Additionally, trust has a partial mediation effect on the relationship between the other three independent variables (System Quality, Information Quality, and task characteristics) and user satisfaction. These findings supported the hypotheses H2b, H3b, H4b, H5b and H6b.

## **8.4 Research Contributions and Implications**

The current research has made significant theoretical and methodological contributions to knowledge, and it has provided important implications for practice as follows:

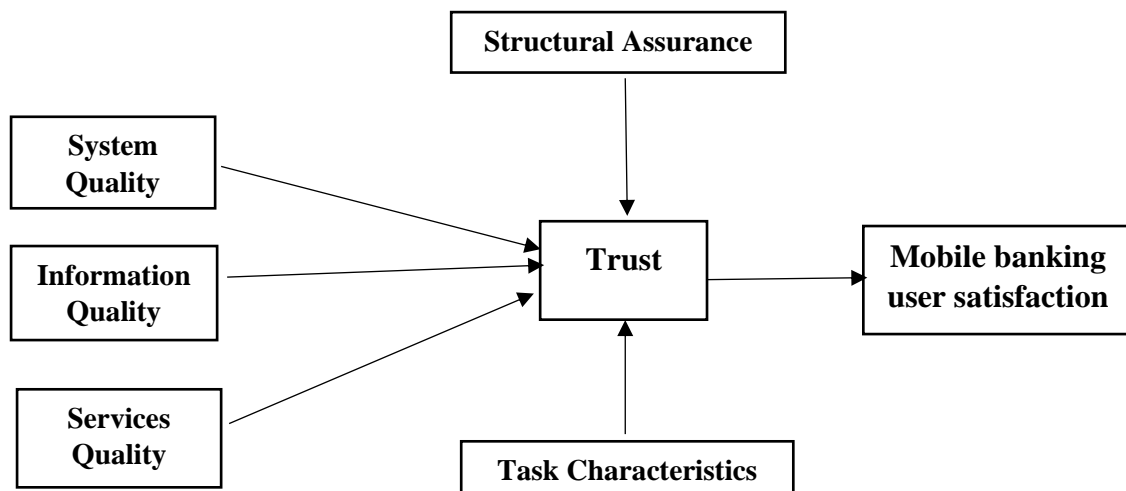
### **8.4.1 Contributions to Knowledge**

This research embeds its contributions in the fields of MB and Information Systems. It primarily investigates the factors which influence customer trust and satisfaction. The research makes multiple contributions to knowledge. In the first instance, through reviewing the MB research, this study found that the existing MB literature lacks consistent conceptualisation of trust in the post-adoption stage of the MB services. Thus, this research is the first to investigate trust concept in MB in the post-adoption stage based on trust concept in e-commerce. As this research has suggested, trust in the MB context is viewed as a multidimensional concept with four dimensions: structural assurance, ability, integrity and benevolence. This conceptualisation of trust was used to determine the factors affecting MB trust which this study meets through objectives 1 and 2.

For the second contribution to knowledge, this research conducted a systematic literature review of the previously published literature related to trust in MB. This approach enabled the researcher to analyse the trust research in MB and identify the literature that has focused on trust in the post-adoption stage of MB. Thus, this research identified the relationships between multiple variables and contradictions and revealed gaps that need to be bridged. This met the aims of objective 1.

For the third contribution, this research is the first to integrate trust into the information system success model (DeLone & McLean, 2003) to clarify further what determines trust and customer satisfaction within the MB context. This resulted in the development of a consistent conceptual framework that enhances the understanding of trust influence in the MB post-adoption

behaviours, particularly customer satisfaction. This framework can be used in further research on trust and satisfaction in the e-business contexts. It explains the mechanism by which trust can enhance user satisfaction. Besides, it determines the factors affecting trust in MB, i.e. (system quality, information quality, service quality, task characteristics and structural assurance). (Objectives 2 and 3). Figure 8.1 depicts the proposed research model of the current research.



**Figure 8. 1 MB customer satisfaction model**

The fourth contribution is the first to identify and investigate the impact of trust as a mediating factor in improving MB user satisfaction. This provided valuable insight into the factors affecting MB user satisfaction indirectly via trust. This met the aims of objective 4.

For the fifth contribution, this research moves away from the focus on initial trust (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef et al., 2018; Sharma et al., 2017; Zhou, 2011, 2012b) and shed light on the influence of the overall trust in the post-adoption stage of MB. This research, therefore, considered the impact of overall trust on customer behaviour, which means that the respondents in the research were current users of MB. This met the aims of objective 2.

For our final contribution, this research made a significant methodological contribution to the MB research. It assessed the out-of-sample predictive power, which is essential for simulating how the PLS model will be used to predict a new observation (Shmueli et al., 2019). Although the structural model used in this study demonstrated a high level of in-sample explanatory power and predictive ability, it is critical to evaluate the out-of-sample predictive power of the model. As mentioned, this study is restricted to MB users in Libya and cultural differences in other countries can limit the generalisability of the study findings. However, since the study model has strong in-sample and out-of-sample predictive abilities, it can be used to investigate new observations in other settings and contexts. This study employed the PLS predict technique proposed by Shmueli et al. (2016) to evaluate out-of-sample predictive power. This technique is discussed in detail in chapter 5 section, 5.5.4.5.2.6, and the results of the out-of-sample test are reported in chapter 6, section 6.5.6.

In addition, following a review of the current MB literature, several methodological flaws were discovered, which this study sought to address. One weakness is the lack of inadequate sample sizes (Afshan & Sharif, 2016; Alalwan et al., 2017; Arcand et al., 2017; Berraies et al., 2017; Sharma & Sharma, 2019). This can affect the representativeness of the sample to the entire population. This research used a relatively large sample size, i.e., 659 responses. Besides, a number of MB studies have pointed out in their research limitations that there is a lack of representativeness in their studies due to the use of students as a sample of the entire population (Afshan & Sharif, 2016; Ahmed et al., 2017; Chung & Kwon, 2009; Malaquias & Hwang, 2016, 2017; Priya et al., 2018; Zhou, 2012b). In order to overcome this shortcoming and increase the generalisability of the findings to the population, this research collects data from current MB users in Libya.

### **8.4.2 Implications for Practice**

The results of this research offer important implications for policymakers in banks. These implications provide a better understanding of how to enhance customer trust and satisfaction in MB. Policymakers in banks can understand:

1-The key characteristics that can be used to assess customer trust in MB services.

2-The mediating effect of trust in enhancing customer satisfaction.

The implications for practice of this research are discussed below:

This study's conceptual model includes the three MB quality variables, task characteristics, and structural assurance and their effects on MB trust and satisfaction. It provides banks with a useful checklist of critical characteristics to consider when evaluating their MB services. This research suggests that bank policymakers should use the three MB quality factors, task characteristics, and structural assurance, to assess user satisfaction as a predictor of MB success. The measures employed in this research can also be used to gather opinions and perceptions of MB users regarding the characteristics of MB in order to identify possible flaws and/or strengths in these areas. Addressing these issues can provide banks with competitive advantages.

MB differs from online banking in several ways, including its design and usability features, such as its small screen and keypads. Thus, MB quality features reflect controllable factors that influence MB user behaviour. Hence, in order to meet the needs of current and potential customers, banks should constantly track and enhance the quality of MB. This study demonstrated that trust is a mediator between the three quality factors of MB (system quality, information quality, and service quality) and user satisfaction. These findings can benefit banks significantly by increasing trust in and satisfaction with their MB system. Since trust is critical

for achieving customer satisfaction in e-banking, banks should encourage their customers to use most MB services on a consistent basis.

The current research provides guidance for enhancing trust in MB. The findings of this research revealed that MB quality factors significantly affect trust. Hence, these aspects should be taken into consideration when developing MB applications and associated services. This is critical because high levels of trust translate to high levels of customer satisfaction and, consequently, the success of MB.

The quality of the MB system can be improved by ensuring easy accessibility, enhancing the ease of use and navigation, and improving visual appeal. These enhancements are expected to result in increased user satisfaction both directly and indirectly through trust. The accuracy, relevance, completeness and timeliness of the information that users receive from MB can all be considered when improving information quality. The findings of this study revealed that high-quality information has a substantial positive impact on consumer satisfaction, both directly and indirectly through trust. Concerning the overall MB service quality, this research revealed that service quality has a significant influence on user satisfaction, but only through trust. Therefore, banks should continually evaluate service quality in order to influence customers' perceptions of their banks' ability and integrity to provide quality MB services. This can be accomplished by maintaining responsiveness, reliability, professionalism, and personalisation of their MB services. Improving the quality of MB services leads to an increased trust, which results in a high level of customer satisfaction in MB.

In addition, this research found that task characteristics directly and indirectly through trust influences user satisfaction. These results demonstrated that MB customers need to believe that their bank is acting in their best interests by offering them the appropriate support to conduct their banking transactions using MB. As a result, this can support customers in carrying out

their daily tasks. Thus, banks should constantly ensure that their customers can conduct banking transactions conveniently and properly, leading to enhanced trust and, subsequently, customer satisfaction.

Finally, in addition to paying close attention to the characteristics of MB, banks should reinforce the security and privacy of MB. This can be obtained by ensuring data security and transactional confidentiality (Zhou, 2012b). Since MB uses wireless networks, which consumers may view as vulnerable to hacker attacks, security and privacy issues are critical in the MB context. Achieving this would increase trust in MB, resulting in high levels of customer satisfaction. Table 8.1 illustrates how the contributions of the current research were mapped against the theory, methodology, and practice gaps.

**Table 8.1 The link between the research’s contributions and theory, methodology and practice gaps**

Contributions	Gap type	Gaps
Conceptualising trust in MB in the post-adoption stage based on trust concept in e-commerce.	Theory	Lack of consistent conceptualisation of trust in the post-adoption stage of the MB services in the existing MB literature.
Conducting a systematic literature review of the previously published literature related to trust in MB.	Theory	Lack of comprehensive reviews of trust research in MB to identify the relationships between multiple variables and contradictions and reveal gaps related to trust in the post-stage of MB that need to be bridged.
Integrating trust into the updated information system success model (DeLone & McLean, 2003) to clarify further what determines trust and customer satisfaction within the MB context.	Theory	Lack of consistent conceptual frameworks that enhances the understanding of trust influence in the MB post-adoption behaviours, particularly customer satisfaction.
Identifying and investigating the impact of trust as a mediating factor in improving MB user satisfaction and to provided valuable insight into the factors affecting MB user satisfaction indirectly via trust.	Theory	Lack of understanding of the potential mediatising effect of trust on consumer behaviour in MB, in particular the mediating role of trust in the formation of MB user satisfaction.

Moving away from the focus on initial trust (Baptista & Oliveira, 2016; Gao & Waechter, 2017; G. Kim et al., 2009; Oliveira et al., 2014; Shareef et al., 2018; Sharma et al., 2017; Zhou, 2011, 2012b) and shed light on the influence of the overall trust in the post-adoption stage.	Theory	Lack of investigation of the overall trust impact on customer behaviour in the MB literature.
Assessing the out-of-sample predictive power, which is essential for simulating how the research model can be used to predict a new observation in order to enhance the generalisability of the study findings.	Methodology	The existing MB literature lacks the evaluation of out-of-sample predictive power as most MB studies have relied on in-sample predictive abilities tests such as R <sup>2</sup> and Q <sup>2</sup> to evaluate the predictive powers of their models.
Addressing the methodological weaknesses regarding sampling in the MB literature and increasing the generalisability of the findings to the population by using a relatively large sample size and collecting data from current MB users.	Methodology	several methodological weaknesses in the MB literature related to sampling can affect the representativeness of the sample to the entire population. Most importantly, the lack of inadequate sample sizes and the use of only students as a sample.
Providing a better understanding of the key characteristics that can be used by policymakers in banks to assess customer trust in MB services.	Practice	Lack of a comprehensive and practical guidance for enhancing trust in MB.
Providing a better understanding of the mediating effect of trust in enhancing customer satisfaction.	Practice	Understanding of how trust can be used as mediator to enhance customer satisfaction in MB.

## 8.5 Research Limitations and Recommendations for Future Research

Like any research, this research is subject to some limitations. This section discusses the theoretical, empirical and methodological limitations of this research. In addition, based on the discussion of the research limitations, some recommendations for future research are suggested.

First, despite the ubiquity of MB, research on its effects on consumer behaviour is still in its infancy. This research has highlighted that the main focus of the existing MB research is on the adoption and behavioural intention towards MB. This has created gaps in the MB research



to pay more attention to studying consumer behaviour in the post-adoption stage. The current research has investigated only customer satisfaction with MB. Future research could consider studying the influence of overall trust on other customer behaviours, such as customer commitment and loyalty.

Second, this research has developed a conceptual framework to investigate customer trust and satisfaction in the MB context. Thus, this study is limited to the MB services. Therefore, future research could apply the conceptual framework of the current research to investigate other online mobile payments. One interesting extension would be the application of the conceptual model to study users' perceptions regarding new mobile payment systems such as mobile wallets and QR code payments.

Third, cross-sectional research was used to collect the data of the current research. This method might not reveal if there are potential changes in customer trust and satisfaction over time. Hence, longitudinal research is required to test the conceptual model of the current research in several periods of time and compare the results. This can provide a better understanding of the formation of trust and satisfaction in MB and improve the generalizability of the research findings.

Fourth, this research was conducted in a developing country, i.e., Libya. The proposed conceptual model of this research demonstrated in-sample and out-of-sample predictive powers. However, future research, especially in the developed world, is needed to expand the research model to other settings and countries. In addition, using the conceptual framework developed in the current research to compare results in two developed and developing countries can also be a valuable approach to explain the potential differences. These differences can be used to explain whether these potential differences have influences on the measurement and structural models.

Fifth, the potential effects of the observed and unobserved heterogeneity of the study sample, such as age, gender, and experience, have not been taken into consideration in this research. Understanding the influences of the differences in the demographic and experience variables in the research sample is important to investigate their impacts on customers' perceptions towards trust and satisfaction within the MB context. Therefore, future research could study the moderator effects of gender, age and experience on the relationships between the independent variables in the research model and trust.

### **Chapter Summary**

This research is the first that has attempted to comprehensively investigate the influence of trust on consumer behaviour in the post-adoption stage of MB, in particular, customer satisfaction. This research has made significant theoretical contributions to knowledge towards a better understanding of the role of trust in enhancing customer satisfaction and the factors which affect overall trust in MB. It has investigated the influences of system quality, information quality, service quality, task characteristics and structural assurance on customer satisfaction through the mediation effect of trust. In addition, this research has also provided valuable practical contributions to assist policymakers in banks in building trust with their customers regarding MB services. Building trust in MB can be achieved by improving the understanding of the key characteristics and aspects of MB that need more attention. This research has also provided some important recommendations for future research in this area.

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## Appendix 1: Questionnaire form



Dear Sir/Madam,

My name is Ahmed Geebren I am a PhD student at the Business School, University of Huddersfield, UK. I am currently conducting a survey on customer trust and satisfaction in mobile banking. The survey is a part of the PhD degree requirements. I truly appreciate your participation and assure you that the survey will only take ten minutes of your valuable time. I would also like to assure you that all the information provided by you will be strictly confidential, will only be used in aggregate form and will not be linked to you in any way. Furthermore, the data collected will be stored in a secure place at the University and will only be accessible to the relevant researcher and supervisors for educational purposes and may be published in proceedings of national/international conferences and/or academic journals.

The purpose of this study is to identify the factors that influence customer trust and satisfaction in mobile banking services. Your participation in this survey is completely voluntary and you may withdraw from participation at any time.

If you have further questions, concerns, or enquiries please do not hesitate to contact me or my supervisor via the addresses below.

Thank you in advance for your valuable assistance in this research.

Yours sincerely

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I think mobile banking is concerned with the present and future interests of users	1	2	3	4	5	6	7
Overall, I trust mobile banking	1	2	3	4	5	6	7
<b>Part 3</b>							
<b>The following statements measure whether you are satisfied or not with the services provided by mobile banking.</b> Please <b>circle</b> only the one number which best reflects your level of agreement or disagreement with the following statements:							
	Strongly disagree		Neutral	Strongly agree			
	←—————→						
I strongly recommend mobile banking to others	1	2	3	4	5	6	7
I think that I made the correct decision to use mobile banking	1	2	3	4	5	6	7
I am satisfied with the way that mobile banking has carried out transactions	1	2	3	4	5	6	7
I am satisfied with the service I have received from mobile banking	1	2	3	4	5	6	7
Overall, I was satisfied with mobile banking	1	2	3	4	5	6	7

### Part 4

**Please answer the following questions about yourself** (Please tick  at the appropriate box for you)

How long have you used mobile banking? (Please check all that apply)

- Not used mobile banking       Less than one year  
 1-2 years       More than 2 years

How often do you use mobile banking?

- Every day       Several times a week     Several times a month  
 Once a week       Once a month

Which mobile banking services do you regularly use? (Please check all that apply)

- Basic account information       Making online payments  
 Checking account balance       Making bank transfer  
 Other

How old are you?

- Less than 18 Years       18-24Years       25-34 Years

- 35- 50                       Above 50 Years

What is your gender?     Male                       Female

What is your highest educational qualification?

- Less than high school                       high school  
 Diploma                                       undergraduate degree  
 Post-graduate or above

What is your current occupation?

- Unemployed                                       Student  
 Private sector                                       Government employee  
 Retired  
 Other

**THANK YOU  
FOR  
YOUR PARTICIPATION IN THIS STUDY**

## Appendix 2: Questionnaire Translated Version



دراسة سلوك مستخدمي الخدمات المصرفية بواسطة الهاتف النقال: من منظور مدخل نظم المعلومات

أخي الكريم/ أختي الكريمة

أنا احمد حامد صالح طالب دكتوراة بجامعة هيدرزفيلد بالمملكة المتحدة. أقوم حاليا بعمل استبيان حول العوامل المؤثرة في ثقة العملاء ورضاهم عن الخدمات المصرفية عبر الهاتف النقال في ليبيا. ويعد هذا الاستبيان جزء من متطلبات حصولي على درجة الدكتوراه.

أقدر كثيرا مشاركتك مع التأكيد على أن هذا الاستبيان لن يستغرق سوى عشر دقائق من وقتك الثمين. كما أود التأكيد على أن جميع المعلومات التي سوف تذكرها سوف يكون محاط بالسرية التامة ولن تستخدم إلا في شكل إجمالي ولن يتم ربطها بكم بأي شكل من الأشكال. وعلاوة على ذلك، سيتم تخزين البيانات التي يتم جمعها في مكان آمن في الجامعة ولن يكون متاحًا إلا للباحث والمشرفين المعنيين للأغراض التعليمية، ويمكن نشرها في مؤتمرات علمية وطنية أو دولية و / أو مجلات أكاديمية.

إن مشاركتك في هذا الاستبيان تطوعية تماما ولكل الحرية في الانسحاب من المشاركة في أي وقت. أرجو عدم التردد في حالة وجود المزيد من الأسئلة أو الاستفسارات بالاتصال بي أو بالمشرف الخاص على وسائل الاتصال الموجودة بالأسفل.

شكرا لك مقدّمًا على مساعدتك القيمة في إجراء هذا البحث.

تفضلوا بقبول فائق الاحترام

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الجزء الأول	
توضح العبارات التالية رأيك حول العوامل التي تؤثر على الثقة في الخدمات المصرفية عبر الهاتف النقال.	
نرجو منك وضع دائرة على الرقم الذي يعكس مدى موافقتك من عدمها على العبارات التالية:	
لا أوافق بشدة	أوافق بشدة
←	→
7 6 5 4 3 2 1	تطبيق الخدمات المصرفية عبر الهاتف النقال....
7 6 5 4 3 2 1	.... يوفر وصول سهل ومريح لخدمات المصرف.
7 6 5 4 3 2 1	.... سهل الاستخدام.
7 6 5 4 3 2 1	.... سهل التنقل لإيجاد الخدمات المرغوبة.
7 6 5 4 3 2 1	.... يقدم عرض للخدمات المصرفية بطريقة جذابة.
7 6 5 4 3 2 1	.... يقدم لي معلومات دقيقة.
7 6 5 4 3 2 1	.... يقدم لي معلومات كافية.
7 6 5 4 3 2 1	.... يزودني بمعلومات ذات صلة باحتياجاتي.
7 6 5 4 3 2 1	.... يزودني بمعلومات حديثة.
7 6 5 4 3 2 1	.... يوفر خدمات يمكن الاعتماد عليها.
7 6 5 4 3 2 1	.... يوفر خدمات سريعة.
7 6 5 4 3 2 1	.... يوفر خدمات احترافية.
7 6 5 4 3 2 1	.... يوفر خدمات شخصية.
←	→
7 6 5 4 3 2 1	أنا اشعر....
7 6 5 4 3 2 1	.... بالثقة أن وسائل التشفير والتطور التكنولوجي في الأنترنت عبر الهاتف النقال يجعل استخدام الخدمات المصرفية عبر الهاتف النقال وسيلة آمنة.
7 6 5 4 3 2 1	.... الهياكل القانونية والتكنولوجية تحميني بشكل كاف من مشاكل الدفع على الأنترنت عبر الهاتف النقال.
7 6 5 4 3 2 1	.... الأنترنت عبر الهاتف النقال هو بيئة قوية وأمنة لاستخدام الخدمات المصرفية عبر الهاتف النقال.
←	→
7 6 5 4 3 2 1	أنا احتاج الى....
7 6 5 4 3 2 1	.... تحويل الأموال في أي وقت وفي أي مكان.
7 6 5 4 3 2 1	.... إدارة حسابي المصرفي في أي وقت وفي أي مكان.



#### الجزء الرابع

الرجاء الإجابة عن الأسئلة التالية والتي تغطي المعلومات الديموغرافية وخبرتك فيما يتعلق باستخدام الخدمات المصرفية عبر الهاتف النقال (يرجى وضع علامة ✓ أمام المربع المناسب لك)

- منذ متى وأنت تستخدم الخدمات المصرفية عبر الهاتف النقال؟

- أنا لا أستخدم الخدمات المصرفية عبر الهاتف النقال  أقل من سنة واحدة  
 1 - 2 سنوات  أكثر من سنتين

- كم مرة تستخدم الخدمات المصرفية عبر الهاتف النقال؟

- كل يوم  عدة مرات في الأسبوع  مرة واحدة في الأسبوع  
 عدة مرات في الشهر  مرة في الشهر

- ما هي الخدمات المصرفية عبر الهاتف النقال التي تستخدمها بانتظام؟

- معلومات الحساب الأساسية  دفع الفواتير وشراء الخدمات  تحويل مصرفي  
 الاستفسار عن الرصيد  أخرى

- كم عمرك؟

- أقل من 18 سنة  18-24 سنة  25-34 سنة  
 35-50 سنة  أكثر من 50 سنة

- ما هو جنسك؟

- ذكر  أنثى

- ما هي أعلى مؤهلاتك التعليمية؟

- أقل من الثانوية  الثانوية العامة  دبلوم  
 بكالوريوس  ماجستير أو أعلى

- ما هي مهنتك الحالية؟

- عاطل عن العمل  طالب  القطاع الخاص  
 موظف حكومي  متقاعد  أخرى

مدة إجابة الاستبيان بالدقائق: .....

أي ملاحظات أو مقترحات بخصوص الأسئلة أو ترتيبها أو تصميم الاستبيان:

.....  
.....  
.....  
.....  
.....  
.....  
.....

نهاية الاستبيان مع جزيل الشكر على المشاركة